SABIEDRĪBA. INTEGRĀCIJA. IZGLĪTĪBA

Starptautiskās zinātniskās konferences materiāli
2019.gada 24.-25.maijs

V daļa
MŪŽIZGLĪTĪBA
INFORMĀCIJAS TEHNOLOĢIJU IZMANTOŠANA IZGLĪTĪBĀ

SOCIETY. INTEGRATION. EDUCATION

Proceedings of the International Scientific Conference
May 24th - 25th, 2019

Volume V
LIFELONG LEARNING
INFORMATION TECHNOLOGIES IN EDUCATION

Rēzekne
2019

Redaktori/*Edited by* Velta Lubkina, Karīne Laganovska, Svetlana Usca

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FORMATION OF TEACHERS' COMPETENCES IN FURTHER EDUCATION

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Abstract. *The interest of contemporary society in improving the quality of education is mainly reflected in the issue of educational results - competences - and their provision in the learning process. Introducing the 21st Century educational standards, the development of competencies required for teaching become more relevant. International documents indicate that a teacher should have the ability to teach, effectively use technologies in learning, help students gain transversal competencies. The teacher should be able to participate in research, use innovation, reflect on his/her work, collaborate with colleagues and parents. It is the teacher's duty to direct the student's individual development.*
Latvian legislation offers wide opportunities for a person employed in education (especially in vocational and education of interests) to become a teacher. It is possible to work as a teacher after attending a short professional development course in education theory. In that case, competences in education (and the right to work at a school) is certified by the B-course certificate after basic training (72 hours total).
The goal of this study is to identify and characterize teacher's competences in education as acquired by teachers during this course. Research methods are a content analysis of 210 questionnaires filled in by vocational education teachers after attending the course and content analysis of their self-assessment. The results of the research show that teacher's competences are only partially formed and incomplete. The attitude towards the needs of the student's personality is inappropriate, there is a desire for an authoritarian style.
Keywords: *further education, competence, learning, teacher, self-assessment.*

Introduction

The interest of contemporary society in improving the quality of education is reflected in the issue of competences and the possibility to attain them in the learning process. Efforts to elaborate and implement a competence-based school curriculum have raised the issue of the competences that teachers need to possess in order to be able to implement this curriculum. In the framework of this study, the authors use the term "competences" in the plural so as to specify its content. The study seeks to identify whether and to what extent teachers' competences are shaped through continuous education. According to Latvian

legislation, persons who have completed a 72 contact-hour continuing education course and have obtained a certificate or the right to implement a vocational education course module (Cabinet of Ministers Regulation No. 569 (2018)) may work in the education sector. Thus, the content of competences acquired in this form of teacher education becomes particularly important for pedagogical work. The results of this study illustrate the need of monitoring and planning for further education steps for those teachers.

Literature review

Teachers' competences have been a topical issue in education in the late 20th, as well as the 21st century. Although researchers agree that competences consist of knowledge, skills and attitudes in certain proportions, opinions differ as to the content of these elements. Šteinbeka and Kazāke (2018) state that a teacher holds an important competency regarding communication, guiding self-inquiry and inquiry, as well as methodological and organisational aspects. Stanley, Leboeuf-Yde and Walker (2016) believe that it would not be very objectionable to include knowledge and skills within the concept of competences, but how important are attitudes, values and abilities? This challenge raised by certain authors, which is no longer merely rhetorical, but rather inspires social discourse, has a critical and often destructive impact on teachers' professional foundations (or even the essence of the profession). How does the knowledge and (supposed) skill of a teacher (individual with the right to teach a subject) manifest in intentional pedagogical (nurturing through education) performance?

Employees of pre-schools, schools, vocational education institutions and learning centres, etc. take equal part in continuing education. For example, competences necessary for vocational education teachers tend to be formulated as "a set of knowledge, skills and attitudes ensuring the educator's readiness and ability to implement effective vocational pedagogical and practical work in the constantly changing conditions of the modern education and production process" (Zanhguzinova, 2018, 12). It is notable that the context provided by attitude (individualisation of values), the teacher's personality and culture, which is a prerequisite for the ability to solve complex life challenges through mobilisation of psychosocial resources, is stressed as highly important (Nesipbayeva, 2003; Tiļļa, 2006; Klišāne et al., 2006). Employment of psychosocial resources takes the form of the teacher's self-inquiry, self-analysis of life activities, reflection (Jo Tondeurs, 2018). Educator competences are jointly defined within the concept of pedagogical culture. If it is of an axiological, technological (in a broader sense – professional activity and action) and heuristic nature (Nesipbayeva, 2003), then pedagogical values become the

foundation of deliberate pedagogical knowledge and skills. Pedagogical values as the internal potential of the teacher's personality are meta-competences – the need and ability to find purpose (Bertchy, Künzli, & Lehman, 2013), seek solutions in unsafe and uncertain life situations, deliberately shape one's own future (Homiča, 2009) by combining this need and ability with subject competency.

In its document Supporting Teacher Competence Development (STCD) the European Commission's working group has stated that teaching competences are complex combinations of knowledge, skills, understanding, values and attitudes, which resonate differently in different national contexts (STCD, 2013). The document notes that teachers should have a specialist knowledge of the subject(s) (subject competence) they teach, as well as the necessary pedagogical knowledge and skills, including the ability to teach heterogenous classes, making effective use of ICT, and helping students/pupils to acquire transversal competences (communication competence); they have to be able to engage in research (inquiry and self-inquiry competence), learn about and make use of innovations, reflect on their own performance, collaborate with colleagues and parents, participate in the development of the school (STCD, 2013). It is crucial that the importance of the meta-competence of learning to learn is highlighted, where the lessons are learning and teaching life, similarly to the idea found at the heart of the competence-based approach (Cabinet of Ministers Regulation No. 747 of 2018).

Obviously, the results that can be obtained through 72 contact-hours of a continuous education course can only partially be called teachers' competences. However, the results obtained ought to be viewed as a sufficient foundation for pedagogical work. For the empirical study, an explicitly simplified under-standing of competences has been used. Competences are understood as a deliberate combination of knowledge, skills and attitudes, where attitudes are founded upon constructive and conscious life values (Garjāne & Augškalne, 2012).

The study is based in practice and data obtained from evaluation questionnaires. The aim of the study is to determine whether and to what extent the teachers' competences are shaped by the 72 contact-hour course "Fundamental pedagogical work". The course allows individuals to obtain a certificate or the right to implement a vocational education subject module.

Methodology

The study employed a survey with a semi-structured questionnaire at the end of the course "Fundamental pedagogical work". The questionnaire contained reflective open-ended questions thus indirectly allowing respondents

to contemplate the personal and professional significance of their performance as a course participant. 210 questionnaires were collected from the course graduates. The course "Fundamental pedagogical work" was held in 2017 in several cities throughout Latvia (Rīga, Cēsis, Liepāja, Jelgava) and it was attended by specialists from various areas who were already working as teachers in interest education, vocational education, schools and pre-schools (without a prior pedagogical degree). The education area and capacity in which the course participants had worked differed greatly – from several months to 10+ years. The questionnaire was anonymous – it did not contain any questions requiring identifying information about the respondent, however it did note the time and location of the course.

The course was divided into four equal content blocks: contemporary pedagogical theory and practice, learning and the organisation of the learning process, personal development and learning at various ages, organisation of the pedagogical process in a multi-cultural environment in the context of inclusive education. The course was based on adult education practices, employing versatile methods and forms of work to encourage participants to analyse, evaluate and reflect on their pedagogical experience.

This article expresses and characterises competences in 3 aspects – knowledge (in psychology, didactics), skills (to teach and to learn), attitudes (human values, traits). In order to determine the link between the goal and the course result obtained, the objective for attendance by the participants was first identified.

Research Results

The result of any educational activity is, to a large extent determined by its objective. Therefore, the first question on the questionnaire sought to identify the reasons for participants attending course.

Respondents could choose one of the given answer options, mark more than one answer or indicate a different – special – reason for attendance. Figure 1 demonstrates that most respondents (192 – Fig.1) indicated that their objective was to obtain and top-up their knowledge, while a significant number of respondents (57 – Fig.1) indicated that their goal was to obtain a course certificate. This answer has a dual interpretation: on the one hand, the certificate is necessary for teachers to be able to continue working, and that is the reason why they are attending the course. Likewise, it can also be appreciated that the respondents have answered honestly, rather than indicating the "correct" answer. At the same time, such an answer also gives reason to wonder if approximately a quarter of the course participants are giving proper attention to the content of the course and truly gaining knowledge in pedagogy. It must be noted that the data

for this aspect has not been expressed as a percentage, because respondents were allowed to indicate more than one answer.
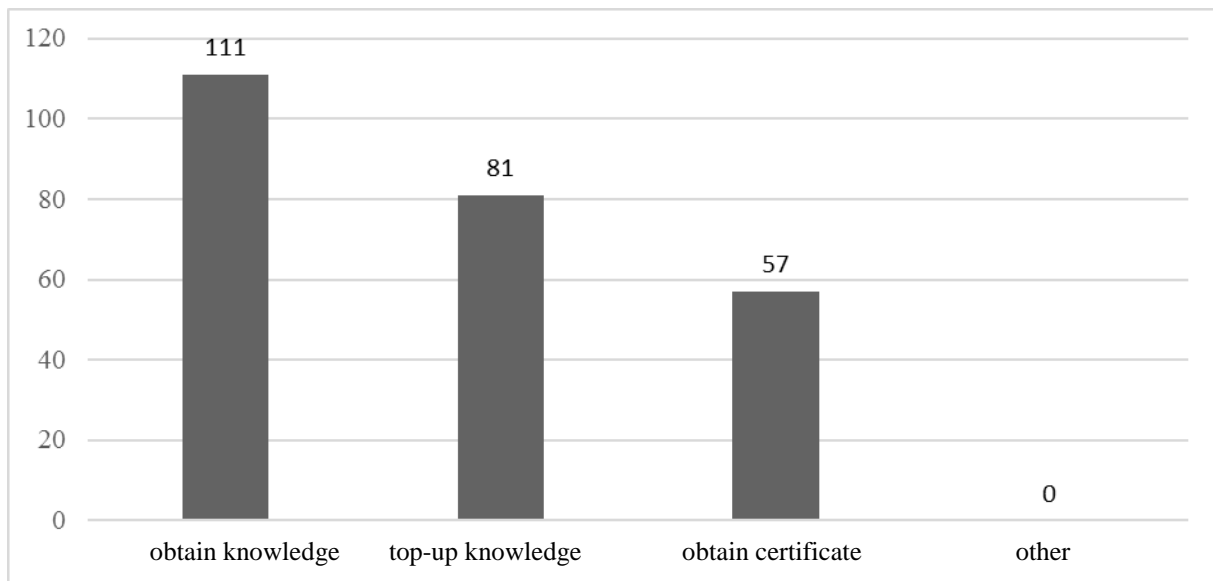
*Figure 1 **Objectives for course participants***

Contemporary pedagogical theory and practice

Learning and organising the learning process

Personal development and learning at various ages

Organising the pedagogical process in a multi-cultural environment in the context of inclusive education

No answer

Personal opinion expressed
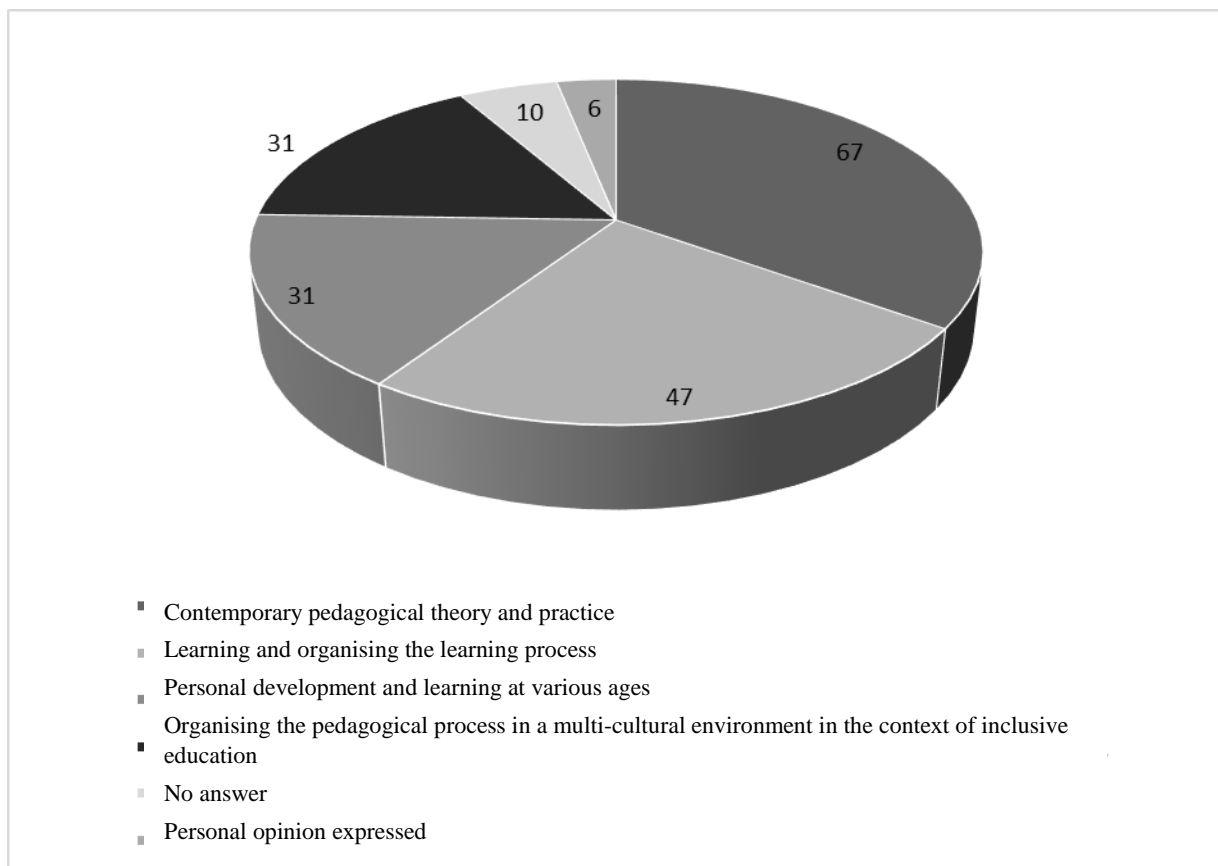
*Figure 2 **Benefits for participants in each theme of the course***

Indicating what they had gained from each theme in the course (Figure 2), 67 respondents stated that they had obtained knowledge and understanding about contemporary pedagogical theory and practice, 47 – about learning and organising the learning process, 31 – about personal development and learning at various ages, 31 – about organising the pedagogical process in a multi-cultural environment. 10 respondents chose not to answer this question and 6 others expressed their personal opinions not directly related to the question.

When asked if they thought that the length of the course was sufficient, 39% gave an affirmative answer, 26% partially agreed with the statement, 35% did not answer, thus giving rise to reasonable doubt as to the understanding of pedagogy that they obtained, and 0,5% gave a negative answer (Figure 3).

When asked to comment on their choice of answer, the participants indicated:

- *The course needed a practical module;*
- *The course needed more practical tasks;*
- *The course needed examples for methods;*
- *The course was lacking in psychology.*
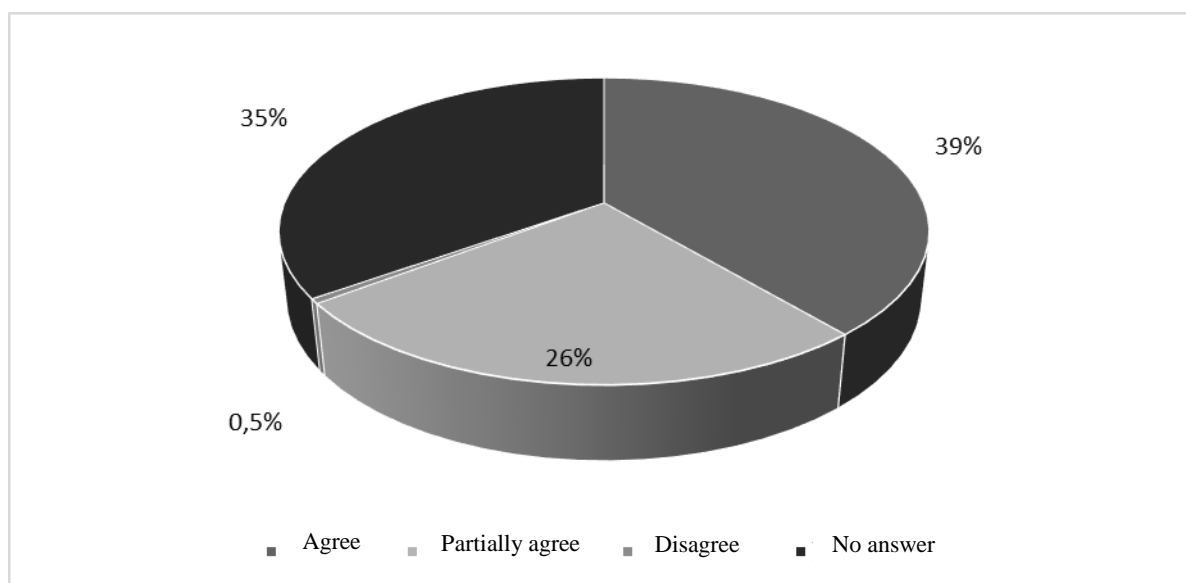
Figure 3 **Length of course**

The statistical breakdown of the responses may indicate that course graduates are not able to assess the sufficiency or insufficiency of the amount of knowledge gained (35% of respondents did not answer the question – Fig.3). The comments show that teachers would like to receive more practical advice or suggestions, which may indicate the limitations in the course volume and the proportion between theory and practice in the course content. However, it seems that currently the course participants have an insufficient understanding of the

subject matter as they markedly prefer to receive individual instruction from the lecturer on how exactly to act in specific situations. Now, a trend can be observed that, instead of seeking pedagogical solutions on their own or in collaboration with colleagues, teachers are expecting ready-made instructions and a "correct" universal method to apply.

About one third (69) of the respondents supplied elaborated answers regarding their takeaways from the course. After analysis of the indicated specific results, they have been divided into three sections – knowledge (in psychology, didactics), skills (to teach and to learn), attitudes (human values, traits).

*Table 1 **Analysis of results obtained from course***

Competences gained	Number of answers
Knowledge (unspecified)	8
Knowledge (theoretical/ general)	16
Skills, teaching methods	27
Attitudes	16
Total	69

Knowledge that could be interpreted as "I know/assume that I know what that is" – is found in 8 expressions (Table 1) which are only partially related to teacher's competence:

- *Organising the study process;*
- *Approaches that can be applied in practice in adult education;*
- *Learning styles;*
- *Understanding human relations;*
- *Assessing teaching situations;*
- *Reflection.*

Wording as to the knowledge gained also contains expressions (16 cases out of 69 – Table 1) that may signify unspecific revelations, as well as repeating phrases that have been retained or the disinclination to express an honest opinion. The following expression may be interpreted as uncertainty (here and henceforth wording from answers is provided with style intact, but grammatical errors have been corrected):

- *Organising the pedagogical process;*
- *An overview of pedagogy in general;*
- *Fundamental pedagogical practices;*
- *Theoretic knowledge about innovations;*
- *Understanding pedagogy;*

- *Practical application of theoretic knowledge.*

Retained expressions:

- *Practical application of theoretic knowledge;*
- *How to improve interactions;*
- *Theoretical material;*
- *Theoretical information;*
- *The person is the central point.*

The following phrases may signify a reluctance to give an honest answer:

- *Where to find information; general knowledge;*
- *Information;*
- *The certificate provides the opportunity to work and earn a living;*
- *Broadened perspective.*

It must be noted that many of the course participants lack sufficient proficiency in Latvian, which hinders their ability to understand and express themselves about their experience with the course.

The skills resulting from the course can mostly be classified as acquisition of teaching methods. The expectations of course participants remain unchanged as to obtaining direct information about teaching methods and moreover – ones that will provide immediate teaching success in working with pupils and adults, will be applicable always and for everyone. For example:

- *How to plan lectures;*
- *Ways to work with students;*
- *Teaching methods for teaching adults;*
- *Practical examples, stories from teachers' experience;*
- *New teaching methods;*
- *Various methods;*
- *Methods for working with difficult customers;*
- *Methods for assessing the audience.*

Although the course lecturers try to employ and analyse as wide a range as possible of teaching methods that are suited for schools, as well as adult education, stressing that there are no universal methods or practices, the stereotypical view that pedagogy (especially didactics) must provide them in both theory and practice persists.

Teaching methods have been noted as an important takeaway from the course on 27 questionnaires (Table 1). It can be ascertained from the answers that the course participants work with adult audiences with specific requirements as to pedagogical practice, as well as in schools and higher education institutions. There are conclusions noting the organising of lessons, including planning, teaching methods and approaches aimed at attaining specific teaching

goals, etc. Course participants are satisfied that hand-out material has been provided, information resources indicated, specific examples studied:

- *A lot of hand-out material that can be used;*
- *Materials and visuals;*
- *Internet links for methods;*
- *Methodology for preparing lessons;*
- *Planning lessons, how to begin a lesson.*

However, as previously mentioned, some course participants were dissatisfied that their specific cases were not solved during the course, which, in turn, would support the assumption that, during the course, it is nearly impossible to make the participants fully grasp the idea that a teacher's professionalism lies within their ability to think critically and independently, act creatively. In this respect there is one (and only one!) conclusion to be noted saying that lessons ought to be viewed as purposeful and compatible with the students' ability and opportunity to learn:

- *Organisation and choice of methods suited for the teaching objective.*

In the assessment of results, the importance of attitudes (18 out of 69 answers, see Table 1) had been indicated and attributed to interaction with pupils and other audiences, as well as to the participants' self-assessment of their performance. As regards teaching and nurturing through education, conclusions have been drawn that people learn differently, they have different aptitudes, but everyone is of value, and patience, tolerance, empathy and mental balance are essential traits for a teacher. Participants indicate that during the course, they have recognised their own abilities, felt encouraged to work and reflect on their pedagogical performance, continue their own education in pedagogy and psychology. The following benefits have been listed, for example:

- *Opportunity for thought and discussion;*
- *Teamwork skills;*
- *Mutual understanding between students and teachers is needed;*
- *An individual approach is needed;*
- *A chance to reflect on your own performance;*
- *Desire to keep learning;*
- *Encouragement;*
- *I set my internal world, mindset in order;*
- *I gained confidence that I can give lectures, understanding the diversity of the audience;*
- *The main difference between people is in their values;*
- *I understood that I need to be more tolerant, because everyone is different;*

- *Teach with a democratic style, because the person is at the centre of it all;*
- *I gained an understanding of myself, gained encouragement.*

The article covers only one year of course results; however, it can be reasoned that only 33% of the 210 people who obtained a certificate have formulated the experience gained as a potentially useful foundation for purposeful pedagogical work. Based on the content of the opinions provided, it can be concluded that their wording indicates the presence of meta-competence (individual learning experience). Of course, shortcomings in the content of the course and the work of the lecturers can be sought and indeed found, however, the opinions expressed by course participants, which were analysed in the study, signify the opposite – that the content provided is sufficient for reaching the objective as long as the participants themselves possess proper motivation and the skills to learn on their own. If not, then are 72 hours enough for society to expect quality of education in line with modern requirements?

Conclusions

1. The formation of teachers' competences as a deliberate combination of knowledge, skills and attitudes has been established as the attainable goal and result of the 72 contact-hour course "Fundamental pedagogical work".
2. Due to the shortage of professionals in the education sector (general education, vocational education, interest education), the possibility to take a 72-hour course could promote new recruits to the pedagogical process.
3. The results of the study show that the 72-hour course "Fundamental pedagogical work" only partially succeeds in forming pedagogical competences, as specific knowledge and skills to implement unified teaching and educational nurturing activities and collaboration respecting personal values can be identified in only about 1/3 of the self-assessments provided by participants.
4. The results of the study show that the content of the course "Fundamental pedagogical work" allows for the obtaining of initial pedagogical competences, however, the shaping of participants' meta-competences needs to be activated.

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MY GRANDCHILDREN WOULD KNOW THAT…
SENIORS INTERPRETING EMOTICONS

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Abstract. *The article is an attempt of presenting didactic experience related to workshops conducted with several groups of seniors in the frame of the University of Warmia and Mazury in Olsztyn (Poland) project. The main aim of the survey presented in this manuscript was to show University of Third Age students' interpretations of emoticons and to analyse forms of communication preferred by them. The data was collected through open-ended discussions and a few tasks farmed out to seniors during the workshops. These tasks were: i) choosing the form of communication (face-to-face or mediated by a mobile device), and ii) indicating emotions, attitudes or associations related to emoticons that had been handed out to them earlier. The analysis testifies that the researched Third Age University students definitely preferred traditional, analogue forms of communication. In their opinion, face-to-face interaction surpasses daily communication processes. Surprisingly, however they were good readers of emoticons, which they owed to their grandchildren, who were perceived by them as specialists in this area.*
Keywords: communication-mediated communication, emoticons, emotions, seniors, Third Age University students.

Introduction

The title of the article suggests that a reader will be involved in a story. This story begins in a lecture room where most academics gather didactic experiences. That specific one was worthy of noticing also in view of explorative purposes.

The research was conducted as a part of the project, granted aid from the Polish Ministry of Science and Higher Education. The title may be translated as *University of Warmia and Mazury in Olsztyn opens knowledge gates for Universities of the Third Age[1]*. There were 11 Universities of the Third Age (U3A) from Warmia and Mazury Province (northeastern Poland) involved in the project. Seniors participated in plenty of workshops and lectures prepared and delivered by University academics. Several Faculty of Social Sciences employees were asked to lecture seniors on relations' area. The presentation was divided into three parts. These were: intimate and partnership relations,

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[1] See more at: http://www.uwm.edu.pl/egazeta/uwm-wspiera-seniorow

familyhood (grandchildren-grandparents relationships, specifically), and social interactions regarding new media and current, new forms of communication.

In this paper, the part related to the communication forms and new media is presented. The story is narrated in a manner that didactic threads intertwine with scientific explorations.

Local seniors – activities, foregoing research

Local Universities of the Third Age (U3A), especially those located in rural areas, have been a matter of concern of several researchers, representing the University of Warmia and Mazury in Olsztyn (UWM). For instance, K. Białobrzeska, C. Kurkowski, and M. Maciejewska observed that seniors, living in rural areas (Warmia and Mazury Province), presented upward tendencies of: taking actions on behalf of people in need, doing activities in seniors clubs, participating in U3A classes as a form of spending their free time, and finally opening-up for using new media and technologies (Białobrzeska, Kurkowski, & Maciejewska, 2017).

In addition, 43% of the researched seniors (aged 60-69) declared using the Internet. In their opinion, computer-mediated communication (CMC) offers them a possibility of maintaining contact with their relatives as well as access to information (Białobrzeska et al., 2017).

In contrast, A. Omelan, R. Podstawski, and M. Raczkowski who were interested in touristic activity of seniors (aged 60+), living in Warmia and Mazury Province, reported difficulties with contacting seniors by the Internet and other mobile devices (Omelan, Podstawski, & Raczkowski, 2017). This testifies that some of the seniors, living in rural areas, in the province, are representatives of digital immigrants (Prensky, 2001) or even that they experience a discrepancy between them and young people, conceptualized as digital divide (Lagacé, Charmarkeh, Laptante, & Tanguay, 2015).

Good practices in terms of working with seniors being residents of rural areas in the Province were presented by K. Białobrzeska, B. Głuszak, C. Kurkowski, & M. Maciejewska (2016). In respect of CMC and of using the Internet, seven interviews carried out by the researchers with chairpersons of different associations, U3As, and other non-governmental organisations were analysed. Only three of them did not include any information about developing ICT (Information and Communication Technologies) usage competencies for seniors. Four of them reported some activities undertaken in terms of having access to the information and communication technologies on behalf of seniors. These were, for example, organising periodically ICT workshops, running an internet café in a village clubhouse or extending and maintaining a computer network with the access to the Internet (Białobrzeska et al., 2016).

It is difficult to say explicitly to what extent local seniors are involved in using modern technology devices and CMC. However, it can surely be admitted that emoticons are a part of computer-mediated communication and have been used more commonly in recent years.

Eyes, nose, and mouth…
Computer-mediated communication literature and research overview

Computer-mediated communication (CMC) is a subject to controversy among researchers. There is no common agreement on this issue. Results of research conducted at the end of the 20th century indicates that frequent usage of the Internet weakens interpersonal relationships (Nie, 2001) and leads to social isolation and depression (Kraut, Kiesler, Mukhopadhyay, Scherlis, & Patterson, 1998). Researchers observed also that it creates conditions for establishing anonymous and impersonal relations (Nie & Erbring, 2002). However, at the beginning of the 21st century, in-depth investigations showed that CMC and the Internet may strengthen community bonds and support the process of establishing relations (Hampton & Wellman, 2002), even when we consider friends living close to each other (Quan-Haase, Wellman, Witte, & Hampton, 2002; Chen, Boase, & Wellman, 2002). Additionally, these interactions may spread to the real world (Katz & Rice, 2002).

As researchers argue, a communication process in the electronic or virtual environment is more difficult to coordinate than face-to-face interactions. This is justified by specific forms of verbal communication used by electronic community participants. They employ text, which is visible on screens of their devices, forms of asynchronous interactions as well as a quasi-language that may be represented by emoticons (van Dijk, 2010).

Emoticons, 'smileys' or 'relational icons' are being described in many research papers related to CMC. In general, they are graphic representations of emotions portrayed on somebody's face. However, as CMC limits face-to-face interactions, their main task is to substitute them. J.B. Walther and K.P. D'addario discovered that verbal message content prevails over the relational icon contributions and that this is probably related to the more effort invested in typing the text than sending a message with the emoticon which may be recognized as requiring less effort (Walther & D'addario, 2001). Moreover, D. Derks, A.E. Bos, and J. von Grumbkow argue that emoticons are generally used to express humor and emotions as well as that they are more often chosen to communicate with people we know than with strangers (Derks, Bos, & von Grumbkow, 2008). It is also noteworthy to mention A.H. Huang, D.C. Yen, and X. Zhang explorations. According to them using emoticons give both enjoyment

(while using them) and valuable benefits to a communication process (Huang, Yen, & Zhang, 2008).

D.W. Sanderson (1993) argues that these are ordinary characters, available on our computer keyboards. He also explains how to read the most common 'smiley', which is :-)

He describes it as follows:

> *If you don't see that it represents a smiling face, tip your head to the left and look at it again. The colon represents the eyes, the dash represents the nose, and the right parenthesis represents the (smiling) mouth. There are smileys for sadness as well as delight (Sanderson, 1993, 1).*

Also J. van Dijk supports D. Sanderson's concept of emoticons and admits that these smileys represent symbols of emotions, entered by keyboards of our devices (van Dijk, 2010). The reason for using them is to send electronic messages, communicate on electronic forums and computer networks, which are spread worldwide (Sanderson, 1993).

Nowadays, emoticons are commonly employed by social media users. However seniors are not 'the first out of the gate' in that area. Moreover, there were any documented studies found, in which researchers would focus their interests on interpretations given to emoticons by elder members of populations. Due to this fact, the exploration of this area was assumed worthy of further investigations.

Methods

This study sought to analyse meanings and senses that were ascribed by seniors to particular emoticons presented to them during the workshops as well as to determine the preferred form of communication (face-to-face or mediated by computer) indicated by participants.

Participants were recruited from the project, mentioned above. There were eleven U3As from the Warmia and Mazury Province that visited the University library class for learning purposes. Each group had around twenty participants (mostly women) who randomly and totally freely could choose the part of relations workshop they wanted to participate in. Generally, they could be divided into three groups (intimate relations interested; grandchildren-grandparents oriented; and social, new media relations). In total, there were around eighty seniors who decided to take part in new media and new forms of communication workshop. Each group of a few seniors was involved in two different tasks.

First of all, they were asked to pair up and turn sideways to each other. Then, they were asked to bring their mobile phones out and send a short message to her or his partner, saying: 'Thank you for a delicious cake you brought me last time'. A partner was asked to send a message back. There was

no specified reply prepared for partners. The participants were also requested not to turn around, touch other members, and definitely not to look in each other's eyes. The second part of this task was to repeat exactly the same thing, however, this time without using mobile devices. The participants could look at each other, touch their hands, hug each other and do whatever they wanted to. Right after this, the pairs could share their experience gathered during both forms of communication and choose the preferred one.

Secondly, the same pairs were given a packet of eleven emoticons. Their task was to indicate emotions, attitudes or associations related to each icon. The pairs got around seven minutes to discuss the emoticons. Right afterwards, flashcards presenting all of icons, were showed them sequentially. Seniors were asked to discuss all ideas at a forum. All ideas were noted down on the other side of flashcards. This allowed achieving data that were used for further analysis.

The experiment sought to search answers to the three research questions. These were: 1/ What type of communication is preferred by seniors (face-to-face or mediated by a mobile device?). It was assumed that some of them would choose CMC, however most of them would prefer traditional, analogue forms of communication. 2/ How do seniors interpret the emoticons? 3/ What kind of meaning do they ascribe to them?

Below, there are presented all relational icons used in the experiment.
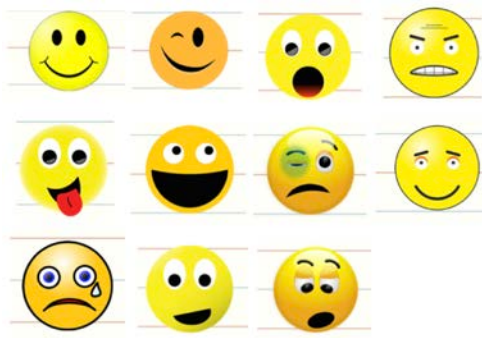
*Figure 1 **Emoticons used in the experiment** (source:*
https://kreatywnapedagogika.wordpress.com/2017/02/25/emocje/)

Data analysis was mainly based on consistency criterion, which is understood as referring associations and interpretations given by participants to emoticons to the navigated explanations of emoticons that were found in literature or electronic resources. The second criterion was based on reaching a consensus in senior groups during open-ended discussions or on controversies appearing during the process of emoticons interpretation. That kind of procedure allowed creating panoplies of meanings or emotions they ascribed to particular emoticons.

My grandchildren know much more than me…

CMC or F2F? All of the researched seniors declared that they prefer face-to-face communication. This confirms the thesis that they are the representatives of Baby Boomers generation (Cantelmi, 2015), born right after the Second World War, which is commonly defined as a generation of digital immigrants (Prensky, 2001). They are much more accustomed to direct meetings and are more likely to look at each other's eyes when they interact. The results disaffirmed the part of the hypothesis where it was assumed that some of the seniors would prefer computer-mediated communication, in respect to dynamic technological development and the same time easy access to the newest technological devices, and the Internet.

Tough row to hoe – 'my grandchildren know much more…' The analysis of seniors' interpretations given to emoticons allowed dividing the collected data into four groups. The division may be presented by the following terms: data meeting consistency criterion (group 1), data meeting consensus criterion (group 2), data partially consistent or consentaneous (group 3), and controversies (group 4). Some of the emoticons were related to more than one group. Explanations of the emoticons were searched in three resources, including: Wikipedia List of Emoticons[2], Emoji Dictionary[3] (both found in the Internet resources), and D.W. Sanderson's book titled 'Smileys' (1993). All analysed emoticons were presented in single tables. Each table included explanations of the icon from the three resources, however some icons were not found in all resources (n/a) or did not exist in any of them.

Four of sequentially presented emoticons definitely met the consistency and consensus criterion (group 1 and group 2), which means that the participants referred correctly to explanations found in literature and internet resources and that there was a consensus in large part of the researched seniors. These emoticons were given a comment below.

Table 1 **Emoticon no. 1**

	List of emoticons (Wikipedia)	wink, smirk
	D.W. Sanderson	The winking smiley, 'You know what I mean', 'you are being sardonic'
	Emoji Dictionary	winking face

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[2] See more: https://en.wikipedia.org/wiki/List_of_emoticons
[3] See more: https://emojidictionary.emojifoundation.com/people

On the one hand, the emoticon was interpreted as a 'tongue in cheek' one. Phrases and associations related to it were, for instance: wink at somebody (7 times), tongue in cheek (7 times), a prank, a joke, a trick, mischievous, humorous, cheeky, and easily. It was also described by the following statements: *Do you dig it?, Do you gather this?* On the other hand, seniors indicated amorous advances associations, e.g.: a wooer, a lady-killer, the Romeo, a chat-up line. Only three of eleven groups discussed this icon as a sardonic, smirking one: a jibe, a little jibe, and derision. Additionally, this emoticon was easily identified by respondents. They declared that it is generally known to everybody.

Table 2 **Emoticon no. 2**

	List of emoticons (Wikipedia)	crying, sad
	D.W. Sanderson	'you are actually shedding tears'
	Emoji Dictionary	crying face, sad person, unhappy

The analysis of interpretations made by groups of seniors indicated that this emoticon was easy to decipher. First of all, all participants undiscovered the correct meaning of it proposed in the found resources. Additionally, there was a general agreement in respect of understanding the emoticon. Most emotions ascribed to it were related to: sadness, grief, crying, sorrow, alarm, and worry. The mentioned associations may be exemplified by the following statements that were added by participants during discussions: *You disagreeably surprised me, You did a number on me, I am sad, It is so hard today*. There is one remark that should be made in this part of the text. It can be assumed that seniors need unequivocal pictures to interpret emoticon. This one had shedding tears, sad mouth as well as eyes. If an emoticon presents a clear message/statement (convergent eyes and mouth), there should be no problem with finding the right meaning of it. Many of the emoticons were problematic in interpretation. The readers will have a chance to experience that in the further analysis.

Table 3 **Emoticon no. 3**

	List of emoticons (Wikipedia)	a smiling humanoid
	D.W. Sanderson	the standard smiley, 'you are joking', 'you are satisfied', 'this is the only smiley you know'
	Emoji Dictionary	n/a

The standard smiley emoticon is being used very often by seniors. There were no difficulties noticed during the process of interpreting this one. The participants generally agreed and indicated the following words: happy, glad, a nice smile, nice, joy, happiness, optimism, sunshine, a smile, jollification, positive emotions, pleasant, vitality, and frivolous. The above were complemented with some positive statements: *I like you, It is nice to see you, I am happy, I had a good day, Greetings,* and *I am satisfied*.

Interesting findings related to that icon were presented by E. Glikson, A. Cheshin, and G.A. van Kleef who examined its impact on the first impressions in work-related places. It turned out that the smiley icon was not interpreted as a warm one or a real smile. According to them, it actually reduced perceptions of competence and was perceived as inappropriate in formal conditions. Reversely, informal environment favoured interpreting the smiley icon as a positive one (Glikson, Cheshin, & van Kleef, 2017).

Table 4 **Emoticon no. 4**

	List of emoticons (Wikipedia)	laughing, big green, joyful, happy
	D.W. Sanderson	n/a
	Emoji Dictionary	joyful, happy

Also this emoticon met the high level of consensus between seniors. They had no problems with interpreting it. They mainly admitted that it is a joyful, laughing emoticon. The consistency criterion was fulfilled as well. It should be added that this is a quite popular or common icon even among seniors. Moreover, the eyes and mouth seem to be presented as integrated. Both smiling and happy. If these two elements are integrated and consistent, seniors have no difficulties with recognising the message hidden in an icon.

On the other hand, the following emoticons partially met the consistency or consensus criterion (group 3).

Table 5 **Emoticon no. 5**

	List of emoticons (Wikipedia)	worried, dissatisfied
	D.W. Sanderson	n/a
	Emoji Dictionary	grimacing face

Some of the seniors got a fix on the interpretation presented in dictionaries and indicated: great dissatisfaction or being dissatisfied. However, the vast majority ascribed stronger emotions to the icon. Their indications were mainly related to: anger, fury or malignancy. The gritted teeth were associated with being: angry, nervous, madcap or furious by them. They also supported their associations with some statements, for instance: *I will be biting, Buzz off, I will get my own back, Don't close on me, It is difficult to cool out right now*. The consensus criterion was not met either in view of the following words indicated by the seniors: sneer, city slicker, cynicism, astonishment, astonished, worried, and mournfully.

Table 6 **Emoticon no. 6**

	List of emoticons (Wikipedia)	cheeky, playful
	D.W. Sanderson	n/a
	Emoji Dictionary	stuck-out tongue, 'shows that you are not serious and kidding'

The consistency criterion was met only to a little extent in that case. Only some of the participants recognised the icon as a playful, stuck-out-tongue or kidding. The seniors did not recognise it, their associations varied greatly. There was definitely a lack of consensus amongst groups. They had food associations, for instance: he/she is mouth-watering, gourmand as well as cynical related indications (jibe, make mock of somebody, disrespectful), weather associations (hot, breathless, breathlessness, exhausted), rudeness connotations (rude, lack of good manners), deprecation associations (resistance, rebellion, anger), and finally intimate related thoughts, like: a deep kiss or eroticism. The researched seniors definitely did not know the icon.

Table 7 **Emoticon no. 7**

	List of emoticons (Wikipedia)	surprised, shocked
	D.W. Sanderson	shocked, amazed, 'you don't believe you said that'
	Emoji Dictionary	surprised

There was no common agreement on that icon interpretation amongst the seniors. Most groups noticed a shock, amazement, and a surprise when looking

at the icon. However, at the same time, some of them interpreted it as fear, anxiety, fright, and scream. Surprisingly, one group indicated this one as sneaky, sly, and manipulative. This proves what was already mentioned in the text. If an icon does not clearly show, for example, sad mouth and sad eyes, the seniors had difficulties with consensus in respect of interpreting an emoticon. It is assumed that they need a clear message contained to understand the meaning of smileys.

Moreover, when the emoticons sent seniors into some kind of confusion, they often referred to their grandchildren. They believed that younger generation definitely would know the icons and would have no problems with interpreting them. Some seniors said: *'My granddaughter / grandson would know that'*. This testifies that the elder generation perceives their grandchildren as specialists in today's, digital communication area. This also refers to M. Mead's prefigurative culture concept, which is future oriented and allows the young generation to transfer trends, knowledge and other things to the elder generation (Mead, 1970).

There were also four controversial emoticons, which were ascribed only to group number four (controversies). These were analysed below.

Table 8 **Emoticon no. 8**

	List of emoticons (Wikipedia)	n/a
	D.W. Sanderson	n/a
	Emoji Dictionary	n/a

The emoticon was very difficult to consider in relation to the consistency criterion. None of the resources included any similar icon. For this reason, the analyses were focused only on interpretations given by the seniors to the emoticon and a consensus criterion. Due to the lack of consensus between participants, finally the icon was analysed from the perspective of controversies related to it. The icon's mouth indicated a smile, however its eyes looked a little bit tired, also the eyebrows were turned down. Its associations were disintegrated between two opposing emotions: joyful-related, like: gladness, satisfied with life, joy, happy, nice, a smile, cheers, and sadness-related: sad, a sad smile, a set smile. The participants saw mainly sadness (probably visible in the emoticon's eyes) and happiness ascribed due to the smile on the emoticon's mouth. On the other hand, in the minority, there were two other distinct groups of indications. First, were related to amusement, while the other one represented

musing states of mind, for instance: head in the clouds, dream fully, thoughtful, moony etc. It is quite certain that the researched seniors were only able to interpret clearly the expressed emotions. They probably divided the icon into two, distinct parts: a happy, smiley mouth and sad, tired eyes.

Table 9 **Emoticon no. 9**

	List of emoticons (Wikipedia)	tired, sleeping
	D.W. Sanderson	n/a
	Emoji Dictionary	tired, sad, sleepy

None of the researched seniors interpreted the emoticon as tired or sleepy. Similar states of mind (sadness and depression) were used only twice. Considering great controversies, which appeared among the seniors, their associations might be divided into four groups. They were presented on the pie chart below with some statements that were articulated by the seniors.
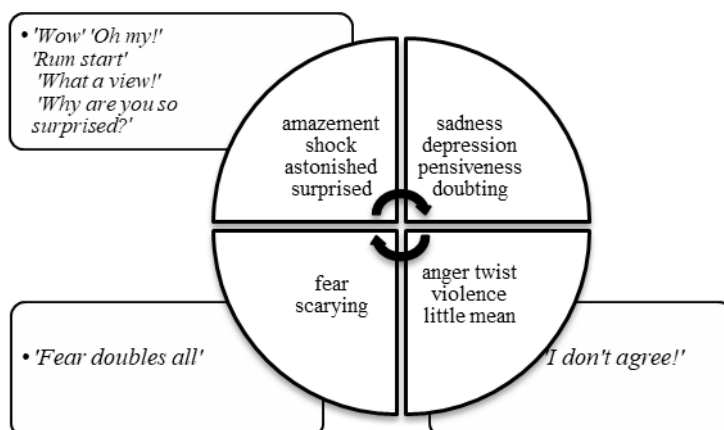
Figure 2 **Controversies in participants' associations related to the sleepy, tired icon** *(source: own research)*

Table 10 **Emoticon no. 10**

	List of emoticons (Wikipedia)	n/a
	D.W. Sanderson	n/a
	Emoji Dictionary	feeling hurt, injured, sick or in pain

The emoticon is similar to a woozy face, found in the Emoji Dictionary. However, it is not the same. 'The woozy face' was not presented in the text. During the analysis process it was decided to look for a different, interesting emoticon. This was a 'face with head-bandage' emoticon (included in the table), which means (acc. to Emoji Dictionary): feeling hurt, injured, sick or in pain. It was assumed that all injured icons might represent similar associations. In this case, it would be feeling hurt (both: physically or mentally). In spite of lack of the exact equivalent presented in all resource materials, during the process of exploration it was presumed that this emoticon would be understood with pain-related associations. Some seniors solved this icon quite well. Most of them noticed: pain, suffering, and injury. However, there was no common agreement to the meaning of the icon. All interpretations were presented on the chart below.
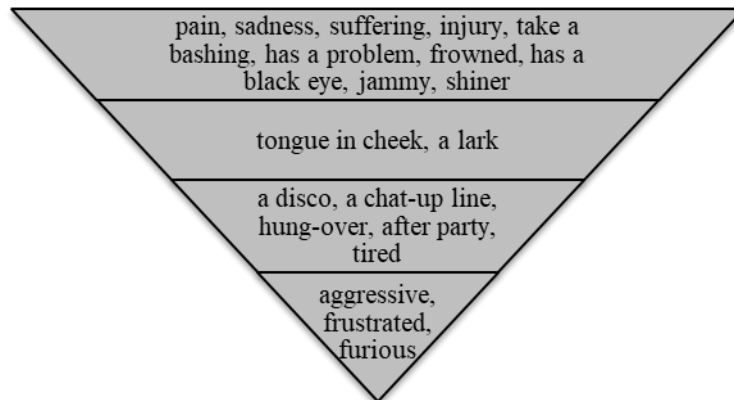
Figure 3 **Controversies in participants' associations related to the feeling hurt icon** *(source: own research)*

The biggest group of interpretations was related to pain, and as it was mentioned above, this seems to be accurate understanding. Surprisingly, however, the second group of associations were related to 'tongue in cheek' meanings. This one was definitely not a correct interpretation. Nevertheless, four groups of seniors ascribed that meaning to this icon.

Table 11 **Emoticon no. 11**

	List of emoticons (Wikipedia)	joyful
	D.W. Sanderson	n/a
	Emoji Dictionary	n/a

This emoticon was very difficult to analyse due to the fact of not finding its right equivalent in the list of Emoji dictionary and in the D.W. Sanderson's book. Only Wikipedia list of emoticons included this one and indicated it as a joyful one. Consequently, the consistency criterion could not be regarded herein. The second criterion – the group consensus, was not met in regard to the icon. There was no common agreement amongst seniors either. Their associations may be divided into four groups.
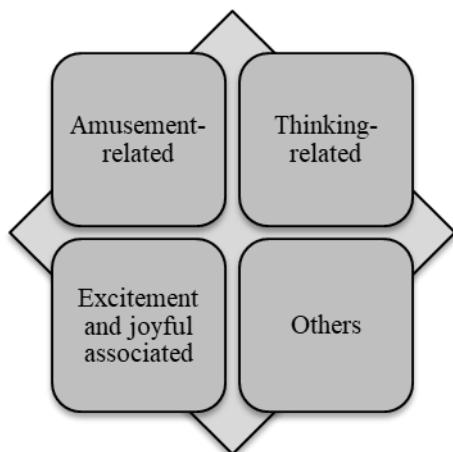
Figure 4 **Controversies in participants' associations related to the joyful icon** *(source: own research)*

The four groups of associations presented on the above chart may testify that controversies appear when the older generation interpret totally new graphic icons, which are unknown to them. This may also indicate that they are much better in expressing feelings or emotions through verbal communication. However, it is noteworthy that the first task given to the seniors during the workshops was related to choosing between face-to-face or computer-mediated communication. Seniors generally chose f-2-f communication, which confirms the mentioned assumption. They generally preferred verbal communication, and moreover they definitely preferred direct interactions, without using any devices to communicate.

Discussion

The readers were promised that they would be involved in a story about the didactic experience related to interpreting emoticons by older people. This story transformed into a research exploration that finally led to some noteworthy, substantive conclusions. These conclusions were closely related to educational and communicational issues, extremely important in a dynamically changing reality. Emoticons have been very well known recently and their popularity

seems to grow up very fast these days. However, when they are considered, they generally are related to computer-mediated communication, which is close to the generation of digital natives (Prensky, 2001), who prefer graphics than texts and meet no difficulties in using computer, games, and Internet language.

The conducted research revealed that seniors are not the worst interpreters of emoticons, however they recognise only some of them effortlessly. The study allowed determining that these were four emoticons: :-), ;-), :'-(, and :-D. Their graphic representations were presented in the first part of the analysis. The research also enabled to observe that if the message/statement contained in the icon was highly integrated, which means that an emoticon had similarly expressed eyes, eyebrows, and mouth, the seniors recognised them effortlessly. The situation looks a little bit different when the information contained in the icon is neither integrated nor clear. The workshop participants invoked their grandchildren, who are perceived by them as specialists in modern communication areas. Additionally, it was noticed that the older generation uncompromisingly chose verbal forms of communication, especially these forms, which are based on direct interactions. They feel much more safe if they can look at each other's eyes than when they are forced to text each other through the agency of various devices.

The thread related to prefigurative culture, introduced by M. Mead was also very explorative from the perspective of the undertaken subject-area. Due to that finding, the observation allowed noticing that the researched seniors, who participate in U3A classes, represent a group of older people, ready and entirely open for learning from younger people – their grandchildren. By reason of this, it seems interesting to reconduct a similar research amongst other representatives of a late elderly stage of human development as well as representatives of digital natives generation and to pose a question, which might resound as: How can we nowadays communicate, in terms of significant intergenerational differences? The process of searching for answers to the mentioned question seems to be very important from the perspective of contemporary educational purposes.

It is a limitation of the presented study that some of the analysed emoticons were not found in the literature or Internet resources, hence sometimes it was difficult to refer to a correct emoticon meaning. It also should be admitted that the presented study had just an explorative character and requires further comparative analysis, which might be supportive in searching for answers related to the intergenerational communication processes.

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EXPERT EVALUATION OF FORMATION AND DEVELOPMENT OF COMPETENCE IN LABOUR AND CIVIL PROTECTION STUDIES

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Abstract. *Labour protection specialists need to improve and develop their competence in order to ensure a safe, healthy and sustainable working environment in the relevant economic sector. Competence and its components, as well as the criteria and parameters are very important factors in the formation and development of competence in adult education. The aim of the study was to carry out expert evaluation of the developed competence components' model in labour and civil protection as well as the criteria and parameters, basing on the analysis of theoretical knowledge. The methodological basis included studies, analyses and evaluation of the relevant publications in the context of the competence - components of competence their criteria and carrying out an expert evaluation of the component model, its parameters and criteria. The expert evaluation found that it is necessary to replace the communication component in the model of competence components with the component of intelligibility. The evaluation of intuition, skills, attitude and professional ethics are those were in most cases consensus was reached, thus being unanimously evaluated. Unanimous were also the evaluations of knowledge, creativity, emotional intelligence and reflection. A relatively low level of consensus was reached in the evaluation of communication. Attitude as a component of competence was unanimously ranked first in terms of significance.*
Keywords: *competence, competence components, expert evaluation.*

Introduction

The competence components have a significant role in the formation and development of labour and civil protection competence in the adult study process and work environment.

Basing on the theoretical knowledge (Brizga, 2018) attitude, knowledge, skills, creativity, professional ethics, communication, emotional intelligence, intuition and reflection have been analysed.

In the 21st century the competence approach in education is based on the principal assumption: to emphasize an individual's ability to reflect, to use his/her metacognitive skills, to be creative, independent in thinking and critically evaluate his/her actions and take responsibility for these actions (Catlaks, 2015). European Qualifications Framework for Lifelong learning [EQFfLl], (2009) describes knowledgeas theoretic or factual. Knowledge is the result of information assimilation acquired during the study process, the aggregate of facts, principles, theories and experiences related to work or the study field.

EQFfLl, (2009) indicates that skills are the abilities to adapt knowledge and use these skills to carry out practical or theoretical tasks.

Creativity should not be considered as the entirety of inborn characteristics, but as an attitude towards life - as an entirety of skills and abilities and also innovation, that develop during the process of problem solving and decision making (Sternberg, 2012).

Professional ethics deals with the aspects of ethics in relation with the relevant field of professional activities. The most significant values of pedagogical ethics are humanism, honesty, fairness and freedom (Tirri, 2010; Tirri, Nokelainen, & Komulainen, 2013).

Communication skill training for adult learners should incorporate six key components:

1. assessment – includes the analysis of the initial skills and outcomes which are desirable to achieve while implementing the educational programme.
2. orientation – adults have to understand why they need to acquire communication skills
3. instruction – in adult education there should be information about the skills to be acquired. Instructions and training should be combined with oral presentations.
4. practice – it is important that the learner is able to assess his/her action during the practice period. Practical studies have to be varied, so that they are not boring and could arise interest in acquiring skills.
5. feedback – in the course of carrying out a skill, learners need feedback about their performance. Feedback can be corrective with an aim to identify the mistakes as well as motivating to improve one's skills.
6. assessment – after acquiring the study programme the assessment is carried out finding out whether learners are using the acquired knowledge outside the learning environment (Greene, 2016).

Articulation means that knowledge elements are clearly expressed, and they are interconnected (Holodnaja, 2002).

In the context of labour protection specialists' competence, articulation means qualitatively developed, clearly understood instructions and job descriptions as well as an instructing procedure.

Emotional intelligence has been studied by many scientists (Mayer, Salovey, Caruso, & Sitarenios, 2001; Mayer, Roberts, & Barsade, 2008a; Mayer, Salovey, & Caruso, 2008b; Goleman, 2000; Boyatzis, Goleman, & Rhee, 1999; Bar-On, 2007; Zeidner, Matthews, & Roberts, 2009) analysing it as an ability to lead/manage, control, use the feelings and knowledge on emotions, assimilate them in the process of thinking in order to improve thinking and the ability to use emotions to achieve the aim.

The psychologist Sergey Kluchnikov (2012) points out that "an individual's intuitive abilities develop only in the event that his/her will becomes stronger and at the same time, the person's moral and spiritual facets are perfected, activity and inner strength increase". It is a skill, which is based on one's experience, but not facts.

"In the reflection process returning to the experience we have had and the awareness of the feelings, which can be used in the future, are of great importance" (Šteinberga, 2013, 75). A specialist who acquires work and civil protection needs reflection on improving his/her professional and social competences.

A model of competence components has been developed based on theoretical knowledge (Table 1).
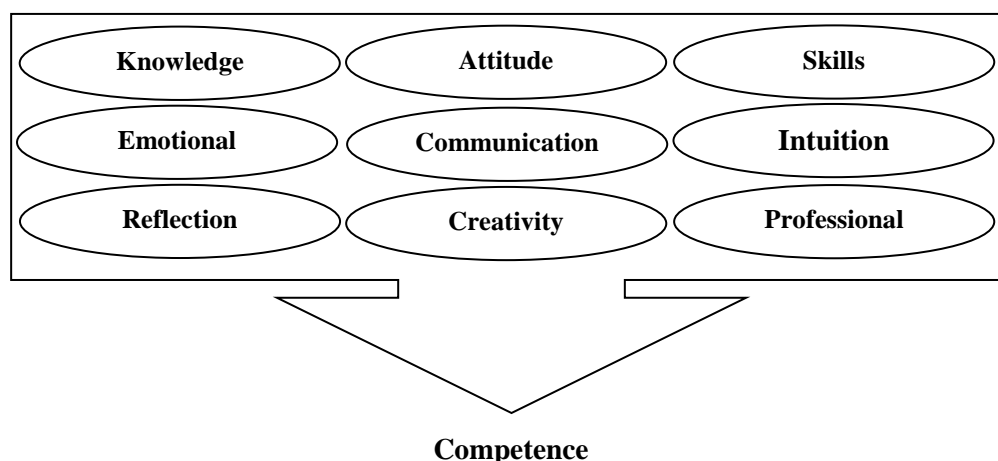
Figure 1 **Model of competence components in labour and civil protection**

Based on the findings of the theoretical studies, the expert evaluation was carried out for the components of the developed Model of competence

components in labour and civil protection to determine the most significant competence components to be included in the competence formation and development model for labour protection specialists.

Methodology

The aim of the study was to carry out an expert evaluation of the criteria and parameter of the developed Model of competence components in labour and civil protection based on the analysis of theoretical knowledge.

The methodological basis of the study included studies, analyses and evaluation of the relevant publications in the context of the competence, competence components and criteria and performing the expert evaluation of the component model, its indicators and criteria.

Criterion – competence in the field of labour protection and/or education parameters. Experts mainly with the experience in the field of education (A, C and D) and an expert with the prevailing experience gained while working in the field of labour protection (B) were chosen. Two experts (C and E) have the experience in both fields (Table 1). Four experts take part in the implementation of the programmes.

*Table 1 **List of experts***

Experts	Experience			Scientific and academic degree
	Position	Work experience	Scope of activity	
A	Associate professor	17	Higher education	Dr. silv.
B	Labour protection specialist in a manufacturing enterprise	19	Labour protection	Mg. psych. Professional Mg. in labour protection.
C	Labour protection specialist in a joint-stock company, Lecturer	8 4	Labour protection. Higher education	Mg. biol. 2nd level. Professional higher LP
D	Assistant profesor. Leading researcher	10	Higher education	Dr. sc. ing., Mg. paed.
E	Visiting lecturer at LU and LLU. Labour protection expert	9 11	Higher education. Labour protection	Professional Mg. Labour protection

The experts' different experience contributed to the comprehensive evaluation of the specialist's competence development model.

The data processing and assessment of the experts' evaluations have been structured in 11 stages (Orlov, 2002). For the processing of data, an on-line software programme was used (Preacher, 2001).

Results and Discussion

In order to find out which competence components, their parameters and criteria are most significant for the improvement of labour protection specialists` competence model. Labour protection specialists` competence model (Brizga, 2018), an expert evaluation was carried out for the competence components, parameters and criteria, which were obtained by analysing the theoretical findings from publications. Basing on the analysis of the theoretical knowledge obtained and expert recommendations, the model was improved. The experts expressed the following opinions:

Expert A.

The model is based on the formation of labour protection specialists' competence. It is difficult to understand the development of competence in the work environment. It is recommended that relatively most significant components should be included in the competence component model.

Expert B.

The employees of the company have a high self-esteem, however, they do not read instructions and they do not use personal protective equipment and violate other labour protection requirements. Obviously, attitude is the most significant component of competence. There is a probability that the stressor is outside one's work, at home, in the family, etc., however, the employer, in co-operation with the labour protection specialist, can find ways to motivate employees, and get them interested in these work related issues, to promote the existence of informal attitudes.

All the instructing procedures, training and certifications are actually carried out, only the employee who has been working for the company for 10 years, believes that he already knows better than the instructor does.

In large companies, the labour protection specialist needs to review the amount of instructions required per worker, shorten the scope of instructions, simplify the text (make it easier to perceive), provide visual instructions, films, presentations, practical training, involve the staff in creating instructions, since in this way it is easier to perceive the essence of the instruction, and it stays in the memory longer, makes one think and apply it to oneself.

Expert C.

It is recommended that the improvement of the competence should be based on the competence components in the labour protection specialists'

competence formation and development model. The most significant components should be included in the competence component model.

Expert D.

All these competence components are essential. If they are to be ranked, then the most important component is knowledge, followed by attitude and skills. Communication is the use of knowledge, which indicates the change of the term *competence* component. It is recommended that the competence component *communication* should be replaced with a more understandable term – *intelligibility*, *comprehension or comprehensibility*. Reflection is a prerequisite for creating new ideas, and it is used as a basis for the formation of new knowledge, creativity as well as other components.

Expert E.

All the elements of competence are significant. If they are to be ranked, the most significant ones are attitude, knowledge and skills. It is necessary to emphasize the key components of competence in the labour protection specialists' competence formation and development model, namely those components which promote competence development.

It could be concluded that the experts point at the necessity to improve the model of the competence components in labour and civil protection, including the most significant components of competence. The experts express the necessity to improve the labour protection specialists' competence formation and development model emphasizing competence development and competence components.

The recommendation proposed by expert D regarding the professional terminology for the competence component *communication* is disputable.

To assess the ranking of the significance of competence components, they have been summarised in Table 2, and the statistical processing of data has been performed. Non-parametric statistics of the data have been determined: medians **M**, modas **M** and amplitudes **A** (Mean, Median, Mode, Range Calculator).

Criterion: relative significance of competence components.

Parameters: the sum ranks of competence component ranks: attitude - 1, knowledge - 2, skills - 3, communication - 4, reflection - 5, creativity - 6, professional ethics - 7, emotional intelligence - 8, intuition - 9.

Regarding intuition, skills, attitudes and professional ethics the ranking was the most unanimous one (**A = 1**). Unanimous was also the evaluation of knowledge, creativity, emotional intelligence and reflection **(A = 2),** the consensus reached in evaluation was relatively low for communication.

The competence component *attitude* was unanimously ranked as first by significance.

Table 2 **Relative significance of competence components**
(Results of expert evaluation)

Components of competence	Experts					Ranks L_i	Ranks rank	Median M_e	Mode M_o	Amplitude A
	A	B	C	D	E					
Level (rank)										
Intuition	9	9	9	8	9	**44**	9	9	9	1
Knowledge	2	3	2	1	2	**10**	**2**	2	2	2
Communication	5	2	5	4	4	**20**	**4**	(4)	2; 4.5	3
Skills	3	4	3	3	3	**16**	**3**	3	3	1
Attitude	1	1	1	2	1	**6**	**1**	1	1	1
Creativity	4	5	6	6	6	**27**	6	6	6	2
Emotional intelligence	8	8	7	9	8	**40**	8	8	8	2
Professional ethics	7	7	8	7	7	**36**	7	7	7	1
Reflection	6	6	4	5	5	**26**	5	5	5; 6	2
Total	45	45	45	45	45	225	45	X	X	X

In a partly structured interview and during the discussions with the experts both in groups and in individually, it was concluded that the most significant competence components should be emphasized in the component model of competence development: attitude, knowledge, skills and comprehensibility (replacing communication).

Attitude - a tolerant, positive, consistent and responsible attitude towards promoting labour practices which are safe, sustainable and harmless to health, accountability for one's words and actions; responsibility to partners, a critical evaluation of dominant public attitudes to the observance of labour protection rules, thus reducing the impact of formal attitudes to these rules; respect for different and diverse views; objective and considerate evaluation and characterisation of accidents, observing confidentiality.

Criteria of attitude:

- tolerance has been observed: (***parameters*** - respect of different views; awareness and ability to control one's emotions, ability to evaluate his/her behaviour and adapt to changes; sensitivity in the evaluation and characterisation of accidents, observance of confidentiality; readiness to recognize and understand other people's feelings experiences; stress control; the ability to separate personal feelings from professional relationships);

- understanding values and ensuring well-being both in the work environment and outside it: (***parameters*** - understanding of the safety

priority in the workplace; the ability to update and justify each employee's personal responsibility and action, life, health and well-being both in the work environment and outside it; the ability to carry out activities within the framework of the function of a position using a value filter - in order to achieve the goals of the value, it should be based on the maintenance of health throughout the entire life; the ability to recognize the values of life and of the world in their inner essence - the ability to present one's own consciousness for the person him/herself by comparing values with one's own understanding and changing that understanding - preferably upward in order to carry out healthy safe and sustainable work);

- will behaviour: (***parameters*** - the ability to evaluate behavioral attitudes in order to formulate a prediction for specific activities for the implementation of harmless to health, safe and sustainable work; being responsible for one's words and deeds thus demonstrating a positive example; ability to transfer the acquired knowledge, experience, genetic abilities in a new non-standard situation, the ability of self-control and self-correction).

Knowledge - the person understands occupational health and labour medicine, promotion of wellness, protection of the surrounding environment, management sciences, economics, business IT, record keeping, rules and regulations of labour protection, work environment risk assessment and management, choice of labour protection equipment, ergonomics, fire safety and civil protection, work psychology and pedagogy, Human-Contextual-Time model, the pillars of the 21st century education, promoting of wellbeing, organisation of learning and instructional process, and utilizing this knowledge in the development of the required methodological materials in the context of safe and sustainable work which is non-harmful to health.

Knowledge criteria:
- cognition activity and responsibility: (***parameters*** - readiness to acquire new knowledge, because the person is aware of the lack of skills; self-awareness; the person is able to use the knowledge in creating a safe work environment and in reducing formal approach to the observance of rules; the person is able to use knowledge in constantly changing conditions and also is able to carry out self-evaluation, because he/she is aware of his/her knowledge);
- diversity of knowledge: (***parameters*** - the person has a wide range of knowledge because he/she understands occupational health and occupational medicine, environmental protection, management science, economics, applied informatics, record keeping, labour

protection legislation, work environment risk assessment and management of work environment, choice of labour protection equipment, ergonomics, fire safety and civil protection, work psychology and pedagogy);

- updating of knowledge in a specific situation: (***parameters*** - the person understands and knows how to apply the acquired knowledge to the Human-Contextual-Time model, education pillars of the 21st century, promotion of wellbeing, facilitation, organization and management of teaching and instructing process, development of the methodological materials and documents for their implementation in a safe, healthy and sustainable work context).

Skills - skills to create and develop a safe, healthy and sustainable working environment, to design and develop a learning environment in enterprises and organizations, to plan, organize and conduct training and instructing procedures, to develop and improve instruction, teaching aids and presentations, to use information technologies in training and to improve their use to identify and use Latvian and EU labour protection legislation;

Skills criteria:

- intellectual skills: (***parameters*** - basing on experience an adult learner has skills to analyse complex phenomena, to determine the nature of the problem and means to solve it, synthesize and integrate various elements, crystallize values, effectively use information, constructively cooperate with others);
- professional skills: (***parameters -*** skills to form and develop a safe, healthy and sustainable working environment, to create and develop a learning environment in enterprises and organizations, to plan, organize and manage training and instructing, to develop and improve instructions, teaching aids and presentations, to use information technologies in training and improve their use, to identify and use Latvian and EU labour protection legislation).

Intelligibility - the ability to clearly demonstrate and explain work issues associated with safe, non-harmful to health conditions and sustainable work, corresponding to the individual learner's or learner group's level of previously acquired knowledge and to develop understandable methodological materials and instructions.

Criteria of intelligibility:

- communication and interaction: (***parameters*** - the person is able to use knowledge about the principles and rules for the successful implementation of the communicative process, creating communication between enterprises and communication within the

same enterprise and controlling state institutions; he/she directly addresses complex issues and is a good listener, kindly shares the information, promotes open communication and perceives both bad and good news; can maintain peace and balance, ability to substantiate his or her opinion, ability to persuade, demonstrates ability to cooperate with employers and employees, and is able to create a safe working environment, has the ability to explain both to employers and employees the need for using safe work practices which are harmless to health);

- professional intelligibility: (***parameters*** - the ability to explain issues related to safe, sustainable work which is harmless to health, as well as to prepare comprehensible methodological materials and instructions, according to the prior level of knowledge of the particular learner's or training group's members).

Conclusions

The experts acknowledge that it is necessary to use the most significant components of competence in the development of the model. Evaluating the significance of the components of competence in the context of safe and sustainable work which is harmless to health, it has been stated that attitude is in first place. Basing on the experts' opinion it was decided to replace the competence component *communication* with *intelligibility.*

As a result of the research it was concluded that the most significant competence components in labour and civil protection context are knowledge, skills, attitude and intelligibility. These four most significant components will be included in the labour protection specialists` competence formation and development model.

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SUPERVĪZIJA PEDAGOGIEM KARJERAS KONSULTANTIEM

Supervision for Pedagogues – Career Counsellors

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Abstract. *Pedagogues-career counsellors perform diverse tasks at schools, and supervision is a new tool for educating and supporting these specialists. The purpose of the article is to carry out a quantitative study on the use of supervision in the professional development of pedagogues-career counsellors and to analyse the results. Study method — structured written questionnaire. The study's results show that pedagogues-career counsellors are satisfied with supervision. They think it is an appropriate form of professional development. Respondents are positive about the methods used in supervision. The main benefits of supervisions (in pedagogues – career counsellors opinion) are following: supervisions helps to become aware of strengths and weaknesses, promotes motivation at work, educates on various aspects of professional activity, promotes professional development, helps to more clearly define goals, helps to achieve the goals set, helps to prioritize, increases self-confidence, affects behavior, changes attitude, helps to understand the causal relationships, helps to become aware of personal resources, develops thinking etc.*
Keywords: benefits, supervision, pedagogue - career counsellor, professional support.

Ievads
Introduction

Mūsdienīgā izglītības iestādē skolēniem tiek nodrošināts daudzveidīgs atbalsts un radīti apstākļi viņu individuālo kompetenču attīstībai, redzesloka paplašināšanai, savu spēju un iespēju apzināšanai. Par to rūpējas skolas vadība, pedagogi un atbalsta personāls. Daļā Latvijas skolu strādā arī pedagogi karjeras konsultanti.

Pedagogu karjeras konsultantu amata pienākumu loks ir visai plašs: sadarboties ar skolas administrāciju, klašu audzinātājiem, izglītojamo vecākiem skolēnu karjeras izglītības un atbalsta jautājumos, vadīt grupu nodarbības, sniegt individuālās karjeras konsultācijas, rūpēties par karjeras atbalsta pasākumu īstenošanu dažādām izglītojamo grupām, apzināt uzņēmumus, organizācijas, individuālos komersantus, kas var skolēnus iepazīstināt ar dažādu jomu profesionāļu darba ikdienu, profesijas specifiku un darba apstākļiem, organizēt

skolēnu mācību ekskursijas uz šiem uzņēmumiem, veikt metodisko un pētniecisko darbu, piedalīties profesionālās pilnveides pasākumos.

Valsts izglītības attīstības aģentūra (turpmāk - VIAA) 2016.gadā ir uzsākusi ESF projekta "Karjeras attīstības atbalsts vispārējās un profesionālās izglītības iestādēs" īstenošanu, un tā ietvaros viena no plānotajām darbībām pedagogu karjeras konsultantu atbalsta, profesionālās pilnveides un attīstības jomā ir plānota arī supervīzija.

Supervīzija ir relatīvi jauna darbinieku atbalsta forma Latvijā, un vēl nav iedzīvinātas idejas par tās pozitīvo lomu darbinieku potenciāla stiprināšanā. Lai gan tā efektīvi darbojas biznesa sfērā un tiek izmantota atsevišķās palīdzošajās profesijās (sociālais pedagogs, psihologs, mediķis u.tml.), tomēr darba devējiem izglītības nozarē pietrūkst izpratnes ne tikai par supervīzijas izglītojošo dabu, bet arī par tās norises specifiku, jo praktiskā pieredze šajā jomā ir visai ierobežota. Šo apstākļu kopums iezīmē pētījuma aktualitāti un problēmu – trūkst zināšanu un pieredzes supervīziju nodrošināšanā karjeras atbalsta sniedzējiem.

Noteiktās tautsaimniecības jomās strādājošie (sociālais pedagogs, psihologs, mediķis u.tml.) tomēr var saņemt supervīzijas pakalpojumu savas profesionālās pilnveides nolūkā.

Autores personīgo ieinteresētību nosaka iepriekšējā pieredze karjeras konsultanta profesijas standarta izstrādē un līdzdalība ESF projekta "Karjeras attīstības atbalsts vispārējās un profesionālās izglītības iestādēs" aktivitāšu īstenošanā pašlaik.

Raksta mērķis – veikt kvantitatīvo pētījumu par supervīzijas izmantojumu pedagogu karjeras konsultantu profesionālajā pilnveidē un analizēt iegūtos rezultātus.

Uzdevumi:
1) analizēt zinātnisko literatūru par supervīziju kā darbinieku atbalsta un izglītošanas formu,
2) veikt kvantitatīvo (aptauja projektā iesaistītajiem pedagogiem karjeras konsultantiem) pētījumu un analizēt iegūtos rezultātus.

Pētījuma jautājumi:
1) Vai pedagogi karjeras konsultanti ir apmierināti ar supervīziju un vai tā ir viņiem pieņemama darba forma?
2) Kādi ir nozīmīgākie profesionālie un personiskie ieguvumi supervīzijas procesā pedagogu karjeras konsultantu skatījumā?

Pētījuma metode – strukturēta rakstiska aptauja pedagogiem karjeras konsultantiem, kas piedalījušies ESF projekta "Karjeras attīstības atbalsts vispārējās un profesionālās izglītības iestādēs" nodrošinātajā supervīzijā 2018.gadā.

Pētījums veikts 2018.gada novembrī.

Supervīzijas nozīme profesionālajā pilnveidē
Role of Supervision in the Professional Development

Arvien jaunas izglītošanās un profesionālās pilnveides formas aizstāj tradicionālās lekcijas dažādu profesiju speciālistiem, dažādojot mācīšanās vidi un veidus. Supervīzija, pēc I. Stankus-Višas domām, ir "viens no efektīvākajiem un mūsdienīgākajiem veidiem, kā turpināt profesionāli pilnveidoties" (Stankus-Viša, 2017, 19).

Mūsdienu pasaulē, attīstoties mūžizglītības idejai, ir mainījušies arī akcenti no zināšanu kvantitātes, kas kādreiz bija profesionalitātes mēraukla, uz kompetencēm un darba rezultātiem. Pieaugušo mācīšanās procesā būtiska ir arī sevis un citu indivīdu iepazīšana un izzināšana, salāgojot savas kompetences ar apkārtējo pieredzi, saskatot jaunas pašattīstības iespējas. Šajā kontekstā L. Āboltiņa norāda, ka "supervīzija ir arī reflektīva mācīšanās, un mūžizglītība – neatņemama profesionālās prakses sastāvdaļa, kas palīdz reflektēt par savu praksi supervizora vadībā, lai personiski un profesionāli attīstītos, tā veicinot nepārtrauktu mācīšanos. Supervīzija ir vide, kas var sniegt iespēju eksperimentēt, mācīties labāk saprast sevi, savu rīcību un palīdzēt formulēt jaunus darbības veidus." (Āboltiņa, 2009, 26)

Līdzīgā veidā supervīzijas būtība raksturota *BSO Consulting Formats* vietnē, akcentējot uzstādījumu, ka supervīzija ir uz cilvēku orientēta konsultēšanas forma, kuras mērķis ir refleksija par darbu, kā arī profesionālo un psihosociālo kompetenču attīstība, savukārt supervīzijas galvenais uzdevums ir darba un komandas procesu uzlabošana (BSO Consulting Formats, 2019, 2). Aizvien uzlabojas supervīziju efektivitāte, jo "supervīzijas jēdziens kļūst aizvien skaidrāks, supervīzija tiek praktizēta noteiktos profesijas standartos un kvalitātes sistēmas ietvaros. Supervīzijas prakse tiek realizēta līdzās citām profesionālās konsultēšanas formām, iegūstot lielu nozīmi mūsdienu darbaspēka profesionālajā pilnveidē." (Stankus-Viša, 2017, 27)

A. Hodža (Hodge, 2007) saistībā ar profesionālās pilnveides nozīmi supervīzijas procesā norāda, ka supervīzija ir starppersonu mācīšanās emocionāli drošā vidē, kā arī attiecības un savstarpējo atbalstu attīstoša kopīga jaunrade. Tā nodrošina reflektējošu forumu – emocionālo un profesionālo labklājību veicinošu vidi, kas dialoga un atgriezeniskās saites sniegšanas un saņemšanas veidā paplašina profesionālo perspektīvu.

Supervīzijas procesā tiek atklātas tās dalībnieku vajadzības, esošie un nepieciešamie resursi, un vienlaikus attīstās un mainās arī pats supervizors kā speciālists. Taču tieši supervizors ir procesa vadītājs, līdz ar to viņa uzdevums ir izveidot brīvu un drošu supervīzijas atmosfēru, sekot tam, kā tiek ievēroti grupas darba noteikumi, veltīt uzmanību izskanējušajiem problēmjautājumiem un definētajiem mērķiem, izvēlēties piemērotākās metodes supervīzijā un

nodrošināt atgriezenisko saiti klātesošajiem. Drošības un brīvības sajūta rada tādas savstarpējās attieksmes, kas paver plašākas iespējas kreatīvai jaunu risinājumu ģenerēšanai, ideju pārbaudīšanai diskutējot, nodrošina piemērotu mikroklimatu, lai dalībnieki dalītos savā pieredzē, apmainītos viedokļiem, piedāvātu palīdzību viens otram un atbalstītu citus. Supervīzijas noslēgumā parasti tiek apkopoti ieguvumi pēc kārtējās sesijas, konstatētas izmaiņas domāšanā, precizētas veiksmīgākās idejas, atgriežoties pie sākotnējiem mērķiem.

Supervīzijas galvenās funkcijas ir formulējusi E. Apine: "… administratīvā jeb normatīvā, atbalsta jeb spēcinošā un izglītojošā jeb formējošā, kuru kopīgais mērķis bija panākt iespējami augstu […] konsultanta darba kvalitāti organizācijā. […] Saskaņā ar šīm funkcijām supervizors pilda vairākas – skolotāja, atbalstītāja, konsultanta, kolēģa, eksperta, kompetenču speciālista – lomas, kuras ietekmē supervizora darba stilu un attiecības ar supervizējamo." (Apine, 2017, 64)

Supervīzija ir divu vai vairāku personu savstarpēja mijiedarbība, kur attiecības un to izpausmes veidojas harmoniski, un šis formāts ļauj dalībniekiem "atvērties" un atbalstoši sadarboties ar mērķi dot un saņemt atgriezenisko saiti par piedzīvoto, dzirdēto, novēroto un saprasto. Analizējot procesus supervīzijas grupā, B. Proktore atzīmē, ka atgriezeniskās saites veiksmīgai norisei svarīga ir katra dalībnieka individuālās reflektīvās vides nodrošināšana (Proctor, 2000), ar to domājot atbalstošu attieksmi, savstarpēju pieņemšanu, vēlmi iedziļināties, lai noskaidrotu notikumu vai pārdzīvojumu patieso būtību. Taču atsevišķa supervīzijas dalībnieka individuālajam tempam nebūtu jānonāk disonansē ar grupas kopējo tempu, supervīzijas galvenajiem principiem un spēju iekļauties grupas attīstības struktūrā. Tālāk šo ideju attīsta L. Āboltiņa, apgalvojot, ka reflektīvās vides respektēšana un veidošana ir prioritāte gan supervīzijas dalībnieku, gan gadījuma prezentētāja attīstības un mācīšanās vajadzību kontekstā. (Āboltiņa, 2012)

Ja supervīzija notiek grupā, tad supervizora pienākums ir apzināties, ka šāda forma rada laika deficītu katram supervizējamajam, ierobežojums ir arī iekšējās trauksmes palielināšanās, jo jārunā publiski, līdz ar to var mazināties mācīšanās kapacitāte. Turklāt jārēķinās ar apstākli, ka katram supervīzijas dalībniekam būs sava individuālā profesionālā pieredze, pārliecības, vērtības, zināšanas un spējas. Tāpēc supervizora atbildība saistās arī ar pozitīvas grupas dinamikas veidošanu.

Pētnieki D. Klaterbuks, C. Vitakers un M. Lukas akcentē nepieciešamību supervīzijas procesā pārņemt noderīgo pieredzi no citiem un arī aktualizē jautājumu par vajadzību pašiem supervizoriem mācīties vienam no otra supervīziju norises kvalitātes standartu paaugstināšanai (Clutterbuck, Whitaker, & Lucas, 2016).

Pētījuma metodoloģija
Research Methodology

Empīriskā pētījuma dati iegūti, nosūtot aptaujas anketu tiem pedagogiem karjeras konsultantiem, kas ir piedalījušies ESF projekta "Karjeras attīstības atbalsts vispārējās un profesionālās izglītības iestādēs" nodrošinātajās supervīzijās. Anketa netika nosūtīta pedagogiem karjeras konsultantiem, kas bija pārtraukuši darba attiecības projektā līdz 2018.gada 1.septembrim un līdz ar to projekta aktivitātes viņiem vairs nav saistošas, kā arī tiem pedagogiem karjeras konsultantiem, kas darba attiecībās stājušies periodā pēc supervīziju sērijas 2018.gada pavasarī. Līdz ar to tiek pieņemts, viņiem nav supervīziju pieredzes un viedokļa par tām. Tādējādi pastāv noteikti pētījuma izlases ierobežojumi.

Kopā saņemtas 183 norādītajā termiņā aizpildītas anketas, un visas ir derīgas datu apstrādei, vizualizācijai un interpretācijai.

Pētījuma rezultāti
Results of the Research

Pētījumā piedalījās pedagogi karjeras konsultanti, kas veic savus pienākumus vienā vai vairākās vispārējās izglītības iestādēs vai PIKC (profesionālās izglītības kompetences centros). Attiecīgie dati aplūkojami 1.attēlā.
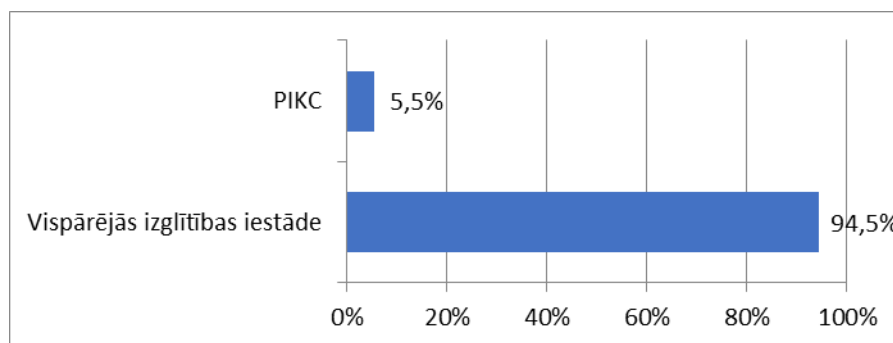
*1.attēls. **Respondentu pārstāvētās izglītības iestādes***
*Figure 1 **Educational establishments represented by respondents***

6% respondentu, kas piedalījušies aptaujā, pārstāv PIKC, un 94% - vispārējās izglītības iestādes (sākumskolas, pamatskolas un vidusskolas). Zināms, ka PKK darba specifika šajās izglītības iestādēs atšķiras – PIKC audzēkņi jau ir pieņēmuši lēmumu par savu turpmāko profesiju, bet vispārējas izglītības iestāžu skolēnu vajadzības ir izzināt dažādas tautsaimniecības nozares, iepazīt konkrētu profesiju saturu, izmēģināt savus spēkus un pārbaudīt interesi par tām, iemācīties pieņemt atbildīgus lēmumus dzīvē. Respondentu proporcija

atbilst iesaistīto izglītības iestāžu proporcijai projektā, līdz ar to secināms, ka iegūtie dati atspoguļo vidējās tendences.
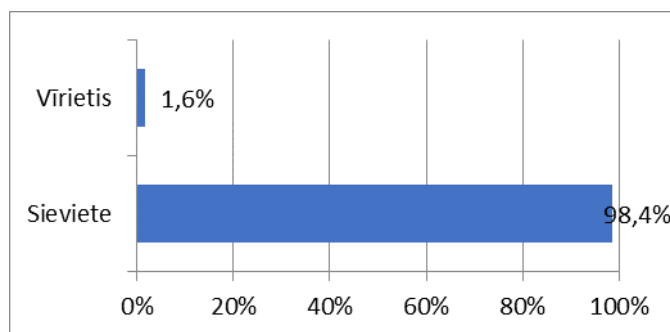
2.attēls. **Respondentu dzimums**
Figure 2 **Gender of respondents**

Iegūtās respondentu atbildes 2.attēlā ataino Latvijā izteikto sieviešu un vīriešu disproporciju pedagoga profesijā kopumā, un šī tendence saskan ar Eiropas Komisijas izglītības informācijas tīkla Eurydice ziņojumā „Skolotāja profesija Eiropā: prakse, paštēls un politika" (VIAA, 2015) analizēto informāciju. Tur norādīts, ka, alīdzinot ar citām Eiropas valstīm, kur skolotāju kolektīvos sievietes ir aptuveni divas trešdaļas, Latvijā vīriešu skaits ir mazāks kā 20%. Savukārt šajā aptaujā par supervīzijas lomu pedagogu karjeras konsultantu atbalstā vīriešu skaits ir tik nenozīmīgs (tikai 2%), ka viņu, iespējams, atšķirīgais viedoklis nespēj būtiski ietekmēt kopējo rezultātu.
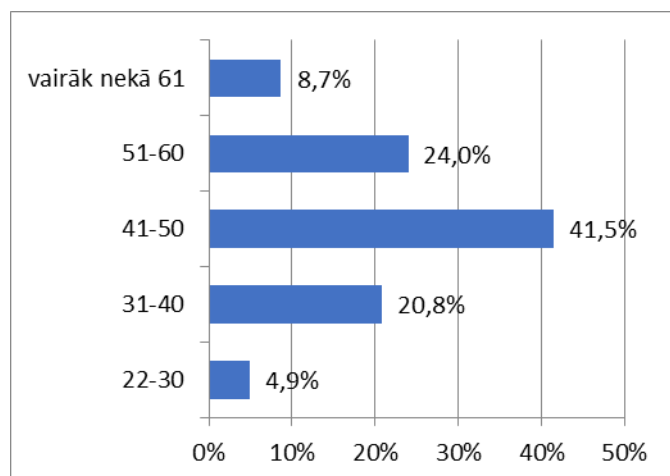
3.attēls. **Respondentu vecums**
Figure 3 **Age of respondents**

Diagrammā 3.attēlā uzskatāmi parādīta respondentu vecuma struktūra, kurā dominē pedagogi karjeras konsultanti 41-50 gadu segmentā (41%), un līdzīgi pārstāvēti ir PKK 31-40 gadu (21%) un 51-60 gadu (24%) intervālos. 9% respondentu ir vairāk nekā 61 gads, kas ir tuvu pensionēšanās vecumam,

savukārt pavisam neliela daļa respondentu (5%) ir vecumā līdz 30 gadiem. Iegūtie dati parāda, ka jau tuvākajos gados sagaidāms darbaspēka iztrūkums, tātad par personāla attīstību atbildīgajiem speciālistiem, izglītības pārvalžu metodiķiem un vadītājiem, skolu direktoriem savlaicīgi jāanalizē situācija, jāizvērtē vajadzības un jārosina jaunu speciālistu apmācība karjeras konsultēšanas jomā, lai nodrošinātu karjeras attīstības atbalsta sistēmas darbības nepārtrauktību un ilgtspēju.

Nozīmīgs rādītājs ir arī pedagogu karjeras konsultantu darba pieredze šajā amatā (skat. 4.att.).
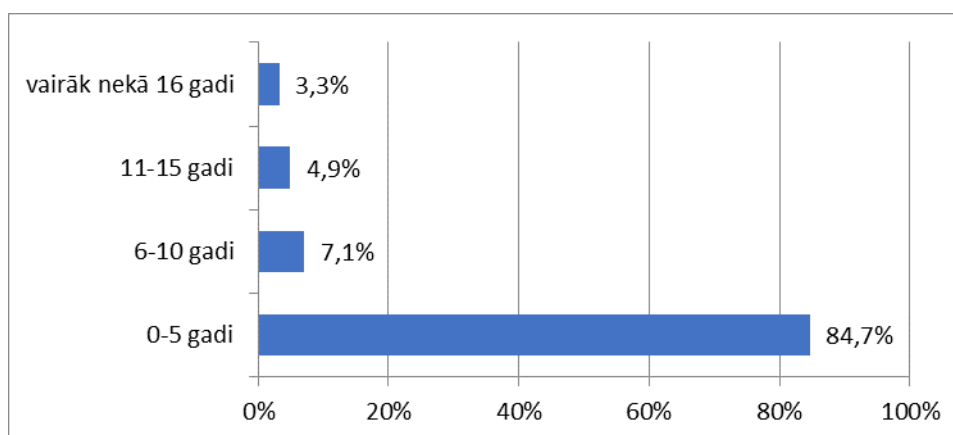
4.attēls. **Respondentu darba pieredze nozarē**
Figure 4 **Experience of respondents in the sector**

4.attēlā vizualizētie dati par pedagogu karjeras konsultantu darba pieredzi ir likumsakarīgi. 85% no viņiem darbu šajā profesijā uzsākuši tikai ar ESF projekta sākumu, un pirmie līgumi ar pašvaldībām par pedagogu karjeras konsultantu nodarbināšanu noslēgti 2017.gada martā. Tātad šo speciālistu profesionālā pieredze var būt pat mazāka nekā 2 gadi. Tas nozīmē, ka no iesaistītā personāla profesionālās attīstības viedokļa supervīzijas ir aktuāls un savlaicīgs pasākums, kas dod iespēju dalībniekiem pilnveidoties un pašapliecināties, stiprināt drošības sajūtu, gūt iepriekš vēl nepiedzīvotu pieredzi un mācīties no kolēģiem jaunas attieksmes un pieejas darbā, pārliecinošāk formulēt mērķus un saskatīt perspektīvas. Un projekta ietvaros šis jautājums tiek risināts sistēmiski.

Pārējo 15% respondentu darba pieredze veidojusies, strādājot par karjeras konsultantiem Nodarbinātības Valsts aģentūrā vai kādās vispārējās izglītības iestādēs. Turklāt NVA karjeras konsultantiem darba pienākumi saistījās ar citām mērķgrupām – ilgstošajiem bezdarbniekiem, māmiņām pēc bērna kopšanas atvaļinājuma u.tml., līdz ar to no jauna jāveido iemaņas darbam ar skolēniem un PIKC audzēkņiem. Tādējādi šo cilvēku profesionālie un personiskie ieguvumi pēc supervīzijas arī ir būtiski.
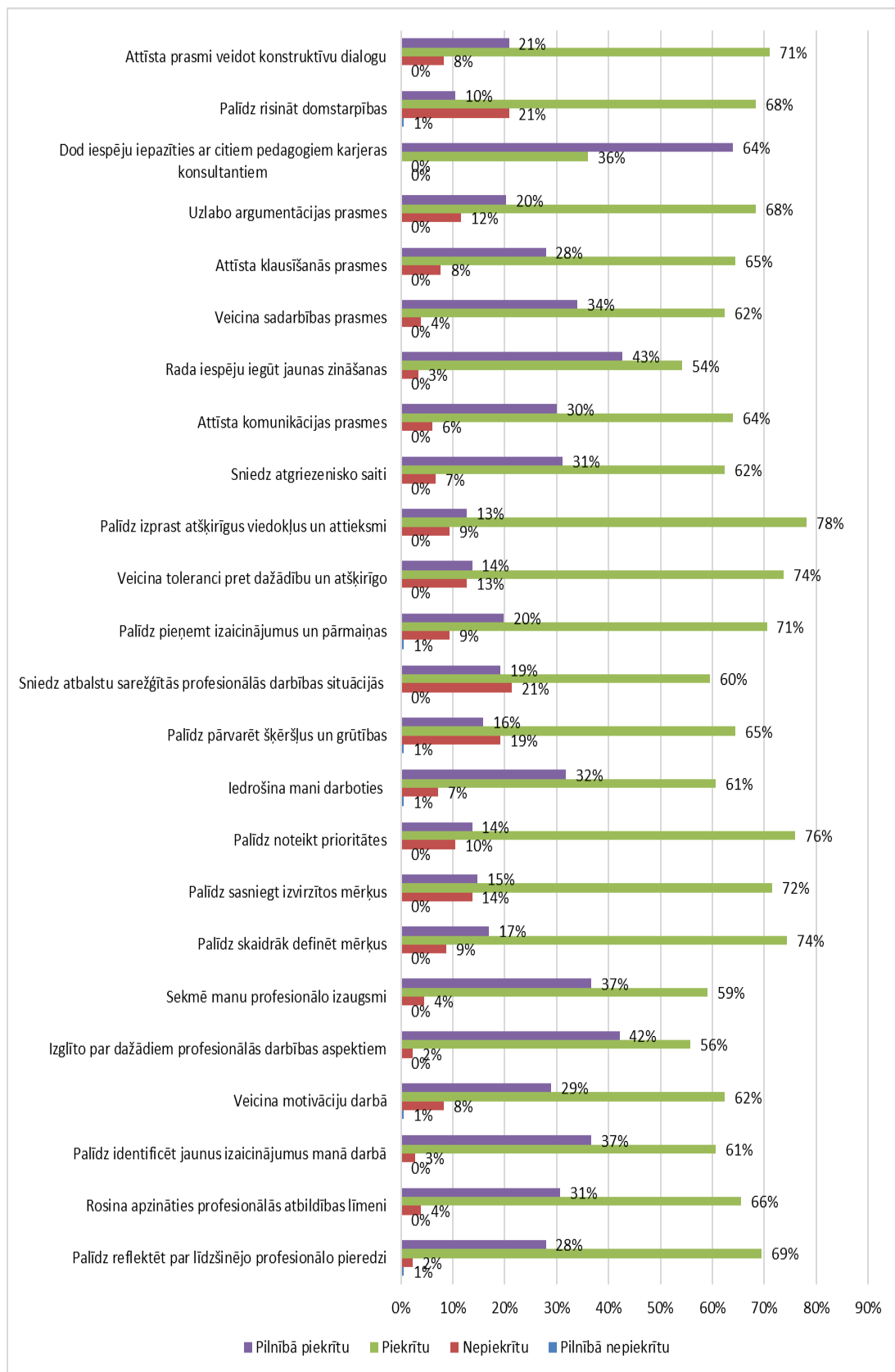
5.attēls. **Pedagogu karjeras konsultantu profesionālie ieguvumi pēc supervīzijas**
Figure 5 **Pedagogues' career counsellers professional benefits after supervision**

5.attēlā atspoguļoti pedagogu karjeras konsultantu atzīmētie profesionālie ieguvumi pēc notikušās supervīzijas. Iegūto datu analīze liecina, ka visi respondenti (100%) par būtiskāko ieguvumu atzīmē iespēju iepazīties ar citiem kolēģiem, kas strādā projektā iesaistītajās izglītības iestādēs. Šāda iepazīšanās veicina jaunu kontaktu un sadarbības tīklu veidošanos, kā arī profesionāli nozīmīgas informācijas apmaiņu ārpus speciāli organizētiem profesionālās pilnveides pasākumiem, nodrošinot nosacījumus ātrākai specifisku un nozarei raksturīgu problēmu risināšanai.

Vienlaikus 98% respondentu piekrīt apgalvojumam, ka supervīzijās to dalībnieki tiek izglītoti par dažādiem profesionālās darbības aspektiem, un šāds vērtējums saskan ar supervīziju mērķi un iekļaujas to funkcijās. Veidojot karjeras attīstības atbalsta sistēmu Latvijas izglītības iestādēs, profesijas satura iepazīšana un vienlaikus arī personīgās pieredzes salīdzināšana ar kolēģu pieredzi veicina labās prakses pārņemšanu un izplatīšanos. Supervīzijas laikā diskutējot tiek radītas arī jaunas profesionāli nozīmīgas kolektīvās zināšanas dažādos būtiskos aspektos, radot pamatu jaunu prasmju apguvei. Līdz ar to supervīziju kā vidi jaunu zināšanu ieguvei atzīmējuši 97% respondentu.

Supervizors palīdz reflektēt par dalībnieku līdzšinējo profesionālo pieredzi, un to kā ieguvumu aptaujā atzīmējuši 97% respondentu. Faktiski šādi apstiprinās supervīzijas nozīme refleksijas kā būtiskas PKK profesionālās prasmes veidošanā. Refleksijā katram dalībniekam ir iespēja analizēt un saprast savu iekšējo pasauli un uzlabo spēju uztvert citu personu (kolēģu, klientu u.c.) individualitātes.

Līdzīgs aptaujas dalībnieku skaits (97%) norāda, ka supervīzija palīdz identificēt jaunus izaicinājumus darbā. Tās ir profesionālās darbības situācijas, kas varbūt kādam iepriekš vēl nav piedzīvotas, taču citiem kolēģiem jau ir bijusi vajadzība ģenerēt atbilstošus un pārdomātus risinājumus. Supervīzijā šādas situācijas un to cēloņsakarības tiek apzinātas, un, uzklausot kolēģu un/vai supervizora pieredzi, dalībnieki jūtas drošāki un labāk sagatavoti arī jauniem izaicinājumiem.

96% respondentu atzīmē, ka supervīzija ir sekmējusi viņu profesionālo izaugsmi, un tikpat daudzi norāda, ka tā rosinājusi apzināties profesionālās atbildības līmeni. Profesionālā atbildība parasti saistās ar profesijas satura labāku izpratni, robežu un iespēju apzināšanos, pienākumu un tiesību sabalansēšanu un personīgu pieņemšanu. Izpratne par profesionālo atbildību darbiniekam palīdz arī izvērtēt un noteikt prioritātes darbā, pārvaldīt un mobilizēt iekšējos un ārējos resursus maksimāla rezultāta sasniegšanai un klienta vajadzību apmierināšanai.

Pedagogi karjeras konsultanti atzīmējuši arī dažādus personiskos ieguvumus pēc supervīzijas (skat. 6.att.), kam teorētiķu skatījumā ir cieša saistība ar profesionālo pienākumu izpildes kvalitāti un darbinieka pašizjūtu.

Starp tiem dominējošie ir šādi: veicina pašanalīzi darba situācijās (92%), palīdz identificēt riskus un izvērtēt iespējas (91%), palīdz ieraudzīt jaunas iespējas (98%), palīdz apzināties pedagoga karjeras konsultanta personīgos resursus (92%), paplašina manu redzesloku (98%).

Nedaudz zemāk novērtēti, taču 80% robežu pārsniedz šādi personiskie ieguvumi supervīzijas gaitā: saņemtais emocionālais atbalsts (83%), palīdzība veidot attiecības ar darba kolēģiem (85%), uzlabojusies saskarsmes kultūra (81%), veicināta sevis apzināšanās (88%), attīstīta domāšana (84%), palīdzība izprast cēloņsakarības (89%), paaugstinājusies pašapziņa (80%), palīdzība apzināties stiprās un vājās puses (87%). Visi šie nosacījumi spēj pozitīvi ietekmēt attieksmi pret veicamajiem pienākumiem un palielināt katra indivīda pienesumu projekta īstenošanā un skolēnu vajadzību apmierināšanā.
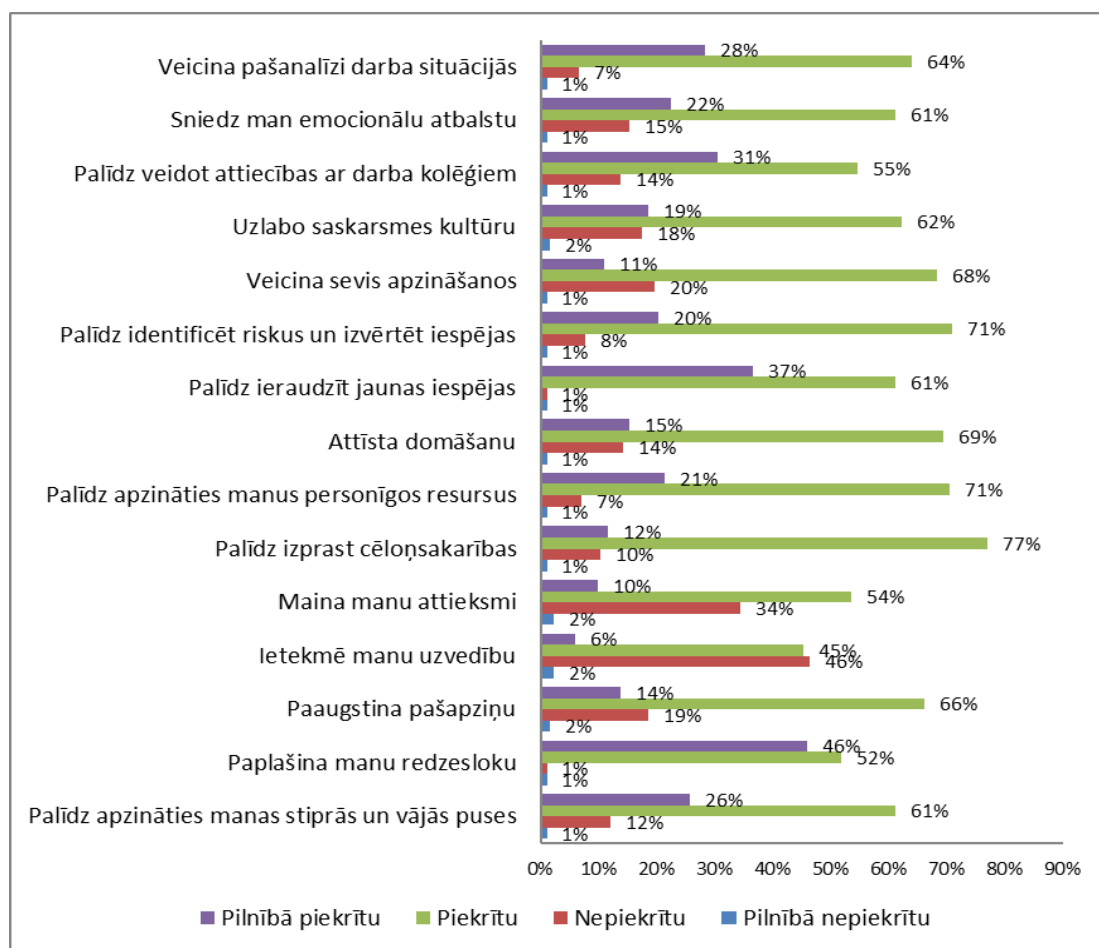
6.attēls. **Pedagogu karjeras konsultantu personiskie ieguvumi pēc supervīzijas**
Figure 6 **Pedagogues' career counsellers personnel benefits after supervision**

Kā redzams 6.attēlā, zemāk novērtētie parametri ir "maina manu uzvedību" (51%) un "maina manu attieksmi" (64%). Daļēji tas var tikt skaidrots ar PKK bagātīgo pedagoģisko pieredzi, kas paredz arī jau izmēģinātus savstarpējo un

darba attiecību modeļus, taču nenoliedz jaunu pieeju, metožu un paņēmienu ieviešanu savā profesionālajā darbībā nākotnē.

Respondentu attieksme pret supervīziju atspoguļota 7.attēlā. Pētījuma dati apliecina, ka 98% respondentu attieksme pret supervīziju vērtējama kā pozitīva vai ļoti pozitīva un tikai 2% gadījumu attieksme ir atturīga. Lai analizētu šādu atsevišķu negatīvu atbilžu iemeslus, būtu nepieciešams padziļināts pētījums, piemēram, intervijas ar šo atbilžu autoriem, taču tādā gadījumā nebūtu iespējams saglabāt respondentu anonimitāti, mazinātos iespēja brīvi paust viedokli un, iespējams, tiktu saņemtas sociāli vēlamas atbildes. Tomēr darba devējam un atbildīgajiem speciālistiem būtu nepieciešams saprast negatīvās attieksmes iemeslus, lai pieņemtu adekvātus lēmumus par to, kā nākotnē efektīvāk sniegt atbalstu darbinieka kompetences pilnveidē, izmantojot citu saturu, formas, metodes vai alternatīvus pakalpojumu sniedzējus.
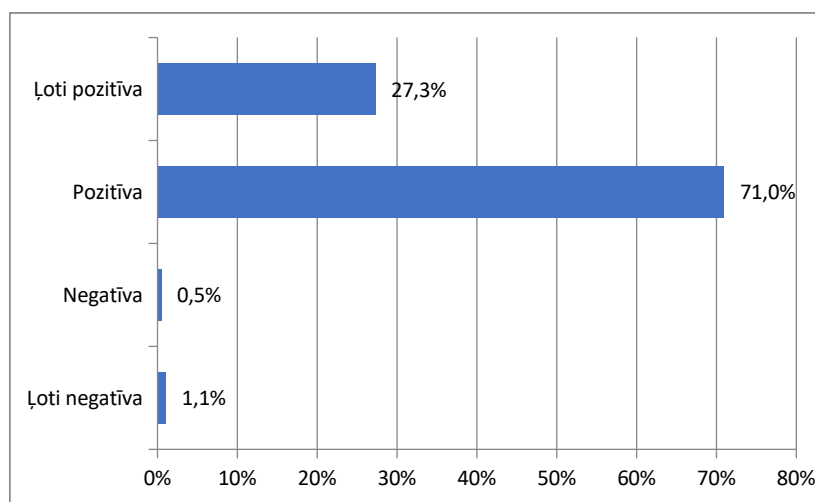
*7.attēls. **Respondentu attieksme pret supervīziju***
*Figure 7 **Respondents' attitude to supervision***

Atsevišķā jautājumā tika noskaidrota pedagogu karjeras konsultantu apmierinātība ar supervīzijas procesu un rezultātu (skat. 8.attēlu).

Lai detalizēti izprastu pamatojumu PKK attieksmei pret supervīziju, respondentiem tika lūgts novērtēt vairākus aspektus, kas veido kopainu apmierinātībai ar supervīziju. Iegūtos rezultātus iespējams sakārtot, saskaitot atbildes "piekrītu" un "pilnībā piekrītu", kā arī ranžējot tos no lielākajām vērtībām līdz mazākajām (skat. 1.tabulu).
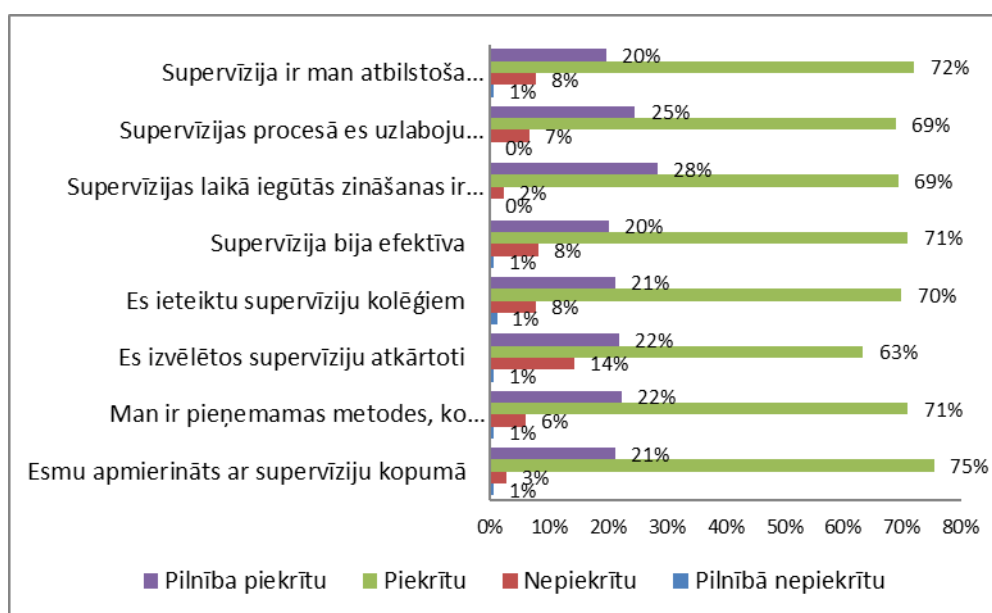
8.attēls. **Respondentu apmierinātība ar supervīziju**
Figure 8 **Respondents' satisfaction with supervision**

1.tabula. **Respondentu apmierinātība ar supervīziju**
Table 1 **Respondents' satisfaction with supervision**

N.p.k.	Vērtējuma aspekti	Atbildes (%)
1.	Supervīzijas laikā iegūtās zināšanas ir pielietojamas praksē	97
2.	Esmu apmierināts ar supervīziju kopumā	96
3.	Supervīzijas procesā es uzlaboju profesionālās kompetences	94
4.	Man ir pieņemamas metodes, ko izmanto supervīzijā	93
5.	Supervīzija ir man atbilstoša profesionālās pilnveides forma	92
6.	Supervīzija bija efektīva	91
7.	Es ieteiktu supervīziju kolēģiem	91
8.	Es izvēlētos supervīziju atkārtoti	85

Analizējot 1.tabulā iegūto ainu, var secināt, ka supervīzijas dalībnieki kopumā ir apmierināti ar supervīziju (96%). Viņi uzskata, ka iegūtās zināšanas ir pielietojamas praksē (97% - augstākais apmierinātības rādītājs), ir uzlabojušās viņu profesionālās kompetences (94%). Respondenti pauž arī pozitīvu attieksmi pret supervīzijā izmantotajām metodēm (93%), pieņem šādu profesionālās pilnveides formu (92%), norāda, ka tā bijusi efektīva (91%).

91% respondentu ieteiktu šādu profesionālās pilnveides formu arī saviem kolēģiem. Taču neizpratni raisa 15% respondentu pārliecība neizvēlēties supervīziju atkārtoti, lai gan daļa šo pašu cilvēku iepriekš pozitīvi novērtējuši supervīzijā iegūtās zināšanas, to pielietojamību profesionālajā darbībā, kā arī profesionālo kompetenču uzlabošanos supervīzijas rezultātā. Cēlonis varētu būt

zināms subjektīvisms aptaujas aizpildīšanā un/vai emocionālo komponentu ietekme.
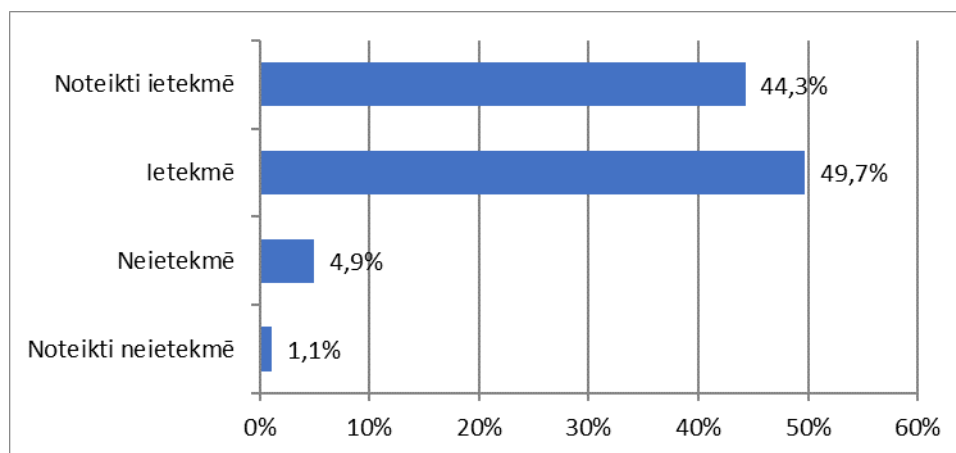
9.attēls. **Supervizora personības, profesionālās pieredzes, kompetences un profesionālās ētikas ietekme uz respondentu apmierinātību ar supervīziju**
Figure 9 **The effect of supervisors personality, professional experience, competence and professional ethics on respondents' satisfaction with supervision**

9.attēlā diagrammā vizualizētie dati apliecina, cik nozīmīga loma ir paša supervizora personībai, viņa profesionālajai pieredzei un ētikas izpratnei virzībā uz pozitīvu supervīzijas rezultātu, un to kā dalībnieku apmierinātību ietekmējošu faktoru minējuši 94% respondentu. Neapšaubāmi, supervīzijas gaitā izgaismojas abu iesaistīto pušu (supervizora un dalībnieku) personības un rakstura īpašības, vērtības, attieksme pret idejām, notikumiem, cilvēkiem un viņu rīcību. Līdz ar to optimālā gadījumā tikai personām ar attīstītu emocionālo inteliģenci un empātiju būtu vēlams iesaistīties ētisko dilemmu risināšanā supervizora lomā un kļūt par iedvesmas avotu citiem, ievērojot augstus profesionālos standartus nozarē.
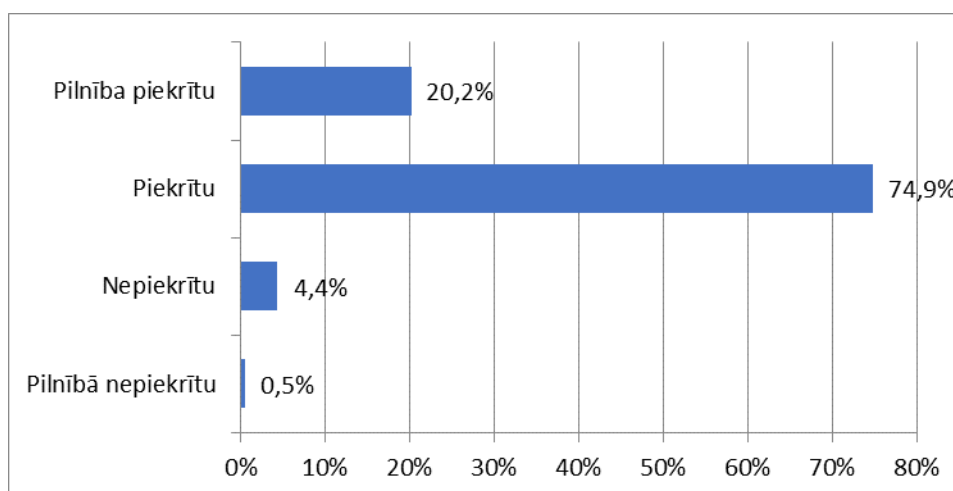
10.attēls. **Supervīzijas atpazīstamības novērtējums**
Figure 10 **Supervision awareness assessment**

Kopumā 95% (20% - "pilnībā piekrītu" un 75% - "piekrītu") respondentu supervīziju novērtē kā atpazīstamu profesionālās izaugsmes formu. Tas norāda, ka izglītības nozarē supervīzija jau ir izmantota kādā citā kontekstā vai arī par to ir uzklausītas kādas atsauksmes no kolēģiem.
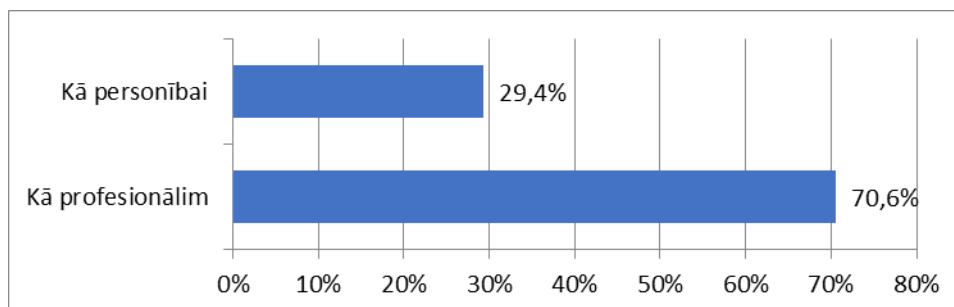
*10.attēls. **Pedagogiem karjeras konsultantiem nepieciešamā atbalsta veids turpmākajās supervīzijās***
*Figure 10 **Type of support needed for pedagogues' career counsellers in future supervisions***

10.attēlā parādītas pedagogu karjeras konsultantu vajadzības turpmākajās supervīzijās. Savā būtībā tā ir universāla atbalsta forma, taču 71% PKK visu atzīmēto atbilžu liecina, ka turpmāk nepieciešamajai palīdzībai vairāk jāsaistās ar profesionālas dabas jautājumu iztirzāšanu un iespējamajiem risinājumiem, mazāk vajadzīgs atbalsts šim speciālistam kā personībai. Tā kā atbildot uz šo jautājumu bija iespēja atzīmēt abus atbilžu variantus, tad nepieciešams veikt papildus aprēķinus, lai noskaidrotu, cik % PKK ir norādījuši vienu un otru variantu. Rezultāti parāda, ka 90,7% respondentu atzīmējuši atbalstu profesionālo jautājumu risināšanai, bet 37,7% - nepieciešamību pēc individuālā atbalstā kā personībai. Iespējams, ka tas saistās ar pārliecības un drošības sajūtas stiprināšanu, jo lielākā daļa respondentu ir iesācēji šajā profesijā.

Secinājumi
Conclusions

Pētījuma rezultāti apliecina teorētiķu viedokļus par supervīzijas pozitīvo ietekmi pedagogu karjeras konsultantu profesionālās pilnveides procesā. Supervīzija nodrošina reflektējošu vidi – emocionālo un profesionālo labklājību veicinošu procesu, kas dialoga un atgriezeniskās saites sniegšanas un saņemšanas veidā paplašina profesionālo redzējumu. Supervīzijas gaitā tiek atklātas tās dalībnieku vajadzības, esošie un nepieciešamie resursi.

Empīriskajā pētījumā iegūtie rezultāti parāda, ka pedagogi karjeras konsultanti ir apmierināti ar supervīziju, un viņiem ir pieņemams šāds profesionālās pilnveides un atbalsta instruments. Viņi akcentē iegūto zināšanu pielietojamību praksē un uzlabotās profesionālās kompetences.

Pētījuma dati apliecina, ka 98% respondentu attieksme pret supervīziju vērtējama kā pozitīva vai ļoti pozitīva.

Nozīmīgākie profesionālie ieguvumi supervīzijas gaitā, pēc pedagogu karjeras konsultantu domām, ir iespēja iepazīties ar citiem kolēģiem, izglītošanās par dažādiem profesionālās darbības aspektiem, saņemtā palīdzība reflektēt par iepriekšējo profesionālo pieredzi, jaunu izaicinājumu identifikācija u.c. Savukārt būtiskākie personiskie ieguvumi ir šādi: supervīzija veicina pašanalīzi darba situācijās, palīdz identificēt riskus un izvērtēt iespējas, ieraudzīt jaunas iespējas, palīdz apzināties pedagoga karjeras konsultanta personīgos resursus un paplašina redzesloku.

Iepriekš minētie pētījuma rezultāti apliecina supervīzijas kā profesionālās pilnveides un atbalsta formas nozīmīgumu un efektivitāti pedagogu karjeras konsultantu darbā.

Summary

The purpose of the article is to carry out a quantitative study on the use of supervision in the professional development of pedagogues-career counsellors and to analyse the results. Study method — structured written questionnaire. Pedagogues-career counsellors perform diverse tasks at schools, and supervision is a new tool for educating and supporting these specialists.

The study's results show that pedagogues-career counsellors are satisfied with supervision. Pedagogues-career counsellors think it is an appropriate form of professional development. They highlight the availability of acquired knowledge in practice and improved professional competencies.

Respondents are positive about the methods used in supervision. The main benefits of supervisions (in pedagogues – career counsellors opinion) are following: supervisions helps to become aware of strengths and weaknesses, promotes motivation at work, educates on various aspects of professional activity, promotes professional development, helps to more clearly define goals, helps to achieve the goals set, helps to prioritize, increases self-confidence, affects behavior, changes attitude, helps to understand the causal relationships, helps to become aware of personal resources, develops thinking etc.

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THE RECOVERY OF COMPREHENSIBLE MATHEMATICS

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Abstract. *The main objective is to get over the gap that exists between mathematics and common people, especially grown up people. Apart mathematical details, the problem lies in a good choice of notices (curiosity) and nice problems (play). Some historical notes about great mathematicians are presented and discussed, with explicit reference to the cases when the boundary between Nobel prize and mathematics was broken. Favourable fields are probability and operations research. Since probability tends to an excess of theory, operations research seemed to be a good choice. The Fields Medal, a kind of Nobel prize for Mathematics, was also considered, since in 2018 it was achieved by the Italian mathematician Figalli, former student of Scuola Normale Superiore di Pisa. He started from an important field in the frame of Operations Research, namely Optimal Transport. This sector allows to summarize a very nice procedure for its solution, non at all obvious to be trasferred to the computer. Since mathematics is forgotten in the course of life, except for those few parts of current use, to bring the adult back into the interest of mathematics, topics related to everyday life should be presented. Operations research, and especially network optimization, provide significant but pleasing problems.*
Keywords: Fields Medal, Optimal Mass Transport, Linear Programming, Stepping Stones, Duality

Introduction

Mathematics is forgotten in the course of life, except for those few parts of current use. To bring the adult back to the interest in mathematics, topics related to everyday life and (possibly) free from school exercises should be presented. However, curiosity for facts linked to the scientific actuality must also be satisfied.

The most sensational events in the world of science are the Nobel prizes. Everybody knows that the prize is awarded every year to scholars and to men of culture of the highest fame. In particular, for scientists there are prizes for physics, chemistry, medicine, more recently economics. The prize that is missing in science is that for mathematics, and therefore only rarely one of its scholars reaches, under false label, this goal. We will show later some examples between economics and mathematics.

There is also a world prize for maths. It is conferred only once every four years, on the occasion of the International Congress of Mathematicians. This is the Fields Medal, which is reserved for researchers under the age of 40, based on the fact that the maximum creativity of mathematicians, for consolidated experience, is achieved in youthful years. However, there is a risk that an important discovery will not win while its author is young, and there is no possibility of a change of mind. In the Nobel Prize, on the contrary, there were frequent cases of recovery that made the winner say "When I achieved the result, thirty years ago, I thought I deserved the Nobel Prize, ... now it has arrived".

The winners of the great scientific prizes usually come from prestigious research schools, and in the next section we will cite as an example the Scuola Normale Superiore di Pisa, where Alessio Figalli, Fields Medal 2018, was a pupil. We will also mention some of its eminent mathematicians.

As for a pleasant exercise, the choice will fall on the fashionable subject studied by the latest Fields Medal: optimal mass transport. The possibility of connecting an example that can be understood with a scientific result of world-wide value is an absolute rarity, and usually occurs only in the encounter between applicative problems and non-usual mathematical foundations. The economy, the social sciences, the non-deterministic biological and physical models, are lands of conquest more or less fortunate. In our example we will enter a field where it is possible to explain to the layman not only the result but also the technique with which the problem can be faced to obtain concrete results. The methodology section has this objective. The result section shows how they are interpreted to derive optimal solutions, and the conclusions suggest the critical analysis that must be used in the economic applications of mathematical procedures. In this way the reader will catch a glimpse of the road that led Figalli to his victory in the Fields Medal.

From History to Literature Review

The land of conquest of mathematicians is the economy, which to mention the most ancient cases, sees the victory of Vassily Leontieff (1973)[1], creator of the macroeconomic system of input-output matrices, of Leonid Kantorovich (1975)[2], who since the forties reopened the topic of mass transport, of the inventor of artificial intelligence Herbert A. Simon (1978) and that of the great game theory expert John F. Nash (1994).

The Scuola Normale Superiore of Pisa had among its students two Nobel Prizes for Physics (Enrico Fermi and Carlo Rubbia), and a mathematician for the Fields Medal, Figalli. It is one of the most prestigious scientific universities. For mathematics we must remember at least four distinguished names: Ennio De Giorgi (1928-1996), professor of analysis for 35 years; Enrico Bombieri, born in 1940, professor in the seventies, Fields Medal in 1974; Luigi Ambrosio (born in 1963) student and then fellow of the Accademia dei Lincei; Alessio Figalli (born in 1984), student and then graduate student, Fields Medal in 2018.

The name of De Giorgi crosses with that of Nash for the titanic challenge that engaged them between 1955 and 1958, aimed at solving the nineteenth problem of Hilbert (the regularity of the solutions of elliptic problems with discontinuous coefficients). De Giorgi came first (De Giorgi, 1957) starting, among other things, from sophisticated inequalities of isoperimetric type (generalized in De Giorgi, 1958), while Nash reached the goal in 1958 (Nash 1958) using the properties of the heat equation. Due to the concomitance of the results neither of them received the deserved Fields Medal. The story of those years is narrated with rich testimony by Parlangeli in his book on the life of De Giorgi (Parlangeli, 2015/2019, pages 57-67). In Piccinini's book on De Giorgi (Piccinini, 2016), the manuscript text of De Giorgi's demonstration is included in the appendix, as well as some comments on its contents (pag. 128-130). A broad discussion on the subject is found in the note by Piccinini-Lepellere (Piccinini & Lepellere, 2018), where the important final role of Moser (Moser, 1960) in the simplification of the proof is also specified.

In general, Fields Medal winners work in very sophisticated and complicated areas of mathematics, where only a few high-level and highly specialized colleagues can understand the extent of the findings. A philosopher would talk about esotericism. The exception is sometimes given by the theory of numbers, where the comprehensibility of some results, however, should not

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[1] The Input.Output matrix theory has led to the solution of various mathematical problems concerning the hierarchical order of economics, discussed in depth by some of the authors in (Chang, Piccinini, Iseppi, & Lepellere, 2013)

[2] He won with Tjalling C. Koopmans, who in those same years contributed to linear programming using the simplex method together with Dantzig.

make us think of ease of problems (falsely exoteric lessons). This was precisely the sector in which Enrico Bombieri won, in 1974 in Vancouver. But in those same years Bombieri participated enthusiastically and with refined authority also in the research of De Giorgi on the surfaces of the minimum area, a natural continuation of the research on the nineteenth problem of Hilbert (Bombieri, De Giorgi, & Giusti, 1969 and Bombieri, De Giorgi, & Miranda, 1969). At the *Lectio Magistralis* in Vancouver he surprised all those present, especially talking of his works with De Giorgi instead of his researches in number theory that had already given him international fame. In the opinion of who was present it seemed the first revenge of De Giorgi, while Nash had still to wait.

A very brilliant and original student of De Giorgi is Ambrosio, who took at the Scuola Normale the chair that was formerly his. He again touched the optimal mass transport sector, which had remained in the shadows for many years, being almost considered pure operationsl research. Here he has obtained important results, also connecting to problems dear to the Master, concerning the surfaces of minimum area and thin obstacles. Ambrosio in the book for the tenth anniversary of the death of De Giorgi (Ambrosio, 2008), wrote a note inspired by the theory of geometric measure, continuing the approach of the book completed years before by Piccinini and Colombini (De Giorgi, Colombini, & Piccinini, 1972 and Piccinini, 1973). His teaching was the basis of the formation of Figalli, his graduate and then Ph.D. student.

Figalli was the first Italian mathematician to renew Bombieri's success in winning the Fields Medal, 44 years later. Given his young age he did not have time to know De Giorgi, but through his teacher he has drawn numerous stimuli. In particular we like to observe that he inherited the curiosity for all the scientific knowledge, which distinguished the Master. In addition, he has developed an exceptional capacity for collaboration even in sectors that at first sight are far from mathematics, such as ecology, meteorology, and sustainable economic development policies, as is evident in some recent applications of Figalli and its collaborators. (De Filippis & Figalli, 2014; Figalli, 2018).

Inspired by this eclectic, but also understandable and stimulating approach, we have chosen a classic theme of optimal mass transport, combining geometric intuition, computer techniques, combinatorial calculus with applications to economics and logistics. The possibility of operating hands-on can give the reader a further reason for satisfaction.

Methodology

The problem. We will expose the problem in its classical form, referring for the most modern (but less readable) forms to Ambrosio (Ambrosio, 2003) and

Villani (Villani, 2009). We will provide the reader with the tools used in the traditional methods of solution so that he can experience them personally.

The problem of optimal mass transport was originally proposed by Monge (Monge, 1781) and then studied during the Second World War for military purposes as evidenced by the pioneering work of Kantorovich (Kantorovich, 1939).

The original problem is the following: a good available in deposits is required by the destinations. In the M deposits O_i are found p_1, ..., p_M units and in N destinations Dj are required r_1, ..., r_N units. For each route from O_i to D_j there is a unit price $c_{i,j}$ for the transport of materials. With a little trick one can suppose that the total availability of the deposits is equal to the total demand T. The problem consists in choosing the origins and the destinations served by each one, which we indicate with $x_{i\,j}$ from O_i to D_j, so that the total cost

$$C = \sum_{i,j} c_{i,j} \, x_{i,j} \qquad (1)$$

is minimal, continuing to satisfy the consistency conditions on the origins and destinations.

The problem belongs to linear programming and can be solved by the simplex method found by Dantzig and Koopmans (Dantzig, 1963). Unfortunately, this straightforward method requires a huge increase in the number of unknowns. Why is there a faster method? Even the amateur understands a logical thread in the fact that it is easy to construct a feasible solution. Of course, in general it is not the best solution and therefore needs to be improved.

The easiest way is called the "north-west corner". It starts from the first deposit and replenishes the first destination until either the availability of the origin or the request of the destination is exhausted. In the first case we proceed with the second origin, in the second case with the second destination and so on. In the last step the last row and the last column are exhausted together. All solutions that, like this one, have M+ N - 1 non-zero elements are called "basic solutions". Except for degenerate cases the optimal solution is a basic solution.

Originally when the calculation was largely manual, and when computers were not very powerful, it was useful to start from a basic solution that was already closer to the probable end result. The method of the northwest corner was not always bad because the problem was often geographic and the costs were proportional to the distance between storage and destination. If the origins are listed according to a reasonable geographical order and destinations as well, it can already provide a good basic solution.

There are more powerful methods of approximation that take into account transport costs from the beginning, and then accelerate the process using a

preparatory work. Classic are the minimum methods per row or per column and the minimum per matrix, which are usually quoted in the classical books of operational research.

Tools: graphs and trees. Graphs and trees are elements of daily life that show a strong interconnection between combinatorics, geometry and information structure. Graphs represent the schematization of a network in which interconnections count, but not the actual design of their route (railways, subways). The method of representation using graphs is very old, so much that one of the most famous works is the Peutingerian tabula published by Miller (Miller, 1887). It represents the roads of the Roman empire, and the linear compression implemented to obtain the portability of the roll distorts all the proportions, but not the significant elements relating to the road nodes and the main localities that dot the streets. To remedy this, it is useful to explicitly write data about the nodes, such as the name, or the size of the city, but also data relating to the arcs that join the nodes, such as the length.

Among the many types of graph a particular relief, even conceptual, is assumed by trees. In this case there is a system of nodes, one of which forms the root of the tree, while the others are reached by a single arc coming from the lower levels. In this way all the nodes are reached and there are no cycles that come back on themselves. In this way every tree of N nodes (including the root) possesses exactly N-1 arcs. Figure 1a illustrates the example of a tree, in which, as in the genealogical trees, the root is represented at the top.
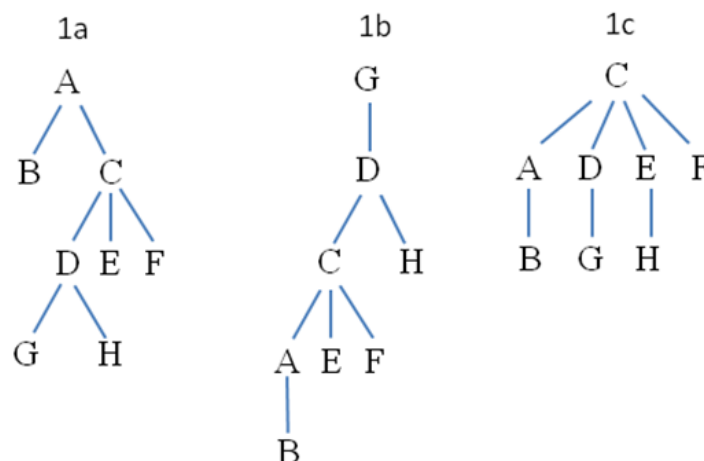
*Figure 1 **Equivalent trees with change of the root***

In a tree, any node can be taken as a root, and there are some invariants, first of all the number of arcs necessary to establish the connection between two chosen nodes. Figure 1b shows the tree 1a starting from one of its final branches, while the 1c shows it starting from an intermediate node.

On the computer efficacious representation of a tree is required. The visual image, comfortable for a man, does not allow further geometrical and algebraic elaborations. It is necessary to represent structural data without losing important information. The first systematic analyses were performed using the connected lists created by Simon and his collaborators in the pioneering study on artificial intelligence (Newell, Shaw, & Simon, 1957) as he recalls in his autobiography (Simon, 1991). Actually, connected lists became one of the pillars of information technology only with the work of Knuth (Knuth, 1968).

The representation of order 0 is the list of the nodes. Even dividing nodes into levels, there is the loss of information (who is the father?). The number of elements that come from each element of the higher level must be known at each level. Thus in the case of Figure 1a the list may be the following, and the patient reader can write the lists of 1b and 1c.

List 1a
Level 0:   A;
Level 1:   B, C;
Level 2:   nil; D, E, F;
Level 3   G, H; nil; nil.

If the empty subsets (nil) were not reported, the origin of the nodes at levels 2 and 3 would no longer be known. This representation also makes it possible to distinguish the order in which descendants enter, and symbolically represents the succession visible in the figure.

Hierarchical representation of trees is common in managing folders on the computer. To go from one folder to another, it is necessary to go back up to the first common ancestor and then go back down along the other branch. This is the criterion that is also followed in the genealogical trees; there are cases in which the number of strings counts both upwards and downwards: in Italy the kinship goes up to the sixth degree, that is to say that for example a brother is a relative of second degree, an uncle is a relative of third, the cousins are fourth-degree relatives, the grandfather's brother is also fourth-degree, the son of a father's cousin is of the sixth grade and so on. The tree 1c represents the kinship related to the subject C, where at the first degree there is the father A and there are the sons D, E and F, while at the second degree there is the brother B and the two grandsons G and H. The degree of kinship remains unchanged also by changing the structure of the tree, as it only counts the number of branches. You can try to reconstruct the path from H to B in the three figures, always finding 4.

Orthogonal trees. A special type of tree is used in the quick procedures for resolving the discrete problem of the minimum cost assignments. The first step is to work on two matrices of M rows (origins) and N columns (destinations).

The former remains fixed and contains the unit costs of transferring from one source to a destination. The second matrix contains the assignments made according to availability and requests. The optimal solution is a basic solution that has exactly $N + M - 1$ assignments, checking that each row and each column are covered. The procedure allows the system to be improved at each step by reducing the total cost until no improvement is possible. The assignments are characterized by a coordinate that expresses the row and one that expresses the column. The basic assignments are usually listed in row order from left to right.

| | 2a *Frame* | 2b *Tree, root in (1,1)* |
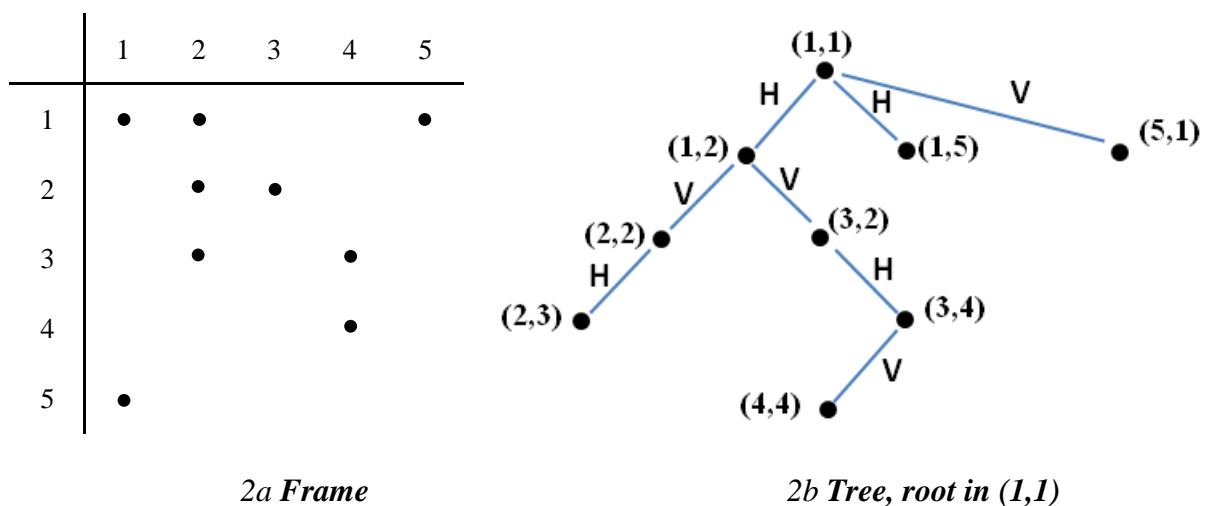
Figure 2 Rectangular complete Tree

Figure 2a shows an example of data assignment and figure 2b shows the orthogonal tree. It starts from the first line and in it all the assignments are searched. The first assignment is assumed as the root of the tree and has the level 0. The other assignments are distinguished by level 1 and by the indicator H (horizontal). We then look for the assignments that are on the same vertical line, and they will also be marked by level 1 and by the indicator V (Vertical). No need to attribute a direction to the root. Then we proceed as in the normal analysis of any tree. In the second level there will be vertical assignments coming from H nodes, and will be indicated with the 2V level, or in horizontal assignments coming from V nodes, which will be indicated with level 2H. Why are you sure that no other descendants are horizontally starting from an H node? Try to do the analysis in Figure 2, starting from the root (1,1), and then, if you have worked correctly, you will find the answer.

Rectangular path. A rectangular path is that in which the direction is changed at each node. The path that connects two nodes according to what we saw in the section on the grammar of trees is already a rectangular path because each connector of a level with that of the upper level alternates the direction. The only exception can occur in the meeting node of two ascending paths. Here,

in fact, both ascending branches can have the same direction. In this case the meeting node must be deleted.

We give two examples with the tree of Figure 2b

Liv 0 (1,1);
Liv 1 (1,2) H, (1,5) H, (5,1) V;
Liv 2 (2,2) V, (3,2) V; nil; nil;
Liv 3 (2,3) H; (3,4) H;
Liv 4 nil; (4,4) V.

For the example of figure 3a the orthogonal connection from (4,4) to (2,3) is needed. With the rules established for the exploration it results (4,4) V (3,4) H (3,2) V (1,2) and respectively (2,3) H (2,2) V (1,2). The welding knot is reached in the same direction and is therefore deleted. The resulting path is therefore (4,4), (3,4), (3,2), (2,2), (2,3).
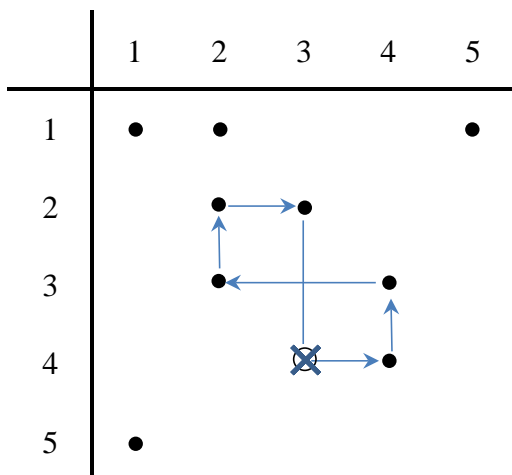
*Figure 3a **Closed path starting from (4,3)***   *Figure 3b **Closed path starting from (5,2)***
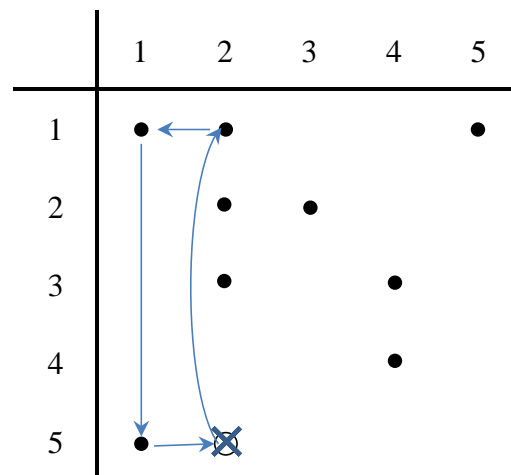
The *stepping stones* procedure is an extension of the previous one because a rectangular polygon (that is a closed rectangular path) must be constructed starting from a non-node point (v, h). The procedure involves finding in the vertical section starting from (v, h) either the node (y, h) belonging to the class H or the root, while in the horizontal section either the node (v, x) belonging to the class V, or the root. In the case of Figure 3b (v, h) = (5,2). It will be noted that in the search for the vertical connection there are three nodes (1,2) H, (2,2) V, (3,2) V. The only node classified H is to be chosen, namely (1,2). For the horizontal connection there is the node (5,1). The two paths (5,2) V (1,2) H (1.1) and in the other direction (5,2) H (5,1) V (1,1) will result. Since the welding knot is reached from different directions it remains, giving place to the path (5,2), (1,2), (1,1), (5,1), (5,2).

The value system. Before the assignment matrix there is the data matrix, where in each box are reported the unit costs from a source (row) to a destination (column). Once a basic allocation is made, it is useful to highlight in the data matrix only the committed boxes. In fig. 4 a possible set of costs associated with the matrix of fig. 2 has been reported. To simplify the subsequent calculations (MODI method) it is useful to characterize the rows and columns with a row indicator and a column indicator so that the cost of a committed box is the sum of the two indicators. In this way it appears that the indicators must satisfy a system of M + N -1 linear equations in M + N unknowns. Therefore one indicator of the root can be arbitrarily chosen and then the following are calculated in the order of exploration of the tree in fig. 2b. Each one is the difference between the cost of the current box and the last indicator found, as shown by the marginals of the matrix in fig.4.

		4	5	6	8	2
		1	2	3	4	5
0	1	4	5			2
-2	2		3	4		
-2	3		3		6	
-7	4				1	
-2	5	2				

Figure 4 **Frame 2 with quoted nodes. Value according tree of 2b [root in (1,1)]**

The rectangular polygon seen in the previous subsection plays a key role in improving the allocation structure. In fact, given an allocation, suppose to insert a new node. It will be inserted into a rectangular polygon with an even number of angles (2k). The new node is the reference point, indicated with 0, the following nodes in the path are numbered up to 2k-1. To keep the balance of the assignments the sum of each row and each column must remain equal. This is achieved by removing a unit in the odd nodes for each unit added to the new node, compensating by adding one unit in the even nodes. The result, given the construction of the indicators, is obtained by subtracting from the cost of the new unit (in the example (4,3)) the sum of the corresponding row and column indicators. Figure 5 shows the explicit sum of the costs of the removed nodes, which (changing the sign) is equal to the sum of the two indicators of the new unit, for a total -7 + 6 = -1. The indicator system corresponds substantially to the

dual variables of the simplex method, as shown by the marginals of the matrix in fig.4.
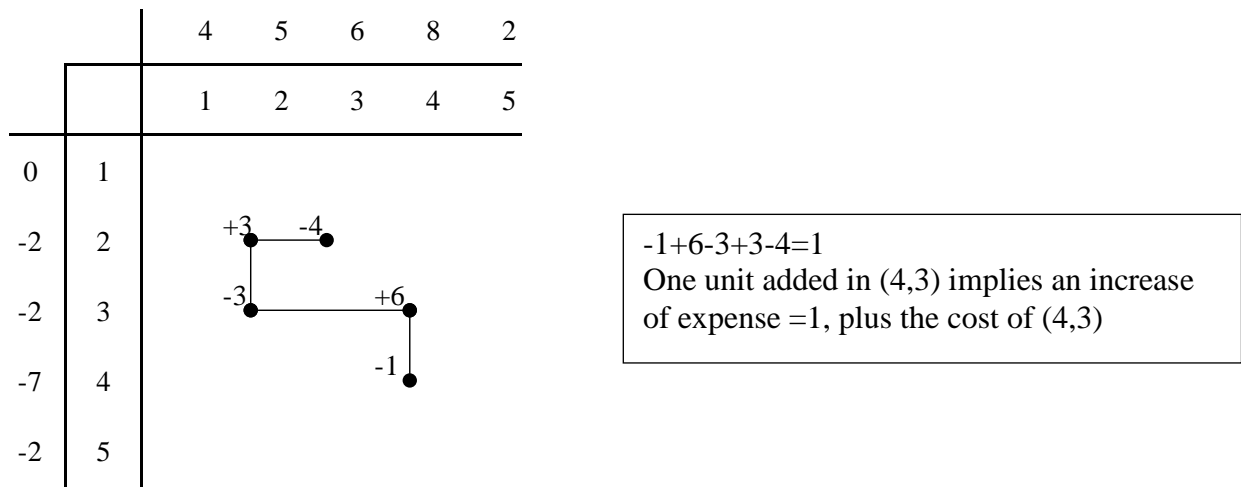
Figure 5 Increase in (4,3) using the closed path (3a)

If the cost of the new unit minus the variation is negative then the attribution to the new box decreases the total cost of the system. Since the nodes where the unit decrease occurs are the odd ones, the maximum amount that can be moved in the new box is equal to the minimum allocation of the odd boxes. The box that generated the minimum will disappear from the new base assignment, in the other nodes alternatively are added (even) and removed (odd) as many units as those of the new assignement[3]. Any other zeros remain assigned with value 0, so that the solution is always constituted by the M + N -1 assignments. If the minimum is 0, then in the new box the assignment is also 0. The problems where this situation occurs are considered degenerate, but they are usually resolved in the same way, provided a solution already examined is not chosen again. The problem is the same that occurs in the simplex procedure in the presence of degenerate cases. The procedure continues in the same way, each time looking for a new allocation where the difference in values is negative.

To verify that a solution is optimal (not necessarily unique) it is enough to build its set of indicators, and to verify that there are no boxes with a negative difference. The presence of null boxes implies the presence of more than one solution with the same minimum value. Remark that (fortunately) it is not necessary to explore every basic configuration, and usually the procedure ends very fast. Anyhow the number of the basic solutions is finite, and at each step a new solution is achieved, therefore the procedure has a finite stopping time.

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[3] The possibility of varying the value depending on whether you add or remove a unit in the rectangular polygon shows that an optimal solution should not be able to undergo this process and therefore that there can be no more than M + N-1 allocations.

Analysis of the results

Before analyzing the way to eliminate multiple solutions it is necessary to explain the techniques that are used when there is no balance between the origins and the destinations. When resources are missing it is possible to add a fictitious deposit that covers the defect. By attributing the cost 0 to each of the destinations, one re-enters the canonical problem. In the case of oversupply, a fictitious destination is added that absorbs the surplus. Also in this case the basic choice is to impose the cost 0. The assignments of diversified costs for the fictitious cases allow to create a penalty system that privileges certain origins and destinations according to the needs of the system. These types of correction, and also other methods of estimating the variables, or splitting the final values into distinct blocks are generally explained in the operations research books, such as those of Ackoff-Sasieni (Ackoff & Sasieni, 1968) or Hillier-Lieberman (Hillier & Lieberman, 2005).

One way of eliminating the plurality of solutions in degenerate cases is that of data perturbation. The degenerate cases arise when the sum of the data of a part of the origins coincides with the sum of a part of the destinations. Then it is sufficient to perturb a little all the data of the origins, and add a fictitious column having the request equal to the sum. An example is $E = MIN / (2M + 2N)$, where MIN is the minimum of the source and destination data. The final result will be purified of the perturbation and will give the correct result without having the problem of avoiding cycles in the presence of multiple solutions. In particular if the data are all expressed by integers, then the solution is in turn made up of integers[4].

These observations allow *inter alia* to use the algorithm described above to solve the problem of optimal assignment[5]. The current procedure of using the simplex method is cumbersome, and therefore specific algorithms for this problem are preferred, but the mass transport method maintains a good efficiency. A good polynomial method is however the Hungarian method, described extensively by Lovasz-Plummer (Lovasz & Plummer, 1986) and well exemplified by Andreatta et al. (Andreatta, Mason, & Romanin, 1990).

For the multiplicity of optimal solutions we recall the classical example of the *Book shifting*. It requires that the N books placed in a shelf [0, N-1] be moved to the location [1, N]. If the order is not required, two extreme cases are possible: either all the books are moved by one unit (and in this case the order is preserved) or the books of [1, N-1] remain still and the first book migrates from

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[4] When the problem is studied in linear programming, the matrix that characterizes it is totally unimodular, what guarantees that the solution in the presence of ineger data will also consist of integers.

[5] The students of one of the authors have implemented the algorithm described above and then it was actually used by colleagues of demography of the Faculty of Statistical Sciences of the University of Padua.

0 to N. If the cost of the transfer is equal to the length of the route both cases have the value N, in a case given by N * 1, in the other case given by (N-1)*0+1*N. At pag. 10 of Ambrosio's lectures (Ambrosio, 2009) the case of Cost = Distance is analyzed, but the case Cost = Distance * Distance (page 11) is very interesting. While the first case continues to give the value N = N*1*1, the second case (jump) gives a much greater value N*N = (N-1)*0+1*N*N. In this case the Brenier-Rachev-Knott-Smith theorem guarantees that the minimum solution (distributed shift) is unique (Rachev & Rueschendorf, 1989).

However, it is enough to make the model more realistic, by establishing that there is a set-up cost C for each operation, independent of the distance to be covered so that the presence of economies of scale can be detected, what could suggest the solution of the single movement, even if it is longer. This happens also in the elementary case of two positions.

In the case when the shift occurs into the following box we have the table 1a, while the case of the jump to the end is in the table 1b.

*Table 1a **Fundamental case of non-unicity with translation***

		C+1	2(C+1)		
		Cost 1	Cost 2	Ass 1	Ass 2
0	0	C+1	C+4	1	Index= -C+2
-(C+1)	1	0	C+1	0	1

*Table 1b **Fundamental case of non-unicity with jump***

		C+1	C+4		
		Cost 1	Cost 2	Ass 1	Ass 2
0	0	C+1	C+4	0	1
-(C+1)	1	0	C+1	1	Index= C-2

In the case of table 1a, if C = 2 the solution is optimal, but not unique. If C < 2 the solution is optimal and unique. If C > 2 the solution must be optimized by switching to table 1b. If C = 2 this solution is also optimal and therefore there is no uniqueness, otherwise the conclusions of the previous case are inverted so that C < 2 requires table 1a, while C > 2 gives the unique optimal solution.

The phenomenon is due to the lack of convexity of the cost function, so that the hypothesis of the Brenier-Rachev-Knott-Smith theorem is violated and therefore the uniqueness of the solution is not predictable. Economically the meaning is that if there are set-up costs at some point the economy of scale can arise (here C=2). For that value of indifference both solutions are acceptable.

Conclusions

While the resolutive techniques, such as the one shown above or that of the simplex serve to solve problems of large size, but not necessarily complex from the conceptual point of view, to understand the behavior of the solutions it is appropriate to resort to simple but significant examples. This is a concrete realization of Einstein's sentence "Things must be explained in the simplest way possible, but not simpler than that". The cases useful for understanding the phenomenon can be quite simple.

The reader can analyze the case of more than two nodes or the possibility to modify the cost allocation rules and draw the economic conclusions. Another interesting problem arises when the distance system is perturbed, as it happens during wars, earthquakes, floods. Resilience must fight against optimality. *Bounded rationality* (according Simon) is to be expected, but what is its price?

In operational research the boundaries between mathematics and its applications to the real world are very blurred and therefore are a source of reasoning combined with experience. The reader interested in a wide panorama of the optimal transport in the course of its historical evolution will be able to consult the book of Villani (Villani, 2009) and the last papers of Figalli (Figalli, 2018).

Summary

The paper starts with the description of the Fields Medal, equivalent of a Nobel prize for mathematicians. It is awarded every four years and is directed to mathematicians younger than 40. Generally the winners work in very complex sectors and only a few high-level colleagues can understand the extent of the findings. 2018 saw a new Italian victory after Bombieri in 1974. Alessio Figalli, formerly graduate student at Scuola Normale di Pisa, worked between mathematical analysis and operations research. This time even those who are not specialists can understand some of the problems faced, and can try to follow some solution procedures. Furthermore, applications to economics and logistics are easily seen. Figalli's research began with the problem of optimal mass transport, originally proposed by Monge and then solved during the Second World War for military purposes. An asset available in deposits is required by the destinations. In the m deposits O_i, we find $p_1, ..., p_m$ units and $r_1, ..., r_n$ units are required in the n destinations D_j. For each route from O_i to D_j there is a unit price c_{ij}, for the transport of materials. With a little trick one can suppose that the total availability of the deposits is equal to the total demand T. The problem consists in choosing the quantities x_{ij} between O_i and D_j, so that the total cost $C = \sum_{i,j} c_{i,j} x_{ij}$, is minimal, continuing to satisfy the balance conditions. The problem falls within linear programming and can be solved by the simplex method, at the price of greatly increasing the number of unknowns. Why is there a faster method? Even the amateur

guesses a logical thread in the fact that it is easy to construct a feasible solution. However, in general it is not the best solution and therefore needs to be improved. The direct procedure is rather easy to grasp for a manual computation, since a graph can help the intuition, but becomes more complex on the computer that has no eyes. In the paper we sketch also this approach, useful in problems of great dimensions, where the main road of the simplex method cannot be applied in view of the huge dimension that it should attain. The generalizations of the optimal transport methods cannot be afforded in this introductory paper, but some selected references can properly drive the curious student.

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EXPLORING THE FACTORS INFLUENCING ETHICAL CONSIDERATIONS IN REPORTING ON MIGRATION ISSUES IN LATVIAN NEWS MEDIA

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Abstract. *This article analyses the perceived importance of various influences on the ways in which Latvian local and national news media (print, online, TV, radio) have reported on migration issues and the process of accepting asylum seekers in Latvia during the last years. Previous studies indicate that the framing in media content depends on a large number of considerations such as general principles of ethical reporting, the established cultures inside media, and – in many cases – the individual perceptions of the "right" and "wrong" of the journalists and editors. The current study applies a qualitative approach drawing on 13 semi-structured interviews with media editors. The data analysis reveal how the perceptions of various individual, procedural and cultural influences intersect with the journalist perceptions of media roles, responsibilities and duties in a democratic society. Based on the results, suggestions are made about the opportunities of lifelong learning training development for journalists.*
Keywords: media ethics, migration reporting, news media.

Introduction

"Managed migration" has become a new policy framework in Europe since 2000 (Balch, 2010, 19). At the same time, immigration has become one of the main subject of news coverage and, in many parts of the world, also related to political contradictions (Hallin, 2015, 876). As the previous research reveals, on one hand, mainstream journalism is trying to follow professional ethics of reporting about migration (Horsti & Nikunen, 2013, 489), on the other hand, media are frequently criticized for "stirring up debates around immigration" (Balabanova & Balch, 2010, 382). Such findings call for further explorations on what are the factors that shape the ways in which media report on migration.

The aim of the current study is to analyse the perceived importance among Latvian media news editors of various influences on the ways in which Latvian news media (print, online, TV, radio) have reported on migration issues and the

process of accepting asylum seekers in Latvia during the period of 2015 – 2016. It was the time when European Union (EU) experienced high rates of immigration. This period is often referred to as a "refugee crisis" (Newland, 2016). The research question of the study is the following: How do news content editors perceive the role of various social influences on the news framing and reporting about migration issues in Latvia and Europe?

Social influences on ethical decisions in migration reporting

Previous literature suggests that journalists in their work and decision making rely on various cues, which journalists adopt through learning, training and socialization into profession (Cook, 1998). Several theoretical interpretation of these structures of cues exist. Some previous studies emphasize the macro-level, arguing about cultural and ideological aspects to be influential on reporting (e.g., Preston, 2009), along with systemic, political and economic influences (e.g., Hallin & Mancini, 2004; Hanitzsch et al., 2010). Others take a broader approach and also include the mezzo- and micro-level aspects, as did Voakes (1997), who, focusing on ethical decision making, found seven different social influences: individual, small group, organizational, competition, occupational, extra-media, and legal. However, previous literature makes it clear that the media systems – varying from liberal, democratic corporatist and polarized pluralist – are very complex and each has its own elements of influences that make them operate according to different logics. The media system in Latvia is characterised as hybrid, lacking one dominant paradigm (Skudra, Šulmane, & Dreijere, 2014). It has characteristics from the liberal media model, the democratic corporatist model, and the Mediterranean or polarised pluralistic model, namely, very liberal media regulation, high level of political parallelism, commercialization tendencies co-exist with weak system of self-regulation, low level of professionalism and accountability towards the audience (ibid.). As it is pointed in the previous literature, the "states" that media take and the modes of operation depend on cultural, economic and political context and circumstances, and the content also influences the dominant framing of news about migration (Hallin, 2015). Human-interest framing is more used in a liberal media system; besides, human-interest framing is more common in popular media outlets than elite-oriented media outlets (Figenschou & Thorbjørnsrud, 2015, 787). It has to do with the fact that "people who already hold a liberal attitude toward immigration prefer, and expose themselves to more human interest–oriented news stories" (Aalberg & Beyer, 2015, 871), while others find personalized reporting of immigration disturbing (Aalberg & Beyer, 2015, 870; Beyer & Mattes, 2015). Other studies indicate that there is a tendency for journalists to use a frame of conflict when discussing social issues and highlighting oppositional views (Horsti & Nikunen, 2013,

500). Hallin (2015) outlines that news coverage about immigration may vary depending on the cultural associations attached to the issue, and the way news interact with demographics of the media audience (p. 877, 879). For example, market driven media might perceive immigrants as unattractive news coverage to their audiences and advertisers (Beyer & Mattes, 2015, 842). Hence, commercial pressures might not lead to the human-interest reporting. In the systems with strong public service culture and professionalization of public service broadcasting journalists more likely feel obligation to focus on the perspectives of marginalized groups in the society (Benson, 2013, as cited in Hallin, 2015, 878).

The portrayal of a "good" asylum seeker (meaning – the one which is grateful, willing to work, learn the local language, seeking asylum because of political reasons) versus a "bad" one (related to threats, risks, illegality, unsafety, seeking asylum for economic reasons) is found to be a common feature in media content (Hellman & Lerkkanen, 2017; Lulle & Ungure, 2015). Immigration "threat" frames often dominate together with reports of a "flood" of "aliens" (Chávez, 2008; Santa Ana, 2002, as cited in Hallin, 2015, 878). McKay, Thomas and Blood (2011) found that media overwhelmingly refer to the numbers of the immigrants arrived, thus creating an image of an "unstoppable wave of asylum seekers" (p. 619). Media often refer to immigration as a threat: potential source of illnesses (Butterworth, 1966, 358), insecurity, increasing levels of crimes (Greenberg & Hier, 2001, 573, 574), risks of riots and drugs, sexual aggression, religious fanaticism and terrorism (Cottle, 2000, 5, 15). Previous research also raises concerns about the problem that immigrants' voices are often absent from the public debate, which leads to a situation where immigrants are perceived as outsiders in relation to the rest of society, and the opportunity of creating a vision of a nation with a multicultural life is missed (Horsti & Nikunen, 2013). Furthermore, the images of immigrants posted in publications often show immigrants in a worse light than the text itself (Hallin, 2015). Horsti and Nikunen (2013, 501) conclude that "this demonstrates the inadequacy of agenda setting without a more profound ethics and understanding of the transnational dimensions of society".

Background of the study

In terms of the "journalistic infrastructures" (Dimants, 2018, 143) that exist outside the media outlets and shape the larger context in which media operate, Latvian media environment is characterised by three different journalistic cultures that compete within the Latvian media system, and they differ in the ways of understanding media accountability and media roles in the society (Dimants, 2018). First, there is a traditional Russian journalistic culture characteristic of the minority of the Latvian media, second, an instrumental and authoritarian (post-Soviet) journalistic culture, and, third, a modern (Western)

journalistic culture with an orientation towards achievement of high journalistic professional standards and journalistic autonomy (Dimants, 2018). Weak system of media accountability is partly a consequence of strong market pressures and commercialization that has challenged Latvian media system since 90ties (Lauk & Jufereva, 2010). Second, the professional media workers' community is divided. There are two professional associations: the Latvian Journalist Union (LJU), which was established in 1992, and Latvian Journalist Association (LJA) that was founded in 2014 (Ločmele, 2017). The LJU does not have a member registration. The LJA, by the end of 2018, united 126 individual members (LŽA, n.d.). Some other professional associations exist, among them Latvian Press Publishers Association and the Latvian Broadcasters Association, but they do not deal with media professionalization issues, rather focusing on lobbying for economic interests of commercial media (Dimants, 2018). Third, currently, there is no single code of ethics binding the entire media sector; different media follow different codes of ethics: their own codes or either the code issued by the LJA in 2014, or the code of the LJU that dates back to 1992 and has never been amended (Ločmele, 2017). It is included in the Action plan of the Latvian Media Policy Guidelines for 2016–2020 to draft a proposal of common ethical standards (Ločmele, 2017). By the end of 2018, the Media Ethics' Council was established (Lsm.lv, 2018), which is going to serve as a self-regulatory body handling complaints about media ethics' breaches. However, accession to the Council is voluntary, and its decisions will be binding only to the member organizations.

Fourth, a critical public debate about the media accountability, responsibility issues and roles of media in a democratic society in Latvia is only emerging. For years, the only place where media critics and latest research was published, was the internet site www.providus.lv (Lauk & Jufereva, 2010). Currently, public broadcasters try to fill in the gap: the Latvian Radio runs a monthly discussion program "Media anatomy" where media representatives, media researchers and other invited experts participate. Every now and then media accountability and professionalism issues are tackled in the weekly discussion program "Tieša runa" ("Direct Speech") in the first channel of Latvian Television.

Finally, media workers in Latvia are offered very few and only occasional project-fund based possibilities for life-long learning (e.g., training programs are offered by the Baltic media centre for excellence). Therefore, it is emphasized in the document of Latvian Media Policy Guidelines for 2016–2020 (Guidelines, 2016), that it is of crucial importance to extend the opportunities for media professionals to improve their skills and knowledge in the field.

After re-gaining independence in 1991, Latvia has had a rather fragmentary experience on welcoming asylum seekers. For example, from 1998 to 2014, a

total of 1440 asylum applications were received by the Latvian authorities. In 2017, 395 persons submitted asylum applications, 158 out of them - relocated from Greece and Italy, but 40 persons resettled from the refugee camps in Turkey (OCMA, 2018). However, in 20th century, Latvia went through significant ethnic changes due to inward migration from other Soviet republics during 1951-1990. During this period, more than two million people arrived in Latvia making the ethnic proportion of Latvians drop from 77% in 1935 to 52% in 1989. This was an aspect stimulating strong public discourse against in-ward immigration after regaining country's independence in 1991 (Eglīte & Krišjāne, 2009). As suggested by Šulmane (2010), media outlets in Latvia continuously reflect the overall feeling in the society as being threatened by external influences. As it was observed recently, in Latvian media a "heightened sense of external threat" emerged during the current migration peek in Europe (Lulle & Ungure, 2015, 83). However, emergence of discourses of solidarity and hospitality also could be observed (ibid.).

Methods

The participants of the study

For the purposes of this paper, 13 news editors from different media outlets were interviewed. In the sampling process, we distinguished between various formats and platforms: press, radio, TV and the Internet (online), as well as public media and commercial media, as well as national and local media.

Data collection

Semi-structured individual interview was chosen as the most appropriate data collection method. The interviews were structured in two blocks of questions: first was about the ethical issues related to the ways in which Latvian media reported on immigration during the "migration crisis" period, and second was about more general aspects related to the status of codes of media ethics in the media outlets that the respondents represented. In the first part of the interview, the respondents were asked to express their overall impressions and highlight particular issues that they considered as problematic from the media ethics perspective. Considering how often the migration reporting is examined through content analysis, and how rare are studies that employ other data collection methods, our interview material provided valuable insight in the factors that actually shape and influence the content production. Each interview lasted for 40 – 60 minutes. Interviews were audiotaped and later transcribed. For the purposes of this paper, only the parts about immigration reporting from the transcripts were used.

Data analysis

Each interview was transcribed and coded according to the principles of thematic coding (Gibbs, 2007). The initial coding of interview material was carried out in order to move from descriptions to analytical categories. Constant comparison approach was applied to find the similar codes in different interviews, and arrive to a set of the dominant themes.

Results and discussion

In this part, we analyse the perceived importance of various influences on the ethical consideration and the ways in which local and national Latvian news media (print, online, TV, radio) reported on migration issues and the process of accepting asylum seekers in Latvia during 2015 – 2016. It was the period when European Union (EU) experienced high rates of immigration, and is often referred to as a "refugee crisis" (Newland, 2016). The section is structured around the following themes that emerged during the analysis of the interviews: the cultural, societal, market, procedural and other influences on ethical considerations about migration reporting, and the perceptions about the media role in a democratic society.

Cultural and societal influences

Media coverage related to immigration processes during this particular period, according to our respondents, could be characterized as a battle between two extremes. Some media stuck to stereotypes about immigrants as Muslims and potential terrorists, about cultural differences that Latvia as host society would not be able to overcome, while other media cultivated liberal, humanistic ideas, and propagated the country's role in global processes and responsibilities of Latvia as a member of EU. In the words of one of our respondents:

> *Media took the migration crisis as a very serious topic... as something that had to be covered a lot. Migration may cause consequences on our future. Many link it [migration] to terrorism risks, others held the opinion that our society may experience further fragmentation and division between ethnic groups. Many think that we should integrate them [migrants] and in this way increase the number of inhabitants. Many diverse opinions are there. They all deserved to be covered by media.* (Respondent 3).

During the interviews, we captured reflections on the thought expressed by Šulmane (2010) that overall negative feeling in the society about immigration has deep historic roots:

> *Latvian public is very much against immigration, and we as media can do very little about it... It is related to the stereotypes in the society, the fear and historic experience, fear from foreign cultures.* (Respondent 4).

Some of our respondents challenged this claim by saying that media leaned towards the opinion that society in general has a negative view on immigration processes and that asylum seekers are undesired and not welcomed in our country. Thus, it can be said that Latvian media failed to act as meaningful hosts (Silverstone, 2007) – media missed the opportunity to organize co-presence of multiple voices thus they did not extend the discussion about immigration towards multiculturalism (Horsti & Nikunen, 2013). As Respondent 1 explained:

Media tried to guess the mood of their audiences. Unfortunately, media believed that people Latvia are mainly conservative. Therefore, media adjusted their tone according to this belief. On the other hand, the division between "ours" and "not-ours" is something that immediately is recognized in our society. Media exploited it. (Respondent 1).

Respondent 1 considered it to be morally wrong of media to promote the divide based on ethnic grounds. He told during the interview, that the medium he works for closed the comments' option for news pieces about immigrants – due to the aggressiveness that was expressed in the comments. In his eyes, this was a move signalling about the stance that the medium chose to take in order to hamper the spread of negativity. He was arguing that in democratic countries media role is to *"stand for all humans"*:

Imagine, the migrant has just arrived, he has nothing... Then it is the duty of the journalists to stand for him, to support his perspective. Journalists had to take positive and supportive stance which they did not. (Respondent 1).

Another of our respondents noted that during the "refugee crisis" period media generally failed to use their tools and power to try to promote societal cohesion:

Especially TV channels could focus more on real stories – take some real asylum seekers as examples; let them be part of the whole thing. How they have arrived, what is their background, where and why they flee from... Then after some time, how they find a job, about the families. The real stories... It could work, I think... Instead of believing that everybody in Latvia is afraid of refugees and against them. Of course, it means that the journalists have to put effort to find such stories... If we only got to know such families, I think, everybody could make such a story. (Respondent 4).

The theme about Latvia and a member state of EU and the duties associated with this appeared in our interview material. As one of our respondents outlined, media had to explain to the audience that Latvia has certain duties as an EU member no matter whether it is liked or not:

Does not look good that we take EU money ... but do not want to give anything in return.... Although some politicians and media find it difficult

> *to accept it... So are we here, - admitting it with clenched teeth...* (Respondent 2).

Established practices and procedural influences

According to our respondents, opinion-based content in the lines of "he said she said" journalism (Rosen, 2011) largely dominated media content during the whole "refugee crisis" period, thus preventing media from providing deeper insight into the complexity of migration processes to their audiences. Rosen (2011) explains that "he said, she said" journalism means that a journalist does not make an attempt to assess or do fact check on claims that he or she collects from public disputes, instead confronting the claims as two opposing and often extreme sides. Several of our respondents noted that media did little or no analysis about the problematics related to migration; instead, they were going after colourful opinions that contradicted each other. As the most popular sources, politicians, state officials and different interest groups served. Media in this way were creating the frame of conflict (Horsti & Nikunen, 2013) around the immigration topic. Some of our respondents did not see as a problematic issue. As Respondent 1 explained:

> *... we collect opinions and then publish in the exact same form, without changing. We do not produce analytical materials with opinions from our journalists.* (Respondent 1).

However, other respondents considered such an absence of deeper analysis and reliance on opinions by some of our respondents as wrong and not beneficial to the best interests of media audiences. At the same time, our respondents suggested that market logics guided media – they aimed for audience attention. As one of our respondents said:

> *Media failed in providing deep analysis [about immigration processes]. Instead, they [media] concentrated on polarized opinions. No further elaboration, content with very little added value ... I think, this was not journalists' intention to create a negative image of immigrants or something, not necessarily. My guess is that in such ways media hoped to earn more clicks... The more controversial title you can put, the better... It is the same as with bad "bloody" news.* (Respondent 3).

Apart from "he said she said" style of journalism, another problematic aspect in immigration coverage was that media focused mainly on formal facts – numbers, statistics, changes of legislative acts, aspects in immigration policies – instead of human-interest stories. Journalists were massively reporting about the formalities, probably, as one of our respondents speculated, to convince the audience that the situation is under control, something that is previous literature has been explained as controlling imaginary "unstoppable flow of asylum seekers" (McKay, Thomas, & Blood, 2011). Our respondents argued that partly such practice was caused also by over-reliance on press releases that were

prepared and issued by different state and non-state actors involved in the immigration processes. For many weeks during the "peek" of crisis in 2015, media followed the discussions in Latvian Parliament about the number of asylum seekers that Latvia would accommodate. Our respondents recalled that some politicians made it a big issue during the parliamentary debate before the decision was made. So did some media as well, although the number of asylum seekers that our country finally agreed to accept as part of the EU immigration deal (approximately 500 individuals in total), compared to other EU member countries, was small. However, some of our respondents noted that it was not the best practice to report about immigration with mere numbers, since without telling and showing who are the real people behind these numbers the media content did not help to overcome the *"ethnic fear"* (Respondent 3). Previous research has pointed towards the tendency in Latvian media to follow political agenda, especially in public TV which by many audience members is perceived as a source of "official" national news (Juzefovičs, 2012). Such approach of following the political agenda, according to our respondents, led also to quick exhaustion of the news value of the migration topic, because media had difficulty in extending the scope and broadness of migration themes besides the numbers, formal procedures and legal framework. Respondent 4 commented:

> *Media stuck to a routinized path. Besides foreign news about crimes committed by immigrants in other countries, the domestic news was about immigration policies, and the statistics – how many, where, when and so on...* (Respondent 4).

We derived from our interview material that as soon as policy makers stopped talking about migration issues and – consequently – stopped producing opinions, the topic lost its appeal to media as well. Asked about the topicality of migration by the time of the interviews (end of 2017, early 2018), one of our respondents said: *"there is no reason to do news on migration currently,"* *(Respondent 7)* indicating that there are no political decision making in progress related to immigration.

Time pressure appeared as an influential factor affecting the news production about migration. Our respondents recalled that the "migration crisis" developed very quickly; therefore, in some cases mistakes were made due to hasty decisions to follow the political agenda. The issues with ethically questionable practices in our data appeared in relation to the case when the public TV arranged a live broadcasting in a Saturday morning from the centre for asylum seekers "Mucinieki", which, according to media experts, was an unnecessary effort from the medium, without real news value (Rožukalne,

2016)[1]. However, as Respondent 2 said, it was clear that the public atmosphere in the beginning of 2016 was very nervous, filled with fears and many questions about the potential arrival of the asylum seekers, therefore such decision to organize this particular live broadcast by the public TV might be understandable.

Time pressure had other consequences: during the "peak" of crisis, journalists started filtering more thoroughly content produced by other media because they noticed that some false made-up stories were circulating in Latvian media space. However, our respondents did not see that media in Latvia would intentionally spread misinformation about immigrants; instead, they blamed some journalists for failing to perform their professional duties:

> *Nobody was trying to publish misleading information, I think... Time pressured us very hard, and it was unprofessionalism of some journalists that caused mistakes. However, these mistakes were corrected later.* (Respondent 3).

Another issue that emerged was the terminology – media adapted the word "refugee" very quickly and used it as a general term describing all immigrants, not distinguishing between asylum seekers, persons with alternative status, or refugees. As one reason was mentioned the indifferent attitude towards the terminology or lack of knowledge in the audience:

> *We [journalists] knew that most people do not know the difference, so, probably, the thinking was, why to bother or confuse our readers.* (Respondent 3).

Another reason, according to our respondents, was the unprofessional attitude from journalists who did not care to learn about these nuances and apply correct terminology.

Conclusions

The central conclusion that we can draw from our data analysis are the following. First, instead of reflection on immigrant personal stories, as well as putting focus on immigrants themselves, media focused on legislation, immigration system, and statistics from official sources. Media relied on the various state and NGO actors involved in the process of asylum seeker acceptance and integration and their press releases as dominant information sources. The voices of the immigrants were absent from the news content, which caused the situation where immigrants were shown mainly as a threat or a problem for the society, thus promoting anti-immigrant argument and increasing

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[1] The archived material can be found here: *https://ltv.lsm.lv/lv/raksts/06.02.2016-latvija-ierodas-pirmie-patveruma-mekletaji.-zinu-specializlaidum.id65289/*

fear. From a normative perspective, to stimulate social integration, media should represent the realities of all demographic groups of the society Gans, 2011). Therefore, it ought to be the moral duty of journalists to make sure that the immigrant views are represented in the media content, and actively seek to perform that duty knowing that immigrants cannot reach to media as easily as the other groups of the society, such as Latvian politicians or well-articulated NGOs. Second, in immigration reporting, media largely exploited the format of "he said she said" journalism, preventing media from deeper analysis of the complexities of the immigration problematics. Reliance on official sources also led to limitation of the scope of themes about the immigration processes. Such an approach contributed to a quick exhaustion of the immigration topic. As our study indicates, media have prioritized the concerns about the numbers of audience reach over transnational sensibility (Horsti & Nikunen, 2013). However, we agree with the previous studies that in a democratic society it actually should be the duty of media to create spaces for co-presence of multiple voices, and exercise their power for setting an agenda without the risks of marginalization (Hallin, 2015).

We treated our study results as a baseline knowledge for development of a targeted training program for news media journalists and editors aiming to offer an opportunity to extend knowledge and skills for immigration reporting. We drafted the training program with a specific focus on the following five themes: 1) current processes and legislation at international and national levels in integration of immigrants, the right terminology in the immigration reporting; 2) good practices of media ethics related to immigration reporting in Europe and beyond; 3) media literacy, critical handling of sources and techniques of deconstruction of disinformation in journalists' work; 4) media interaction and impacts on their audiences' attitudes and opinions; 5) employment of storytelling approach in reporting related to the integration of third-country nationals.

We prepared the training program acknowledging that Latvian media operate in a particular cultural, political and political context, therefore, incomplete awareness of the "journalistic infrastructures" (Dimants, 2018) may hinder the journalists from doing an ethical work. We set a specific focus on some techniques and human-interest framing in immigration news as tools that could help the immigrant voices to be more represented in the news content, as well as added elements (media literacy, disinformation deconstruction) to support media in more fair reporting. However, we believe that much more work and effort has to be invested in drafting and implementing media training programs, and also establish system to measure how the improved knowledge and access to training translates into more informed and ethical reporting of immigrants and asylum seekers over time.

Acknowledgements

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EXPERIENTIAL LEARNING AS THE PRECONDITION OF TEACHER'S PROFESSIONAL COMPETENCE DEVELOPMENT

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Abstract. *Society is pausing higher and higher requirements for teachers regarding their professionalism, efficiency of activity, personal qualities and other aspects. If we treated teachers' professional development as a life-long process, we would find alternative learning forms, which enable continuous, individual and flexible learning. It is important to reveal the role of informal learning in the area of life-long learning process because its significance to teacher's professional competence has not been fully estimated. Knowledge, skills, and abilities that teachers bring into their professional activity, gained as the outcome of informal learning and development, are not adequately valued. Insufficient attention is paid to professionality and contextuality of teacher's professional competence development. Therefore, it is crucial to perceive experiential learning which determines development of the competence as a constituent part of informal learning. The aim of the article is to reveal the interaction between experiential learning and teacher's professional competence development. Methodology of the research encompasses both theoretical, namely scientific literature analysis and summary, and empiric research methods. Qualitative research data were collected using biographical-narrative interviews while data analysis and findings are based on Abductive Reasoning Theory according to Peirce, Grounded Theory according to Strauss and Corbin and Formulating Interpretation according to Bohnsack. Scientific literature analysis has revealed that experiental learning is frequently random, spontaneous and unplanned. Due to its nature it is considered as a part of informal learning. The results of the biographical-narrative interviews with teachers show that professional activity provides pedagogues with rich experience and opportunity to develop regarding the contents of the subject taught as well as methodological and personal perspectives.*
Keywords: *development of the professional competence, experiential learning, informal learning, teacher's professional competence.*

Introduction

Rapidly changing world is the learning environment for adults, which gradually extends to encompass all work and everyday life situations. Teacher's learning, which has other individual's education as the object of activity, was traditionally regarded as a part of consistent education. Now it is becoming more independent and surpasses the boundaries of consistent education. Teachers' professional development should be considered as life-long process whereas informal learning must be provided more significance (Dačiulytė, Dromantienė, Indrašienė, Merfeldaitė, Nefas, Penkauskienė, Prakapas, & Railienė, 2013; Evans, 2019; Molzberger, 2016). On the other hand, not all individuals have equal conditions for life-long improvement and, therefore, establishing structures to develop the competence are needed (Carpenter & Linton, 2016; Hamacher, Eickholt, Lenartz, & Blanco, 2012). However, in order to help, one must initially understand what determines development of the competence by informal learning.

Scientists claim that in comparison to formal learning, significantly less attention is paid to two other life-long learning forms, i.e. non-formal and informal learning in such social institutions like family, various organizations, clubs, community, etc. Those areas still lack attention of education politicians and researchers" (Teresevičienė, Gedvilienė, & Zuzevičiūtė, 2006). The statements show that it is important to reveal the role of informal learning in the continuum of life-long learning as the significance of the learning and its impact on the professional competence of the teacher are not fully perceived whereas it is of crucial importance to regard experiential learning as a constituent part of informal learning determining development of the competence.

The aim of the article is to reveal the interaction between experiential learning and development of teacher's professional competence.

Methodology of the research includes theoretical methods such as scientific literature analysis and generalization as well as empiric study. The data of the qualitative research were collected using biographic-narrative interviews while data analysis and findings are based on Abductive Reasoning Theory according to Peirce, Grounded Theory according to Strauss and Corbin (1996) and Formulating Interpretation according to Bohnsack (2014).

Literature Review

Experiential learning is an important aspect of teacher's professional competence. Regarding cognitive competence conception, experiential learning is considered as strategy of the activity (Carpenter & Linton, 2016), while professional competence with regard to functions is compared to

competitiveness which does not exist alone but is always found within the context of solving a certain problem (Kunskaja, 2018). Experiential learning gains a significant role when describing the development of teacher's professional competence. Occasionally there are situations when solutions are not described by scientific theories. In such cases dealing with the occurring problems one has to apply experience-based knowledge. Thus, learning from experience becomes crucially important within life-long learning paradigm (Carpenter & Linton, 2016) as such learning is usually random, spontaneous and derives from life experience. Due to the qualities, experiential learning can be considered as a part of informal learning. According to Tippelt, informal learning is important for professional development and competence (Tippelt, 2018), because the learner, having experienced something, reflects it. Reflection is perceived as analysis and evaluation of one's actions, beliefs and thoughts. Tippelt indicates reflection as a process through which experience (as long-term memory material) transforms into learning while learning subsequently changes to personal and professional development, which in turn helps act appropriately (Tippelt, 2018). According to Wright, McCarthy & Meekison, by reflecting one's experience and understanding, conceptions and specific conclusions are formulated, which are later tested in new situations and allow one to act more efficiently. As well as this, the quality of the activity changes (Wright et al., 2018).

Informal learning is based on consciousness criterion (Cerasoli, Alliger, Donsbach, Mathieu, Tannenbaum, & Orvis, 2018), which states that a person, deliberately but without any additional efforts learns from all activities of his/her life in order to develop (by applying reflection of literature, media and other experiences). Tippelt (2018) relate informal learning to development of professional competence itself. He emphasizes the factor of competence transfer from social environment to the professional area. Informal learning, as it is claimed by Laur-Ernst (2001) and Evans (2019), is based on individual demand, i.e. it is initiated by the individual himself/herself and happens both deliberately and intentionally pursuing personal aims or removing the competence deficit and learning unconsciously without perceiving that one is learning. One more aspect of informal learning is the learning environment, which is usually informal and has no pedagogic intention (Straka, 2003). Moreover, progress of informal learning for each individual is different and has no definite time. Transfer of knowledge and abilities occurs from professional to personal environment and vice versa. Abilities, knowledge and skills gained by learning in informal settings can be transformed to formal environment (Straka, 2003). It is confirmed by Gerzer-Sass (2001), who claims that competences gained in family environment can be transformed to work environment. Thus, the quoted

scientists, according to Paurienė (2017), envisage continuum between learning processes occurring in both formal and informal learning environments.

Discussing the concept of informal learning, significance and relevance of experiential learning become obvious. It can be regarded as a part of informal learning because experiential learning affects informally gained knowledge and skills (Dehnbostel, 2016; Meyer-Drawe, 2019). One usually learns informally via personal discoveries. Employees' professional competence and ability to act in a reflective way, according to Dehnbostel (2016), lie within professional development. Substantiation of informal learning concept can be found in definitions of other scientists: natural learning every day (Meyer-Drawe, 2019); learning, the source of which can be everyday life (Tippelt, 2018); learning during everyday activity at work, at home or in one's free time (Burkšaitienė & Šliogerienė, 2012). Thus, experiential learning as the condition of teacher's professional development is obvious because numerous situations in teachers' work are related to experience-based knowing. Knowledge of pedagogy is insufficient as a lot of situations at schools when communicating with students require more knowledge than bare pedagogy. Teachers, being employed, are obliged to do the job of a certain profession, specialisation or qualification abiding the regulations of an education institution. However, it is not reasonable to claim that there are no new, unexpected situations for a teacher in practice. Here experiential teaching takes its place as the learning process is closely related to changing activity, complex reflection of condition-action-result relationship and integration of knowledge into previous experiences (Kunskaja, 2018; Meyer-Drawe, 2019). Thus, on one hand, different challenges and problems of one's professional activity encourage to look for new solutions and learn from experience while on the other hand, there is the demand to find theoretical basis for knowledge gained via experiential learning (Paurienė, 2017). In other words, random learning can transform or determine deliberate target learning (Evans, 2019). Sustainability of experiential learning is determined by emotional experiences, their discussion and reflection. Thus, when analysing processes of informal learning in professional area and transfer of informal learning processes from personal to professional area, the relation to experiential and reflective learning becomes apparent.

Research methodology

Research design. When conducting the research, qualitative research model was applied (Blaikie & Priest, 2019), based on positions of social constructivism and pragmatic knowledge (Creswell & Creswell, 2017). In order to achieve the goal of the research, biographic-abductive (Grounded Theory) research strategy was selected.

The study sample. 14 respondents participated in the research (13 females, 1 male). The average age was 44. Research population included teachers who have at least 7 years of teaching experience disregarding the education institution. Criteria of informants' selection was duration of pedagogic experience on the basis of Hubermann's (1991) model of Teachers' professional competence development, which related teachers' professional competence to duration of pedagogic experience claiming that after 7 years one feels confident in his/her profession and has the intention to experiment as well as to self-evaluate himself/herself. Research respondents were selected by applying non-probability sampling method, i.e. by using convenience and snowball sampling. Appropriate research sampling was considered as the number of research participants is considered as appropriate sampling when having described the phenomenon; one can claim that the additional data will not lead to new findings. It is known as data saturation.

Method of data collection: biographic narrative interview. Learning and competence development are regarded as biographic experience restored in the form of the narrative (Alheit & Dausien, 2005). Scientists emphasize work at biographies as one of the research strategies in order to track competences gained while learning informally. Biographic research allows to envisage the relationship between life procedure and development processes (Geißler & Orthey, 2002).

Methods of data analysis. The analysis of the obtained data and results are based on Abductive Reasoning Theory according to Peirce (1991), Grounded Theory (subsequently GT) according to Strauss and Corbin (1996) and Formulating Interpretation according to Bohnsack (2014). Software *Maxqda 12* was used for the analysis of qualitative research.

Research Results and Their Discussion

Studies of pedagogy in higher education institution encompass not only theoretical preparation but also professional practice, which helps the learner to better prepare for working activity. The data of the research clearly manifests that experiential learning in pedagogic activity determines the process of teacher's professional competence development.

In their professional activity teachers have to regularly respond to novelties, adjust to learners and society's needs. One of the most significant challenges is the need to change one's point of view, which affects continuous teacher's learning. A teacher is supposed to restructure his/her activity when he/she encounters new situation in his/her activity, i.e. when he/she changes his workplace from higher education institution to a gymnasium or conversely, by changing his/her teaching course(s) or undertaking administration work as well

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as facing more motivated students than previously: "*work nature was completely different. I had to start from scratch again ... to learn how to work with pupils instead of students.*" (Interview No. 14); "*I am satisfied with children with whom I work... their nature is slightly different... you can work with them differently and their work has slightly different nature. (...) children are more motivated .... because I have someone to compare to. I have worked in the school where I had to think carefully how to manage the class for 45 minutes rather than what extra assignments to give ... while in this case I am supposed to find something more interesting and challenging.*" (Interview No. 2).

Apparently, in everyday activity knowledge of modern technologies is useful and it calls for new competences. Frequently it becomes the real challenge for teachers who have been working at school for a very long time: "*We, as teachers, have also faced different innovations because computers appeared and we needed to enrich our knowledge.*" (Interview No. 14).

Informal learning processes are highly determined by recognition and evaluation in teacher's profession. It is important for a teacher to see success or its possibility in professional activity because it proves that he/she is able to accomplish something. Self-esteem is regarded as one of the reasons that encourages the intention to learn and develop. Such aspects like the feeling of success, job satisfaction by seeing astonishing results, students' gratitude as well as principal belief in the significance of one's work become the basis of informal learning activities: "*I truly believe in principle that what I am doing is right. I see favourable results (...) I continuosly learn. I read and learn all the time and look for new information... I can see the importance of the English language.*" (Interview No. 10); "*..job satisfaction is the outcome... and if former students come to thank me, it is what drives me forward... .*" (Interview No. 3).

A very important stimulus for learning is the feeling of confidence. Self-confidence is one of the most important conditions for development. From ethical point of view, in self-confidence we can find the moral values that are related to interpersonal obligations based on belief that the other person is responsible, competent, hard-working, etc.: "*I still experience lots of support and hear good words… . For example, X school was being established and I was invited to take a position of a teacher there... well, hmm, …I was reluctant at first, but the headmaster persuaded me and ... I started working there.*" (Interview No. 7).

Confidence of colleagues and school administration as well as recognition of one's professional competence motivate one to work further and stimulate processes of informal learning.

Teachers regularly observe what is happening in their environment. Learning by observation is based on cognitive learning theory, which focuses on mental procession of information. The ability to learn by observation is regarded

as useful and efficient because in such a way one can master models of integrated actions and does not need to learn from personal attempts or mistakes. The main modelling source is the environment where the individual lives and coexists as well as the mass media (Monginaitė, 2010). In the interview one can find a range of moments which illustrate that one of experiential learning forms is observation of professional and social behaviour: "*attending any Goethe institute seminar we gain so much knowledge – both theoretical and practical... we can use it in class with our students… . We can see in reality how other teachers work.*" (Interview No. 2); "*I learn myself...hmm ... I read literature and observe other teachers' work in the kindergarten… I have never attended any kindergarten myself ... neither have my children.*" (Interview No. 1).

The research has revealed that development of teacher's professional competence happens not only by observing colleagues' work and websites, but also the learners themselves: "*you can learn youth from children .. (laughing). Living among the young you do not feel that old… Children probably teach me to hear the young voice and perceive that ...hmm... the world hasn't stopped near the edge of my youth.*" (Interview No. 7).

By observation learning, as it is illustrated by interviews, methodical teachers' competence develops, i.e. "how to do it by observing others working", different approaches relevant to personal competence are adopted, "the world hasn't stopped near the edge of my youth".

Development of abstract concepts is included in experiential learning. Teachers during the interview reveal that via experiential learning former attitudes change, one gains new understanding about teaching, the significance of motivation and authenticity of teacher's expression: "*It is crucial for a teacher to restructure his/her activity ... because there cannot be routine (...) students must believe in what you have rendered...; it is more important to know how.... morality is ... hmm...when you have no mask, you are not afraid to make a mistake or be embarrased... I am not afraid not to know… the belief in you as a teacher is important.*" (Interview No. 4); "*At school it was said that we, teachers of the Lithuanian language, were not loved…well, ... no one understood what we were actually doing... It is natural that we perceive through ourselves, through our experience (interview No. 3)... . Now, it's holiday time. God ... the holidays are just correcting papers, nothing more... .*" (Interview No. 7).

Respondents tell about their development and they understand that by teaching others they learn themselves. Experience of teaching, preparation of methodological material and seminars are regarded as active experimenting that leads to development components – development of personal, didactic, subject content competences: "*Seminars are beneficial ... especially, well, we know that by teaching the other person you learn yourself (...), by preparing the*

material your subject content competence is extending ... whether you intend it or not ... because you have to prepare everything yourself ... well, you have to adapt it and regularly work at it... so consequently this competence is extending." (Interview No. 2).

Learning from experience can be identified as learning from personal mistakes when they determine the procedure and experience of learning. Informants list both personal mistakes and those made by other individuals. Significant experiences from which they learned are often related to erroneous decisions, unsuccessful stories or unexpected problems. Only recognized and analysed mistakes help the individual concentrate on learning and personal improvement as well as on development of teacher's professional competence: "*It was difficult ... I did not manage the class because I wanted to teach a language; ... I wanted the situation to be different from my own experience at school ... hmm... where I had to memorize texts but I did not succeed... well, I didn't manage to involve students and motivate them.... but I lacked pedagogic knowledge ... I had only my learning experience. I was always very zealous and probably it was difficult for me to perceive others... Then the deputy told me that the individual could not be equal to zero ... and I could not write zero in the register... .*" (Interview No. 12); "*I had the source to learn from ,... there are numerous things that I should not do and .. hmm, I am trying not to do it ... but I saw how things should not be done and what should not happen.*" (Interview No. 7).

Informal learning processes are accompanied by various emotional impressions and feeling-based experiences. Due to emotional charge these processes gain significant sustainability. Each experiential process leads to individual's change, new knowing and ability to see the surrounding world differently and at the same time it makes impact on the process of professional competence development. In order to relate emotional experiences and cognitive evaluation one should talk about that, discuss, and cooperate: "*Now for the last three years communication with close colleagues at school helps… we have close relations and they help me a lot... we can gather together and when some problems emerge, discuss them, ... advise and help each other.*" (Interview No. 2).

Thus, it is important for teachers to share their experiences, feelings, emotions rather than learn from one's own experiences only. Teachers must be open to others' ideas and learn from them. The same is true with mistakes.

Professional activity for teachers provides rich experience and possibility to improve from subject content and personal perspectives. Professional activities related to different experiences and emotional impressions lead to learning processes perceived by the individual himself/herself, which are regarded as experiential and informal, and are related to both internal and external

motivation. Development of professional competence is affected by encounter with the new teaching aspects, other individual's confidence and self-realization. Integral parts of teacher's professional competence are personal, didactic, subject content competences, which are developed by observing work environment and relevant internet media. On the basis of individual professional activities new perception of professional activity is formed while false teachers' decisions and actions lead to efficient learning processes. Sustainability of experiential learning is determined by emotional experiences, their discussion and reflection.

The conducted research reveals that personal reflection serves as the method of personal and professional development, which responds to scientific research (Dehnbostel, 2016; Tippelt, 2018; Wright et al., 2018). Reflective informal learning process allows one to newly look at the obtained knowledge via experience. Evaluation of previous experience-based knowledge and perceived former experience are considered to be the components of teachers' informal learning process. Retrospective look at one's experience when learning from close environment as well as the intention to satisfy the needs of new generation learners lead to informal learning processes.

Conclusions

Experiential learning in professional activity provides teachers with a possibility to develop subject-content, methodological and personal competences as integral parts of professional competence. Interaction between experiential learning process and teacher's professional competence development is defined by the following statements: Theoretical knowledge gained in educational institutions does not fully satisfy the need of integral professional competence parts that has emerged in teaching activity. This need determines learning processes when one seeks to combine theoretical knowledge and practical activity. On one hand, various challenges and problems of teaching activity encourage to develop professional competence by learning from experience while on the other hand, there is a need to base theoretical knowledge that has been gained via experiential learning. Professional activities, through the challenges faced, provide incentives for learning and collegial co-operation whereas satisfaction of personal psychological needs and other factors of internal and external motivation (perceived personal responsibility, experience of self-realization, and trust expressed by others) contribute to sustainable continuous informal learning. The more acknowledged and self-realizing a teacher feels in his/her professional activity, the stronger the learning motivation and the more frequent informal learning activities are. Satisfaction of

psychological needs is regarded as the factor of informal learning activity and individual professional competence development.

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ENVIRONMENTAL AWARENESS PERCEPTION OF YOUNG PEOPLE LIVING IN THE BIOSPHERE RESERVE IN LATVIA

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Abstract. *Environmental education issues are topical at all levels of education, from kindergarten to lifelong learning. The focus of this study was on young people. Vidzeme University of Applied Sciences (ViA) is located in Vidzeme region in Latvia, where the only biosphere reserve in Latvia is located. ViA researchers started research in this area already in 2006, surveying the local population on environmental, social and economic issues in 2007. In 2018 ViA students repeatedly carried out a study of this area by surveying young people up to the age of 19 (n = 120) with an aim of exploring the views of young people living in the biosphere reserve on environmental issues. Environmental awareness is one of the key factors influencing people's behaviour in deciding on a sustainable lifestyle.*

The European Union regularly conducts research of its citizens on environmental issues. In the latest report the respondents from Latvia have shown one of the lowest indicators when responding to the statement "You can participate in environmental protection yourself" – 76% agree with this statement, in comparison with, for example, the Netherlands – 97%, Sweden – 96%.

The youth survey in a face-to-face form was conducted from April to May 2018; it was done by the students and the obtained results were analyzed and compared with the study of 2007 by the authors of the article to characterize the trends in the perception of young people of environmental issues in a specially protected nature territory.

The perception of environmental issues was analyzed according to Bolscho environmental awareness dimensions. In general, the understanding and knowledge of environmental issues of the young people surveyed living in the territory of North Vidzeme Biosphere Reserve (NVBR) is positive, especially on resource-responsible, economical use. In terms of attitudes and values, young people express their support for the preservation of cultural traditions. With regard to the visibility of the NVBR, more work is required to explain the functions and possibilities of the NVBR. Compared to 2007, the feeling of pride of the fact that a respondent lives in a protected nature area has increased.

Keywords: *biosphere reserve, youth, awareness, environment.*

Introduction

Environmental awareness is one of the key factors influencing people's behaviour in making decisions about a sustainable lifestyle, which includes responsible consumption. Raising environmental awareness takes place both in the family, at school and in society. Environmental education issues are topical at all levels of education, from the kindergarten to lifelong learning if global and local society wants to achieve the Sustainable Development Goals (United Nations, 2015). A New Roadmap for the Man and the Biosphere (MAB) Programme and its World Network of Biosphere Reserves (MAM Strategy 2015-2025; Lima Action PLan 2016-2025; Lima Declaration) identifies cooperation in research, training, exchange and capacity-building projects. In the cooperation among different stakeholders, the most significant target group is locals, which is outlined in the Seville Strategy. Mitrofanenko et al. (2018) explains and provides a literature review of the role of the local people in participatory activities on the way to sustainable development in biosphere reserves (Mitrofanenko et al., 2018)

In this study, the emphasis was on young people; students were collaborating with secondary schools in developing and strengthening environmental awareness by taking active action in the territory of the North Vidzeme Biosphere Reserve (hereinafter – the NVBR) in Latvia.

Literature review

The NVBR is a part of internationally recognised framework of the UNESCO programme "Man and Biosphere". The biosphere reserves differ from other categories of protected areas by their functions: 1) nature conservation, including the protection of natural systems and the genetic fund; 2) ensuring socio-economic development; 3) scientific research and ecological education (Melluma, 1993). Hadley affirms that the biosphere reserves are benchmark regions for sustainable development (Hadley, 2002). In order to ensure the socio-economic development in the biosphere reserves, it is important to develop young people's awareness of this kind of protected areas, especially in the context of the population decline. The visibility of the biosphere reserves in the society is low, including among the local population and tourists (Druvaskalne & Livina, 2008; Wall-Reinius & Fredman, 2007).

Environmental awa reness issues have long been the focus of researchers' attention. The historical development of research in Europe and the Baltic Sea Region is well described by Finnish researcher Kokkinen, 2013. In Latvia, Prof. R. Jūrmalietis, Prof. R. Ernšteins, Ē. Lagzdiņa and others have carried out research on environmental awareness issues. The dimensions of environmental

awareness have been studied by Professor Emeritus D. Bolscho, University of Hanover, Germany, who has pointed out that four dimensions should be distinguished when identifying issues of an individual's environmental awareness: environmental knowledge (cognitive component), attitudes and values, emotional experience and interest, and behaviour and action (Bolscho quoted by Jūrmalietis). Knowledge can be defined as information that remains in memory, but does not always determine an individual's behaviour and action (Ham et al., 2016). Therefore, the question of how to determine and identify environmental awareness is rather complex. The most popular research methods for identifying opinions are interviews and surveys.

The need for regular and long-term research on the sustainable use of environmental resources cannot be put off, as well as the research on the ecological and economic assessment of biodiversity and ecosystem services, and the conservation plans of these sensitive natural resources, which is an integral part of "the green economy". Therefore, it is essential that research related to environmental and sustainable development issues is recognized as an important field of science in Latvia (VARAM, 2013).

Since in 2007 the researchers of Vidzeme University of Applied Sciences (hereinafter –ViA) conducted a population survey on sustainable development issues in the territory of the NVBR, and the territory of the NVBR is historically one of the most important research areas of ViA researchers, it was considered appropriate to repeat the survey after 11 years and compare the changes in the environmental awareness in the area of the NVBR in the youth age group. In January 2019, ViA HESPI (Institute of Social, Economic and Humanities Research) has acquired the status of an internationally recognized UNESCO Chair, which furthermore imposes a responsibility to conduct regular research in the area of the NVBR.

From the UNESCO and the United Nations policies and agenda, let`s move on the European Union (EU). The EU regularly conducts research on environmental issues among its citizens. In the last report (2017), the respondents of Latvia have highlighted the problem of waste growth (65% of the respondents of Latvia have indicated this as one of the main problems, 59% of the respondents are worried about the increase in plastic waste, 64% – about the impact of various chemicals in daily consumption). The respondents from Latvia have shown one of the lowest indicators regarding the statement "You can participate in environmental protection yourself" – 76% agree with this statement, in comparison with, for example, the Netherlands – 97%, Sweden – 96% (European Commission, 2017).

The study focuses on strengthening the implementation of the Sustainable Development Strategy "Latvia 2030", which stipulates that Latvia should be "the EU leader in the preservation, enhancement and sustainable use of the

natural capital". The NVBR sustainable development monitoring results (2017) showed that there are decrease of social indicators, but more stable are environment indicators and stagnation of economic and institutional indicators (Arklina, 2018).

Methodology

Description of the case study area

The NVBR is the only biosphere reserve in Latvia, covering 7.3% of the territory of Latvia (457,600 hectares of land and 16,750 hectares of sea) and home to 2.5% of the population of Latvia (49,519 inhabitants on 01.01.2017.). The natural increase indicator is negative in the NVBR, however, it has a tendency to decrease. The area includes 25 nature restricted areas, 1 nature park and 2 almost fully protected marine areas (Ainaži-Salacgrīva, Vitrupe-Tūja). The Landscape Ecological Plan (2008), the NVBR Coastal Tourism Development Plan (2009-2011), and other territorial management documents have been developed for the area.

The object and subject of the study is the knowledge of environmental awareness of young people (up to the age of 19) living in the territory of the NVBR. The youth target group has been selected taking into account three factors: 1) the EU policy "Europe 2020"; 2) the previous training activities in the study area were focused on children and youth; 3) raising the awareness of the biosphere reserve for youth with an aim of attracting youth to the NVBR.

The researchers started the research in this area already in 2006, surveying the local people on environmental, social and economic issues in 2007. And in 2018, ViA students repeatedly researched this area by surveying young people on environmental awareness issues and the life in the biosphere reserve.

The questionnaire contained 5 groups of questions. The first group of 13 statements was related to obtaining opinions on environmental awareness, in which a respondent had to choose whether to agree, disagree or have no opinion on the respective statement. The second group, in which the respondent had to name 3 popular tourism sites, was included in order to find out the respondents' knowledge of the natural and cultural-historical values of their neighbourhood and the NVBR area. The third group was devoted to the assessment of the quality of life, in particular the infrastructure available to the respondents. The respondents had to evaluate the availability and the possibilities of 15 different infrastructure elements and services, evaluating it on a scale from 1 – 5, where 1 - very poor, but 5 - very good. The fourth group of questions was included in order to find out the preferred information channel by which the respondents could get information on news and other issues regarding the NVBR. The respondents had to list the mentioned information sources in order of priority.

And at the end of the questionnaire, the respondents were asked to provide information about themselves, indicating age, nationality, length of residence in the current place of living, type of dwelling, place of residence (including municipality/town). In this article is analysed results from first group of answers. The research tasks were:

1) to identify the most significant problems in the youth audience in the context of environmental issues in the territory of the NVBR;

   The answers will provide an opportunity to understand which areas of the environment regarding the NVBR need an in-depth work.

2) To identify the satisfaction of the young people with the availability of existing infrastructure and services at their place of residence;

   One of the factors characterizing the quality of life that determine a person's happiness, well-being, self-realization, health, fulfilment, meaningful existence, etc. is the availability of public services and infrastructure at the place of living that must be provided by the state. To some extent, this also determines the existence (living, working) of population at a particular geographical location. These opinions would help identify positive and negative trends in the service and infrastructure offer.

3) to compare the data of both surveys to the extent possible (2007 and 2018)

The limitation of the study is that the results obtained cannot be compared with the previous study in the context of administrative districts, since after the administrative reform carried out in 2009, the area of the NVBR is currently located in the territories of 10 municipalities, while in 2007 there were 43 local municipalities (33 parishes, 1 region, 6 towns with rural areas, 3 districts), 16 administrative areas were only partially covered.

Research results

By age structure, the most respondents (67.9%) were young people aged 15-19, Latvians (94.6%) living in the territory of the NVBR (55.4%) since birth or more than 11 years (18.8%) (Table 1).

When carrying out the survey, the aim was to survey the youth group in proportion to the population of the respective municipality located in the NVBR. However, it was not always possible to meet so many young people at the respective place and time.

The respondents were also asked about the type of their dwelling, as it also relatively often determines various environmental activities and habits, such as the possibility to sort waste, leisure activities, etc. 28.6% indicated they were living in an apartment house in the village. The second largest group were those

living in farmsteads outside the village – 20.4%, the third largest group (18.4%) – the respondents living in a detached house in the village area.

*Table 1 **Age, nationality, length of residence of the respondents in the current place of residence in the NVBR area***

Age	Young people aged 12 - 14 32,1 %			Young people aged 15 - 19 67,9 %	
Nationality	Latvian 94,6 %			Russian 5,4 %	
Length of residence in the NVBR area	*Since birth* 55,4 %	*11-19 years* 18,8 %	*6-10 years* 4,5 %	*2-5 years* 17,9 %	*1 year* 3,6 %

The survey included 13 statements reflecting the respondents' views on environmental issues in the area of the NVBR (Table 2). According to Bolscho environmental awareness dimensions, the statements can be divided in the following way (see Table 2). (Bolscho & Hauenschild, 2006).

*Table 2 **Classification of the statements included in the questionnaire according to Bolscho environmental awareness dimensions***

Environmental awareness dimensions	Statements included in the questionnaire
Knowledge of environment *(cognitive component)*	• Any economic activity in the territory of the NVBR is prohibited. • Felling forests in the area of the NVBR should be restricted, as I think it is too extensive. • The Internet connection is very important for business development in the NVBR area.
Attitude and values	• I believe that preservation of natural resources is possible through their careful use by everyone. • I think I will stay here for life. • We need to preserve our traditions by promoting the activities of amateur choirs and dance groups.
Emotional experience and interest *(emotional component)*	• I am proud to live in a specially protected nature area. • I have noticed the logo, stands and signs of the NVBR in many places, and I can say it is visible.
Behaviour and action *(conative component)*	• I support waste sorting as a way to save resources. • I support measures for the conservation of the salmonids. • I participate in the events, seminars and festivals organized by the Nature Conservation Agency, NVBR. • I save resources on everyday basis (electricity, water, heat). • I would gladly participate in the voluntary nature observation campaign throughout the year in the NVBR area.

When considering the results, it can be observed that for 7 statements (out of a total of 13), more than half of the respondents have answered positively. For

example, 93.8% of the respondents agreed with the statement that the preservation of resources was possible through their careful use by everyone. 88.4% of the respondents supported waste sorting, 86.6% agreed with the preservation of cultural traditions by promoting activities of amateur choirs and dance groups, and 79.5% agreed on the importance of the Internet resources in business development.

The most controversial responses were received on the statement that any economic activity in the territory of the NVBR was prohibited. 46.4% of the respondents did not know the answer, 17% responded incorrectly, only 37.5% answered that the economic activity was allowed.

In the NVBR concept it is more important to indicate the essential difference that this is a special area with one of the main functions being particularly the promotion of economic activity (Sacchetti & Campbell, 2017). It should also be explained that the word "reserve" used in the name of the biosphere reserve is no longer associated with the Soviet term "reserve", which was the most strictly protected nature area with many prohibitions.

The next statement relates to the identity of the NVBR; the respondents were asked about the presence of the NVBR logo in nature and its visibility. 44.6% of the respondents indicated they could agree with the statement, but 34.8% disagreed with it, 20.6% didn't know. If we compare these answers with those obtained in the 2007 survey, then the answers were divided more similarly: 38.8% replied that they recognized the logo, 34.7% did not recognize it, but 26.5% did not know the answer. If we compare the real situation in nature, currently there are the NVBR signs on the main national roads, the logo is visible on the information boards placed in nature.

The third statement which received relatively more (69.6%) negative responses was related to the participation in the events organized by the Nature Conservation Agency (NCA) in the territory of the NVBR. Only 17.9% of the respondents agreed with the statement and attended events. Our research findings of youth participation in the biosphere reserve activities confirm the results achieved by Mitrofanenko et al. (2018), namely that the activities with participation should be strengthened (Mitrofanenko et al., 2018). It should be noted that the number of events organized by Vidzeme region administration of NCA in the territory of the NVBR is irregular and considerably smaller than before. In 2017, the first NVBR Traveller Days were organized, which also took place in 2018. The activity of the Nature Education Centre "North Vidzeme", which educates the public on environmental issues, is of great importance. Since 2014, more than 100 classes with nearly 3,000 participants take place each year (Arkliņa, 2018).

The result regarding the statement whether the young people would stay in their place of residence until the end of their lives was no surprise either: 27.7%

responded positively, 57.1% would not stay, but 12.5% did not know. If we consider this statement in the light of the years that young people have lived in the territory of the NVBR, there is a certain correlation (r = 0.25): those who had lived there longer, more often indicated that they wanted to stay in this area. If we evaluate the positive correlations between the duration of residence in the territory of the NVBR and other statements, a positive correlation can be observed in the question on the preservation of cultural traditions (r = 0.156), the preservation of natural resources (r = 0.33), prohibitions of economic activity (r = 0.30), waste sorting (r = 0.94).

Regarding the statement of being proud to live in a specially protected nature area, 73.2% of the respondents indicated that they were really proud, but 22.2% indicated they did not really know the answer. Comparing this question with the survey of 2007, it can be concluded that in the 2018 survey this indicator is higher than in 2007 - in the age group up to 14 years - 60.6% agreed that they were proud, while 21.2% revealed that they did not know, but in the age group of 15-19 years 57.8% were proud, but 23.9% did not know the answer.

If we consider the respondents' answers to environmental questions in the context of the kind of dwelling a respondent lives in, there is a weak positive correlation in the questions on waste sorting (r = 0.098), saving of natural resources (r = 0.073), the NVBR logo and sign visibility (r = 0.026), the preservation of cultural traditions (r = 0.061), as well as comparatively weaker correlations on forest felling (r = 0.022), resource saving (r = 0.028), attendance of events organized by the NCA (r = 0.016).

Conclusions and/or recommendations

The understanding and knowledge of environmental issues of the young people living in the NVBR area is generally positive, especially in terms of responsible, economical use of resources. Compared to the 2007 survey, the responsibility for saving resources has increased (in 2007, 37% of the young people confirmed that they saved electricity, water, heat, in 2018 - 63.4%). In the context of the waste sorting issue, the data collected show the same results in both surveys (88% of the young people confirmed that they supported waste sorting).

Compared to 2007, the feeling of pride that a respondent lives in a protected nature area has increased (73.2% in 2018, 59% in 2007 indicated that they were proud about the fact). According to Vaeliverronen et al. (2017) study conclusions, the engagement of locals, particularly youth, is significant to improve the quality of life in an area. We found that the concept "youth for youth" is valuable and applicable in the future for research and environment

awareness activities. Youth estimates youth contribution in environment awareness activities. As well as that, the Eco Schools programme runs in 67 countries, including Latvia. The programme is contributing to the sustainable development education actively and it must continue and expand. ViA has an Eco-University Certificate and only one school – Vidriži – in the NVBR has an Eco-School Certificate for the academic year 2017/2018, and six institutions have a Green flag in the NVBR territory (Vides fonds, 2018).

We agree with the statement of Mitrofanenko et al. (2018) that the level of youth participation in the activities organised by biosphere reserves and the level of the environment awareness knowledge is linked to the management of a biosphere reserve.

Acknowledgements

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THEORIZING THE CONCEPT OF TRANSFORMATIVE LEARNING EXPERIENCE IN THE CONTEXT OF TEACHER PROFESSIONAL DEVELOPMENT

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Abstract. *The concept of learning experience holds its eminent place within the paradigm of constructivism in contemporary educational science. The study process is being designed and construed to foster educative experiences in accordance with the desired learning outcomes. Transformative learning theory and the concept of perspective transformation marks a specific type of learning experience – one that reconstructs the frame of reference of the learner. Such a paradigmatic shift is also considered necessary for large-scale educational reforms to succeed. Transformative learning theory itself doesn't provide clear-cut solutions for implementation of a certain reform ideology, to the contrary – it questions the assumptions that guide one's action in order to construct a more inclusive, better informed and functional meaning perspective which may disagree with the assumptions that are imposed institutionally. As part of teacher professional development, transformative learning practices hold a promise for emancipation of the teaching profession and the development of agency. This article theorizes the concept of learning experience from the perspective of phenomenology and the theory of transformative learning, bringing forward the concept of transformative learning experience. The aim of the research is to explore the concept of transformative learning experience as an object of study within teacher professional development.*
Keywords: *learning experience, perspective transformation, teacher professional development, transformative learning experience.*

Introduction

The concept of learning experience holds its eminent place within the paradigm of constructivism in contemporary educational science. Study process is being designed and construed to foster educative experiences in accordance with the desired learning outcomes. In the context of ongoing educational reforms, the question of support for teacher professional development is at a disadvantage. An understanding has been reached about the importance of a fundamental support for the competence development of teachers and its complexity, which is stated in the publication of the Organisation for Economic Co-operation and Development (Guerriero, 2017); however, there is no

universal model of development to strive for. In fact, there is no single best model of teaching and no ideal means of its evaluation. Diversity in teaching has been encouraged as a strength (European Commission, 2013). This article argues that teachers' experiences matter. To implement new types of teaching, teachers need learning experiences of their own that help them develop professionally.

Transformative learning theory and the concept of perspective transformation marks a specific type of learning experience – one that reconstructs the frame of reference of the learner. Such a paradigmatic shift is also considered necessary for large-scale educational reforms to succeed. Transformative learning theory itself doesn't provide clear-cut solutions to implement a certain reform ideology, to the contrary – it questions the assumptions and expectations that guide one's action in order to construct a more inclusive, better informed and functional meaning perspective which may disagree with the assumptions that are imposed institutionally. However, as part of teacher professional development, transformative learning practices hold a promise for emancipation of the teaching profession and the development of transformative agency, which in turn is paramount for innovative school-based curriculum design and conceptual problem solving.

This article theorizes the concept of learning experience from the perspective of phenomenology and the theory of transformative learning, bringing forward the concept of transformative learning experience. The aim of the research is to explore the concept of transformative learning experience as an object of study within teacher professional development.

The concept of experience

Learning experience, despite its frequent use in educational discourse, often appears to be treated as an axiomatic notion. In order to construct learning experience as a research category, its grounds must be examined.

In John Dewey's philosophy of education, experience is theorized as a critical aspect of progressive education. He emphasizes: "Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into" (Dewey, 1997, p. 38). Therefore, Dewey stresses the responsibility of the educator to discern conductive or detrimental aspects of the experiences undergone by the learner.

In Dewey's work experience is interpreted as a biologically determined model of continuous interaction between living creatures and their environment (Eldridge, 1998), where equal weight is given to both objective and internal conditions that shape the experience. Experience resembles consciousness, but it is more than that – it also includes interaction with the environment and its

consequences. Dewey remarks that the educative value of an experience is restricted by any obstacles to perceiving the relationship between action and its consequence, the enacted and the undergone (Dewey, 1980). Dewey's model implies that experience grows and takes on meaning and as a model of interaction with the world it may be modified, improved, reconstructed. It is through inquiry that experience becomes self-regulatory. It is a prospective and process-oriented understanding of experience.

Dewey sets forth continuity and interaction as criterions to depict experience as a phenomenon, arguing that the linkage between continuity and interaction provides its educative value to an experience. The concept of continuity characterises both the continuity of perception and succession, the connection between the influence every experience has on the quality of the successive experiences and the attributes it has taken on from the previous ones (Dewey, 1997). This also marks the retrospective aspects of experience – causal linkage, succession and impact of historical experience.

The criterion of interaction is characterised by amounts of social richness as experience is social in its nature. Societal endeavours are saturated by the heritage of previous generations and epochs; therefore, culture encompasses the experience of an individual. Dewey sets forth an imperative not to adopt uncritically the inherited aspects of culture, but to reconstruct it, expose to inquiry and discussion (Dewey, 1997). Dewey saw the democratic self-transforming society as an ideal, so he advocated cultural instrumentalism – the possibility to transform culture through means of experience and intelligence, philosophical reflection and criticism (Eldridge, 1998).

Peter Jarvis regards experience as occurring at the intersection of the inner world of the self and the outside world, which he calls the birthplace of learning (Jarvis, 2006). He argues that we learn only from experiences that have been internalized, noting that the perceived outside stimuli must come to awareness at some point to form recallable experiences, may those be primary (direct) or secondary (mediated) experiences (Jarvis, 2010). It is considered that secondary experiences dominate in formal education.

In developmental science experience may be understood as a coaction of an organism and its environment, noting the profound effects specific learning experiences may have on the development of an individual. It has been discerned that experience has cumulative effects on development (Marshall, 2015). Research in neuroscience confirms that experiences of action/activity alter brain structure and function throughout the lifespan (Lickliter & Honeycutt, 2015), which points to the important role of habit.

Philosophic tradition of phenomenology studies consciousness, the structures of experience and human subjectivity, opposing a reductionistic view in studies of the essence of phenomena (Kūle & Kūlis, 1998). It holds a view

that if a mental phenomenon exists in the consciousness of a person, it has a value, meaning and a function. Phenomenology explores the problem of constitution – relationships between reality and mind, consciousness and true existence (Huserls, 2002).

Phenomenology as a research methodology has proved to be a fruitful approach for the analysis of how meaning is constructed in the social reality. In this tradition, it is believed that meaning is constructed in a pre-predicative level and a subjective experience may not be fully expressed in words. Reality is not reducible to linguistic representations; therefore, predications are representations of experience and may not be treated as experience itself in research. A subjective sense of the observable actions is not directly accessible to the observer. The interpretation of experience depends on the point of view – the very same experience may be described differently by the actor himself/herself, an everyday observer or a social scientist. There is a distinction between *lived experience* as the primary grasp of a phenomenon in the actors' senses, feelings and reactions and experiences as interpretations, notions and causations (Eberle, 2014). *Lived experience* therefore unfolds as a direct, unmediated, current multimodal experience of an individual within a certain point in time, but *experiences* constitute the processed perceptions that have been interpreted to a certain degree, that have formed memories of the experienced events and therefore also involve reduction. Research shows that there may be a significant divergence between the conceptions and subjective evaluation during an experienced event and retrospective evaluations, where the emotional colour of the conclusion of the event may distort the memory significantly (Miron-Shatz, Stone, & Kahneman, 2009).

Experience is constituted contextually, and the concept of *lifeworld* represents the sphere of experience formation and comprehension (Huserls, 2002; Kūle & Kūlis, 1998). Lifeworld is the cultural framework of an experience constitution (Jarvis, 2010). It frames the surroundings of an individual, it is the facet of the world that one has become familiar with and has interiorised. Therefore, if something has not entered an individual's lifeworld (become part of his or her experience), he or she finds it incomprehensible, ungraspable. An individual's experience is characterised by the network of interrelations, ideas and events that have formed one's identity, that has influenced one as a personality, a professional, an adult. It is a comprehensively biographical scope of experience.

Lifeworld reveals itself as both personal and intersubjective, where the notion of self is being constructed in the social sphere (Huserls, 2002). It is the background of communicative action. This marks the significance of an individual's lifeworld, consequently his/her experience and development in the process of learning, enhancement of professional competence and formation of

operational concepts as well as that of assumptions and beliefs. The scope of one's lifeworld may be characterised by the notions of horizon and point of view, where change in one's positionality may result in a changed perspective (Finlayson, 2005).

A temporally distant account of an experience may be considered to be a *conceptualization of experience*; among other things it reveals the perspective through which an individual interprets new experience. In the following pages, this article will describe a specific type of experience – transformative learning which is connected to efforts of improving professional activity.

Transformative learning experience

As there are numerous learning theories, the concept of learning experience may carry different meanings for different theoretical perspectives. According to a general cognitively focused definition of learning, it is "an enduring change in behaviour, or in the capacity to behave in a given fashion, which results from practice or other forms of experience" (Schunk, 2012, p. 3). Consequently, change is involved in any learning, it must endure over time and it occurs through experience which in turn is affected by the characteristics of a specific environment. This definition also implies that learning may be expected to result in action. At the same time, it does not maintain that the nature of learning is necessarily positive, which allows us to think that learning may also be regressive, deformed or defensive.

One of the most prominent comprehensive definitions of learning belongs to Knud Illeris. Through the analysis of numerous perspectives on learning, he defines learning as "any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing" (Illeris, 2007, p. 3). According to Illeris, learning in general is composed of two processes – interaction with the environment (social, cultural or material) and an internal, mental process of acquisition which necessarily includes interplay between the learning content and the incentive function.

Illeris has developed a heuristic typology of learning based on the extent of change generated in mental structures (mental schemes and patterns): cumulative, assimilative, accommodative, transformative/expansive (Illeris, 2009). *Cumulative* or mechanical learning denotes the establishment of new mental schemes or patterns, which are rather isolated formations. This type of learning dominates in the first years of life. *Assimilative* learning is the most common type of learning and refers to learning by addition, complementing the already established schemes or patterns. *Accommodative* or transcendent learning refers to the modification of an existent mental scheme or pattern in order to link in a new kind of experience that doesn't initially fit in the mental

model constructed by the individual. This kind of learning implies that the old scheme is being relinquished or reconstructed to get hold of a new understanding. Finally, the type of learning associated with major structural changes, according to Illeris, is *transformative* learning, in other theories known also as significant learning, expansive learning or transitional learning. It denotes a simultaneous restructuring of a cluster of schemes and patterns, resulting in a transformed meaning perspective and personality-integrated knowledge development. It is considered the most demanding type of learning. Accordingly, the concept of transformative experience denotes a venture through such kind of learning.

Jack Mezirow, who introduced the concept in 1978, defines transformative learning as "the process by which we transform problematic frames of reference (mindsets, habits of mind, meaning perspectives) – sets of assumption and expectation – to make them more inclusive, discriminating, open, reflective and emotionally able to change. Such frames are better because they are more likely to generate beliefs and opinions that will prove more true or justified to guide action" (Mezirow, 2009, p. 92). The notion of a problematic frame of reference expresses the idea of discrepancy between what is experienced or encountered and one's meaning perspective that guides their understanding and acting. We constitute the meaning of our experience through this frame that we have developed over our lifetime – through our experiences, knowledge, impressions, preconceptions and assumptions, which often may prove to be incomplete and adopted unknowingly. This discrepancy may manifest itself as a disorienting dilemma – an event or a situation that highlights incompleteness or distortedness of our understanding. It may trigger what is called transformative learning.

Transformative learning theory is rooted in humanism, critical social theory, emancipatory pedagogy and constructivist assumptions (Cranton & Taylor, 2012; Mezirow, 1991). It may be considered not only a theory of personal transformation, but also as a theory that provides an insight into the mechanisms of cultural change and paradigm shift, which in turn is achieved through individuals. Since its foundation the theory of perspective transformation has undergone certain developments, unveiling a broader understanding of perspective transformation – both in processes and contexts which facilitate it (Cranton, 2016) and as typology of its course and results (Hoggan, 2016; Yacek, 2017).

We construe our experience through our subjective frame of reference that has been shaped through interpretations of sense perception, assessing its significance and building logical links between experiences. A frame of reference is a structure of culture and language, it includes cognitive, conative and affective components and is not limited to the conscious mind; it also affects processes outside awareness. A frame of reference has two dimensions – habits

of mind that broadly shape and delimit perception and form habituality of reasoning; and points of view that could be considered manifestations or articulations of habits of mind, such as belief statements, value judgements, attitudes or feelings. A point of view is more accessible to awareness as well as to feedback from others (Mezirow, 2009), therefore it may be considered more open to investigation whilst habits of mind are not directly accessible to the researcher. They may be inferred through expressed or enacted points of view.

Mezirow's initial 10-phase model of transformation has been debated; it is now generally believed that transformative learning occurs rather as a non-linear process – it can occur either as an epochal, sudden reorientation or it may be a cumulative process. Mezirow states that most of transformative learning comes about outside awareness, where intuition takes the place of critical reflection on assumptions (Mezirow, 2009). He has also described 5 indispensable prerequisites for transformative learning to occur: a) critical reflection on assumptions in one's own thinking or that of others; b) determining the validity of a truth claim via empirical research; c) free participation in dialectical discourse that serves as grounds to validate a judgement socially; d) enacting the new, transformed perspective; e) a certain disposition that allows oneself to become critical and examine assumptions (one's own as well as those of others), follow it through and reconstruct these assumptions, act on them and possibly transform one's frame of reference (Mezirow, 2009). Interestingly, in his recapitulation of the theory disorienting dilemma was not mentioned as a prerequisite to transformative learning although it was believed to trigger it (Mezirow, 1991), which may be justified by the fact that the contemporary life offers enough dilemmas and contradictions to solve as well as the possibility of the activation event taking place outside the awareness and progressing cumulatively.

Transformative learning is believed to be fundamentally intersubjective, calling for the presence of respect and recognition. These are preconditions for both self-realization, autonomy, critical reflection, participation in critical discourse and attempting perspective transformation. Thereby the need for recognition is inextricably linked to empowerment efforts (Hoggan, Mälkki, & Finnegan, 2017; West, Fleming, & Finnegan, 2013). In its essence, transformative learning may be defined as necessarily emancipatory, aiming at the resolution of contradictions and discrepancies and development of a more critical, complete and functional meaning perspective. It might be tempting to employ this understanding of learning to implement certain policies, for instance in education. However, the concept of transformative learning is incompatible with an unquestioned implementation of a certain ideology within the target group, which must be rejected as characteristic to cultural invasion and therefore

unethical. At the same time, critical reflection on assumptions of an ideology may contribute to a more thorough understanding of the situation.

Transformative learning practices hold an opportunity to develop integrative praxis via resolving inherent contradictions, discrepancies and conceptual problems as well as challenging dominating ideologies and fighting for social justice. It can therefore be considered a means of emancipation of the profession. It must be noted that the situation of a disorienting dilemma or a need state contains no automaticity of desirable resolution – it may progress either expansively or regressively (Engeström, 1987). Transformative learning is believed to be more likely if the participation is voluntary (Mezirow, 1991); learning motivation that results in a transformed frame of reference cannot be imposed (Illeris, 2007).

Researchers also stress the responsibility of a facilitator who has to take into consideration the possible negative effects a challenged frame of reference may bring upon the learner (Hoggan et al., 2017), such as tension, anxiety, confusion, cognitive, social and emotional struggles, disorganization and possibly even social exclusion due to a challenged state of affairs. Transformation is one of the scenarios in a situation of a challenged perspective – one may take an expansive position and take time for introspection and critical reflection or they may take up a defensive (including psychological defence mechanisms) or even regressive position to seek refuge from the unknown. If the challenged assumptions are connected to an individual's professional identity and organization of professional activity, it challenges also the justification of former actions and may be devastating to the individual. Therefore support, respect and recognition are of great value to help resolve the tension and reconstruct meaning perspectives to regain coherence.

Transformative learning as a recognisable process is typically initiated in a crisis-like situation and concludes with a sense of relief (Illeris, 2003), self-integration (Hoggan et al., 2017) and a new sense of agency (Hoggan, 2016). We face discrepancies daily and deliberately or intuitively evaluate the need to address and analyse them. Crisis-like situations reveal the progress and extent of the transformation, because it is impossible to avoid addressing them. What makes the difference is the strategies one applies and what are their internal and external resources for a resolve. In a context of professional development, that marks a priority to facilitate situations and support mechanisms that promote a resolution over a mere creation of disorienting situations. It is quite clear that an activity such as teaching practice inherently contains enough dilemmas, double binds, discrepancies and contradictions, therefore no artificially generated dilemmatic situations need to be provided. After all, meaning schemes and frames of reference have a formative and stabilizing function. Learning activities that bring opportunities to identify, analyse and resolve or mitigate

these contradictions and promote an exploration of diverse views, on the other hand, may prove to be more beneficial.

Transformative education is believed to require stepping outside the habitual ways of thinking (Mezirow, 2012). Steven Brookfield states that the only way to overcome a one-dimensional way of thinking (i.e., instead of criticizing a system while submitting to it, engage in improving it) for an adult learner is to get acquainted with a fundamentally different perspective (Brookfield, 2005). Patricia Cranton, too, emphasizes the role of encountering different views and opinions to partake in a critical self-reflection. She suggests provoking dialogue from different viewpoints and learning activities that are structured in a way that helps identify and explore alternative perspectives (Cranton, 2016). From a phenomenological point of view, varied experiences may serve the purpose of expanding one's lifeworld and therefore also broadening one's perspective.

Transformative learning may be viewed from at least two perspectives: a) an endless quest for a more complete and functional perspective; b) transformation of a comparably dysfunctional perspective when discrepancies and contradictions have accumulated. The latter understanding could be more useful in the context of professional development and solution of problems of practice. In the expansive learning theory of Yrjö Engeström important aspects of learning are agency building and concept formation; an activity system and its developments is used as the primary unit of analysis (Engeström, 1987). Change laboratory method within the framework of cultural-historical activity theory depicts a model of how a new concept of an activity system may be generated through analysis of contradictions and through the cycle of expansive learning (Engeström & Sannino, 2010). The theory of expansive learning may prove complementary in understanding and facilitating the processes of transformative learning in a workplace environment. The activity of teaching in its collective nature calls for transformative learning that is not exclusively located in the individual domain.

Conclusions

The concept of experience depicts a model of continuous interaction between an organism and its environment as well as its consequences and its subjective recollection. Affected by the surrounding social richness and culture, a person's experience grows and takes on meaning, shaping and influencing the quality of successive experiences and his/her development. Lifeworld represents the cultural background and the sphere of intersubjective experience formation of an individual or a group; it also describes the scope of comprehension and diversity of encounters an individual has come across. From a

phenomenological point of view, varied experiences may serve the purpose to expand one's lifeworld and therefore also broaden one's perspective.

Learning is characterised by capacity change, it occurs through experience and is deeply affected by it. Transformative learning describes a kind of learning that involves major structural changes in an array of connected mental schemes and patterns or an individual; it results in a transformed meaning perspective (alternatively described as a frame of reference). This kind of learning is believed to be the most expansive, far reaching and explicitly demanding.

The emancipatory and empowering aspects of transformative learning are critical examination of assumptions and development of a more inclusive, informed and functional frame of reference. It may result in overthrow of imposed ideologies, solving conceptual problems and contradictions of practice, advancement of one's professional activity, sense of self integration or a new sense of agency. Transformative learning is believed to be triggered by a disorienting dilemma that constitutes the emergence of discrepancy between the comprehension constructed through the former meaning perspective of an individual and its inability to sufficiently explain an experience. Transformative learning requires stepping outside of the habitual ways of thinking, exploring alternative perspectives, applying critical reflection, participation in a dialectical discourse and developing a disposition to examine one' assumptions critically, following through to action.

In a context of teacher professional development, experiences of transformative learning might prove to be beneficial in resolving or mitigating contradictions in professional activity of teaching with a condition that situations and support mechanisms that promote a resolution and recognition to their learning needs are prioritized.

Transformative learning experiences should be studied in a retrospection through its conceptualizations, evaluations and reflections by the subjects of research. It is impossible to grasp lived experience, therefore it may be studied and inferred through expressed or enacted points of view.

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SOCIO-COGNITIVE CONFLICT AS AN EDUCATIONAL FACTOR IN ACQUIRING NEW KNOWLEDGE AND SOCIAL REPRESENTATIONS: PUBLIC HEALTH STUDY CASE

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Abstract. *This article is aimed to analyse socio-cognitive conflict as an educational factor in the context of learning and education. For a long time, socio-cognitive conflict had been recognised as a negative factor in a learning or study process. Actually, a positive attitude toward the phenomenon was formed as late as in recent decades – thenceforth, socio-cognitive conflict is claimed to be a positive phenomenon provided that a teacher is able to and knows how to control it, so that to make it a learning incentive, an epistemological source of new knowledge and social representations. The analysis of socio-cognitive conflict and a study of students' and teachers' attitudes might help to provide a more comprehensive answer to the following problematic questions: how to perceive and explain the idea of socio-cognitive conflict, its educational importance in the context of learning and education? What are the conditions for a positive solution of socio-cognitive conflict? What is the role of socio-cognitive conflict in a learning or study process? Thus, a goal of the article is to reveal the essence of socio-cognitive conflict and aspects of control thereof in the learning situation from the point of view of students and teachers. The article consists of two parts: the first part addresses a theoretical discourse of the concept of socio-cognitive conflict, and the second part is dedicated to empirical research, i.e., study of an attitude of teachers and students toward the socio-cognitive conflict as a source of new knowledge and social representations.*
Keywords: *socio-cognitive conflict, cognitive conflict, adult learning, social interaction.*

Introduction

A person gets involved with socio-cognitive conflict (hereafter – SCC) not only during a learning or studying process, but also in many real-life situations where his/her ideas, knowledge, social representations, attitudes, beliefs, etc. come up against any new overwhelming or contradictory information,

completely different knowledge, attitudes, beliefs, etc. This is known as the SCC situation.

However, not only *socio-cognitive* conflict may develop in the process of learning and cognition, but a *cognitive* one, too. This is not the same thing since the SCC is destabilisation of a learning process that develops in the course of a cognitive process through the interaction with others due to different social representations, attitudes to a fact, phenomenon, subject, information, knowledge, and other types of confrontation (Sacco et al., 2008, 2). The SCC may serve as an educating factor if it allows a learner to appreciate and accept points of view of other people and, at the same time, to change, enrich his/her own social representations of facts, phenomena, subjects and, thus, acquire new knowledge, integrate it into the existing system of knowledge and representations, find a solution to a learning issue (Darnon et al., 2007, 231). Whereas, *cognitive conflict* is destabilisation of a learning process that arises from a person's ignorance and inability to act (Jatkauskienė et al., 2015).

Learning within a group or with a group is a perfect environment for the development of SCC, and, hence, for the emergence, and formation of new knowledge, variation of initial representations. There is perhaps no group of learners or teachers in which all members' attitudes, aspirations, ambitions, certain initial representations of subjects or phenomena, or knowledge would be in complete accord. Such difference often causes conflicts among members of a group and/or between members and a teacher and, consequently, various learning problems (affective, social, motivational, etc.), tension, anxiety, and fear.

In Lithuania, no scientific publications on the SCC in the context of student learning and teachers' didactic activities were found. Some aspects of this scientific problem in the context of adult education and support were covered in previous studies of scholars from Klaipėda University (Jatkauskienė et al., 2015; Nugaras, 2017). There is, nonetheless, a lack of more detailed academic discussions on the SCC, as well as empirical studies in this area. The situation is somewhat different abroad, though, the number of previous empirical studies on this topic is quite small. The reason for this is probably that most researchers are confined by the following challenges of the SCC analysis: a) complexity of teaching activities and learning situations; b) a field of research which highlights personal or professional identity, personal interest, stimulus, competence of teachers and students, interpersonal relationships (not only positive), conflicts, other moral issues that have a negative impact on researchers' motivation in choosing this topic; c) lack of previous studies in the area of social representations of teachers and students; and d) lack of experience in studying the SCC. As a result, today we still have a shortage of scholarly works on the emergence of conditions for and the solution of the SCC in the context of social

interaction as a part of a learning and teaching process. It should be underlined that a deeper analysis of the SCC might not only reveal the concept of SCC, its expression, essence, and role in the context of learning/study – it might also disclose learning peculiarities and the role of teachers in providing support or in analyzing their performance in the context of the SCC.

The article presents key results of empirical research. *Hypothesis of the research*: SCC in the context of learning/study might become an educational factor in acquisition of new knowledge, in constructing new or reconstructing existing social representations, provided that students and teachers understand the idea of SCC and conditions for a positive solution of SCC are created. The following *problematic question* has been construed to verify the hypothesis: What is the educating role of the SCC in the context of learning/study for acquiring new knowledge, constructing and reconstructing social representations? Detail questions have been formulated to answer the above problematic question: How to perceive and explain the idea of SCC in the context of learning/study? What are the conditions for a positive solution of SCC in the context of learning/study? What is the role of SCC in a learning or study process?

Goal of the article is to reveal the idea of SCC and an educational effect thereof in the context of learning/study from the point of view of students and teachers.

The work on the article involved: *scientific literature* – to reveal the concept and expression of SCC; *meta-analysis* – to compare findings of previous studies in this area. Empirical data were collected by means of the questionnaire survey.

The research is based on a *socio-constructivism learning model* that is applied in university studies (Joiţa, 2005), J. Pjažè (2011) with the idea that there are two phases of learning: *destabilisation and stabilisation, conceptualization of perturbation information* (Thievenaz, 2017), which is duly justified in explaining the adult learning in the context of social interaction.

Practical relevance of the research is demonstrated by the following findings:
- Teachers and students are found to perceive the idea of SCC quite differently, that may have negative consequences for quality of studies, learning, teachers' performance, and relations among group members. Therefore, it is considered necessary to provide students with additional information about the SCC phenomenon and advantages of it;
- The study shows that most teachers and more than half of students see the role of SCC as an opportunity to acquire new knowledge, representations, to improve their existing knowledge, as a chance to

make classes more interesting, while students' and teachers' activities – more dynamic. This, consequently, allows stating that SCC can be regarded as an educational factor in the context of learning/study and should be plasticised as a didactic method during classes solely with respect to wishes, attitudes, and, perhaps, abilities of teachers;

- In view of the discussion and conclusions of the study, practical recommendations for teachers on the application and control of SCC are hereby provided.

Theoretical Discourse of the Concept and Role of Socio-Cognitive Conflict

The SCC is one of the concepts that allow describing and explaining the conditions of adult learning in the context of social interaction. Scholars of social psychology began to study the SCC in the 1980s of the 20th century; later, it became the subject of interdisciplinary analysis (Johnson et al., 2009). The interdisciplinary analysis of SCC not only allowed defining the concept, but also emphasised its positive influence on social interaction and, especially, on the adult learning process (Sacco et al., 2008).

According to I. Zaharia (2013, 458), SCC can be defined as a whole of heterogeneous responses to the same cognitive problem. For a long time, socio-cognitive conflict had been recognised as a negative factor in a learning or study process. Actually, a positive attitude toward the phenomenon was formed as late as in recent decades – thenceforth, socio-cognitive conflict is claimed to be a positive phenomenon provided that a teacher is able to and knows how to control it, so that SCC becomes a learning incentive, epistemological source of new knowledge and representations for reviving the entire heterogeneous group of learners (Darnon et al., 2007, 228). This statement can be explained as follows: no fact, phenomenon, or reality exists in its pure form or in social emptiness, while cognition thereof is more like a conversation than a representation of reality. Therefore, each of us has an initial representation (image) of a certain fact, phenomenon, or other reality around us that is based on our personal story, experience, education, knowledge, culture, ideology, and other factors. So it can be argued that there is no single pure fact, phenomenon, event, or reality – there can rather be as many as views of separate people. Moreover, a new attitude, information, or knowledge may happen to mismatch existing representation of a person, as a result, may be unacceptable and rejected by the person, i.e. SCC develops. One of the key preconditions is that the SCC should become a source of learning and educational factor in this case, i.e., a sufficient and affective (emotional) security of the learner (Jatkauskienė, 2013). Otherwise, he/she will not be able and/or be reluctant to permanently experience emotional imbalance, in other words, he/she will be no longer interested in the

cognitive process itself. Hence, cognitive problems, that develop in the process of learning and discussion, are not as threatening as affective learning problems. Through the right guidance, a teacher is able to control the SCC and, thus, put the discussion and the SCC on the right track, so that to turn the latter into a source of learning and an educational factor (Butera et al., 2005).

For almost half a century, cognitive conflict and SCC have been addressed and interpreted in many academic works, by identifying various contributing factors and consequences thereof.

Some didactic approaches, which are practiced at a university, are aimed to encourage student discussion or debate in addressing problematic questions. This may be a workshop, problem-based learning, projects, group discussion, etc. Such didactic approaches stimulate interaction, so it can be assumed that students get involved in the SCC process.

Initially, the concept of SCC was based on the attitude of Z. Pjažė (2011) stating that collaboration plays a major role in individual cognitive development. Later on, experimental studies supported this position and allowed the development of a learning model in which social variables become key elements of the cognitive development process (Belbase, 2014). This position is different from the one of Z. Pjažė (2011) arguing that social variables had been regarded as external and/or peripheral elements.

According to J. Pjažė (2011), there are two phases of learning: *destabilisation* and *stabilisation.* Destabilisation occurs due to unawareness, inability to act (cognitive conflict), and can be expressed as "*I do not know what to do.*" In case of SCC, destabilisation arises from the disapproval of other people's opinions, attitudes, etc. and can be expressed as "*I do not agree, oppose ...*" This destabilisation can be associated with affective problems, e.g., "*I am useless, I cannot do it.*" Stabilisation, solution of the SCC occurs through the process of assimilation-accommodation, in which new experience or knowledge is acquired, and the individual expands his/her field of understanding, perception, knowledge, and activities. Differences in the learning student's conceptions, verification of hypotheses and observations, analysis of finding may cause the so-called "cognitive shock," cognitive conflict, and loss of balance (Jatkauskienė et al., 2015). Should the cognitive conflict arise from the interaction with other learners or teachers, it becomes the SCC. Therefore, the mechanism of cognitive conflict is the same as for the SCC. The only difference is that SCC arises from interaction with other people (Daele, 2009).

As soon as a student faces a problem that makes him/her review the pre-formed concepts or representations, he/she is forced to reassess the existing associations, images, relationships, processes, etc., formed on the basis of incorrect data, information, or knowledge. Such a review is the only way to accept new information, construct new knowledge, and adjust concepts.

Therefore, Ž. Pjažė named this mental process as *accommodation*. The teacher, who resorts to the principles of constructivism or socio-constructivism, can make use of cognitive conflict or SCC and involve a learner in the process of reflection, search for solutions and acquisition of new knowledge.

A teacher's performance may be strong or poor in case of SCC, subject to the destabilisation/stabilisation phases. In diagnostics, acknowledgment of knowledge, and practical training, a teacher is quite active, whereas at the stage of growth, knowledge recognition and formalization, the teacher delegates an initiative to learners. It is particularly important to encourage, motivate a learner, to explain a nature of an issue to be resolved, situations to be analyzed (Davis et al., 2011). Knowledge should actually become a tool for a learner to act and better understand the surrounding environment. Therefore, it is very important for a teacher to shape didactic situations that are regarded as a whole of tasks for acquiring new knowledge and competences (Jatkauskienė, 2013). The didactic situations, while being shaped in the didactic process, must meet two basic requirements:

- situations must be as realistic as possible, without averting away from real life;
- situations must be at least partially familiar to the learner so that to make him/her truly interested in the problem-solving process, at the same time, in acquiring new knowledge and competences.

Even if in the absence of adequate student-and-teacher co-operation to stimulate development, acquisition of new knowledge and competencies, the SCC can become a factor in initiating the person's inner dialogue and reflection.

As mentioned above, SCC can be described as a whole of heterogeneous solutions to the same cognitive problem. Individual cognitive restructuring may occur namely because of the divergence of solutions and confrontation. This thesis is based on several basic principles:

- construction of knowledge is of social nature and based on interaction between individuals;
- any type of interaction is not necessarily a source or factor of learning;
- based on the learning perspectives of interactionism and constructivism, which make a theoretical framework of SCC, the occurrence of divergence, a loss of balance between interacting individuals is important. This is the only prerequisite to an individual reflection, rebalancing and changes in representations or knowledge (Schunk, 2011).

In recent decades, the concept of SCC has moved away from Ž. Pjažė's individualistic idea – according to L. Vygotsky (1978), the background of learning is social interaction. The scientist introduced the concept of the "*zone of proximal development.*" W. Doise and G. Mugny (1997, cit. Nugaras, 2017)

carried on Ž. Pjažė's and S. Vygotsky's ideas and complemented them with some new elements: social interaction, where causing the SCC, becomes a source of cognitive development. Social interaction is, therefore, constructive if it creates a confrontation between divergent ideas.

The initial loss of individual balance is claimed to occur in a group of learners, as each learner faces different perspectives (Johnson et al., 2009). The learner, thus, is forced to perceive his/her thoughts, taking into account thoughts and views of other members of the group. The secondary imbalance is of a different nature: once the learner faces thoughts or attitudes of others, he-she is forced to review his/her personal and other peoples' representations so that to construct new knowledge (Johnson et al., 2009). In this perspective, narrative becomes a way to "think about one's thoughts." allowing to understand one's own and others' reasoning (Sacco et al., 2008).

It should be emphasised that the statement "SCC is a source of learning and educational factor" is to be supported by the following arguments (Nugaras, 2017):

- While transforming the actors into opponents, the SCC encourages them to put their attitudes away and try to perceive views, attitudes and opinions of the others. It is not that simple, in particular, given the fact that the knowledge or expertise available to opponents reveals or underlines their professional or personal identity. Therefore, retreat, refusal of one's position is not always benevolent or well-appreciated in case of social interaction;

- In a social interaction, an actor may receive information that might never have been obtained through learning or solving cognitive problems on his/her own. This allows him/her looking up at the cognitive problem encountered from a different angle, finding a different way of problem solving.

Hence, in case of SCC, clothes of the social context are "pulled on" the cognitive conflict. In fact, the SCC solving process should involve the restoration of not just cognitive, but affective and social equilibrium, too, because the SCC can be both individual and interpersonal. Working on the SCC solution through the interaction with other people is an opportunity to use joint efforts and knowledge of SCC participants to create a new cognitive structure.

Empirical Findings: Analysis of Students' and Teachers' Attitudes toward Socio-cognitive Conflict as a Source of New Knowledge and Representations

Research design. In 2017, the Department of Public Health of the Faculty of Health Sciences, Klaipėda University, initiated an exploratory research with

the aim of finding out an attitude of respondents toward the idea of SCC and its educational role in the context of learning/study for acquiring new knowledge, constructing and reconstructing social representations. Quantitative method was chosen for the empirical research. The design of empirical research was developed on the basis of analysis of scientific literature. It consists of several stages: 1) preparation for research; 2) questionnaire survey; 3) analysis of research data; 4) discussion of research findings.

The first stage involved the development of empirical research tool - a questionnaire of closed-ended questions. It was based on scientific literature and implies basic parameters of the SCC. The first part of the questions is devoted to the analysis of demographic data, the second – to respondents' attitudes towards the idea of SCC in the context of learning/study. The third part deals with the analysis of conditions needed for the positive application of the SCC in the context of learning/study, and the fourth part – with the role of the SCC in the context of learning/study. Validity of the questionnaire (internal reliability) was based on the method of expert assessment. Respondents of the survey were provided with the goal of research and general information on filling-in the questionnaire. Name and surname of the respondents were not asked to ensure anonymity. Questionnaire statements and questions were not offensive or degrading a human dignity.

At the second stage, teachers and students of public health study programmes of Klaipėda, Vilnius and Lithuanian universities of health sciences were surveyed. A sample of the questionnaire survey consisted of respondents (178 teachers and 243 students). The survey involved target criterion selection, i.e., sample units were selected from the population under the established criterion (teachers in the first and second cycle programmes of public health studies and students thereof). The selected method was based on the presumption that teachers arrange their didactic activities in such a way to involve students in discussions, problem-based learning situations, case studies, etc., whereby the SCC develops in one way or another. The sampling aimed to ensure that teachers and students participating in the research represented the generality of teachers and students of the first and second cycle programmes of public health studies. When deciding on the sample size, findings were planned to be summarizing for the generality with 5% error, as per calculation recommendations of K. Kardelis (2002). Therefore, it is believed that 178 teachers and 243 students are a sufficient and representative sample for the case study. Females accounted for 68 percent of respondents in the survey. By seniority, university staff who has worked 10-20 years (35%), 20 and more years (31%) was dominant in the study. Average age of students was 21.3 years old.

The data, obtained in the third stage of study, were analyzed using statistical database methods: descriptive statistics, correlation analysis, etc. The collected data was analysed using the statistical analysis software SPSS 17 for social sciences.

This article presents only some of the key findings of empirical research and demonstrates differences in teachers' and students' attitudes, based on the developed detail questions of the survey. In order to address these questions, teachers' and students' data of the questionnaire were analyzed. Correlation between the findings and other studies is presented in the discussion section.

First detail question of research: How to perceive and explain the idea of socio-cognitive conflict in the context of learning/study?

Table 1. **Perception of the idea of socio-cognitive conflict, in percent**

Descriptive statements	Teachers	Students	Chi square criterion (X^2)
SCC is a situation where newly acquired information and knowledge make me question my existing knowledge system, review, adjust it.	58.1%	44.3%	X^2=1.689, df=1, p=0.004
SCC is a situation where newly acquired information and knowledge do not match my existing information, knowledge, or attitudes, I find them unacceptable.	74.2%	65.8%	X^2= 7.866, df=1, p=0.005

Data presented in the table suggests that participants of the study understand the idea of SCC, however, there are statistically significant differences in estimates observed under the Mann-Whitney U test criterion. From the point of view of teachers (74.2%), the idea of the SCC is supported by the fact that a newly received information or knowledge does not match the person's existing information, knowledge, or attitudes, he/she finds them unacceptable. Such an idea of SCC is supported by fewer participating students (65.8%). Further, more teachers (58.1%) rather more students (44.3%) perceive the idea of SCC as a situation where a newly received information or knowledge raises doubt about the existing knowledge system, make them review or adjust it. Thus, teachers are better informed about the idea of SCC. In one case or another, the SCC involves a social interaction process, in which its participants are supposed to have precedent positive cognitive and social skills, other skills of solving the SCC and learning issues. Consequently, the study findings show that the SCC situation emphasises two different ways of reasoning and decision-making: *focusing* and *de-centering* (Darnon et al., 2007). In case of focusing, a person attaches too much importance to the elements which he/she is observing, which he/she is paying attention to; he/she finds it difficult to perceive point of

view of others and rejects it. In case of de-centering, an individual is able to perceive attitudes of others and review his/her existing system of knowledge.

Second detail question of research: What are the conditions for a positive solution of SCC in the context of learning/study?

*Table 2. **Perception of conditions for a positive solution of socio-cognitive conflict in the context of learning/study, in percent***

Descriptive statements	Teachers	Students	Chi square criterion (X^2)
Emotional security in SCC	51.6 %	24.1%	$X^2 = 7.796$, df=1, p=0.005
Consideration of positive verbal and non-verbal communication	60.8%	83.9%	$X^2 = 5.401$, df=1, p=0.020
Consideration of the importance of arguments presented	51,6 %	32.9%	$X^2 = 3.299$ df=1, p=0.069
Acceptance of the other person's opinion, attitude	58.1%	27.8%	$X^2 = 8.784$, df=1, p=0.003
Review of existing associations, representations, communications, processes, etc., formed on the basis of incorrect information	61.3%	45.6%	$X^2 = 2.201$, df=1, p=0.138
Active teacher guidance in discussion	61.9%	70.6%	$X^2 = 7.666$, df=1, p=0.006
SCC is positively addressed where opponents of the discussion have equal social and professional status	58.2%	87.1%	$X^2 = 8.312$, df=1, p=0.004

The Mann-Whitney U test was conducted to identify statistically significant differences (Mann-Whitney U criterion = 596.500, p = 0.000): the internal rating of teachers was higher than the one of students. Hence, teachers have a better understanding of conditions needed for solving a socio-cognitive conflict. Data presented in the table demonstrate that there is a statistically significant difference in the attitudes of teachers and students toward an emotional security in case of SCC (51.6% of teachers, 24.1% of students). More than half (51.6%) of teachers believe that it is important to evaluate the arguments presented, while only 32.9% of students consider it important. Students (83.9%) more than teachers (60.8%) regard a positive verbal and non-verbal communication. Teachers (58.1%) more than students (27.8%) tend to believe that the other person's opinion, attitude is important in case of SCC. According to the teachers (61.3%), a positively solving of SCC should involve a review of existing associations, representations, relationships, processes, etc., formed on the basis of incorrect information. Yet, both groups (61.9 percent of teachers; 70.6 percent of students) believe that a teacher should take an active guidance in discussion in case of SCC. As many as 87.1 percent of students believe that SCC is positively addressed where opponents of the discussion have

equal social and professional status. In other words, they tend to presume that teachers will find a solution to conflict based on their teaching status and available knowledge. This presumption may shape the majority's attitude, approach to the object or phenomenon of interest.

Third detail question of research: What is the role of socio-cognitive conflict in a learning or study process?

*Table 3. **Perception of the role of socio-cognitive conflict, in percent***

Descriptive statements	Teachers	Students	Chi square criterion (X^2)
SCC is worrying, stressful to its participants, as it jeopardises a person's competence and authority	10.1%	77.4%	X^2=48.874, df=1, p=0.000
SCC is an opportunity to show one's knowledge, flaunt one's knowledge before other members of the group	12%	90.3%	X^2= 51.957, df=1, p=0.000
SCC is a great opportunity to share knowledge	71.0%	20.3%	X^2= 34.730, df=1, p=0.000
SCC is an opportunity to understand who your friends and "enemies" are	6.9%	54.8%	X^2= 27.591, df=1, p=0.000
SCC is an opportunity to acquire new knowledge, images (representations), improve available knowledge	93.5%	55.7%	X^2= 14.290 df=1, p=0.000
SCC makes classes more interesting, while students' and teachers' activities – more dynamic	74.2%	44.2%	X^2= 7.980, df=1, p=0.005

The Mann-Whitney U test was applied to identify statistically significant differences (Mann-Whitney U = 154.500, p = 0.000): the internal rating of teachers was higher (90.02%) than the one of students (41.96). That means, teachers have a better understanding of the role of SCC. As many as 93.5 percent of teachers and 55.7 percent of students are convinced that SCC provides an opportunity to acquire new knowledge, images (representations), improve their existing knowledge. It is obvious that teachers (74.2%) and students (44.2%) prefer to apply the SCC as an educational factor during classes, since its makes classes more interesting, while students' and teachers' activities – more dynamic. However, quite a great number (77.4 percent) of participating students believe that SCC is worrying, stressful to its participants, as it jeopardises a person's competence and authority. Only 10.1 percent of teachers support this point of view. Teachers are sceptical about the statement that SCC allows to understand who your friends and "enemies" are – only 6.9 percent of all of the teachers who participated in the study, unlike students (54.8%), support this point of view. Obviously, students believe that SCC might be solved only at the level of mutual relations rather than a cognitive problem.

This allows stating that teachers distinguish between socio-cognitive conflict and regular conflict.

Discussion

The findings of the empirical research are supported by insights into previous studies. Analysis of the SCC allows stating that the initial representation of every real event, fact, phenomenon, or subject has two dimensions: *cognitive* (what a person knows, is aware of the fact, event, phenomenon) and *emotional* (what a person feels, how he/she reacts to fact, phenomenon, subject) responds to fact, phenomenon, object) (Darnon et al., 2007). Every fact triggers an action or reaction to it, which is based on the available initial representation of fact or phenomenon. Therefore, some authors believe (Davis et al., 2011; Buchs et al., 2004) that new information, knowledge received by a group of learners:

(a) *may match a person's representation*, support his/her idea, and, at the same time, to expand his/her knowledge, as this enrichment with information, knowledge, and representations is in line with the person's initial representations. This *process of balancing* the new information and the initial representations does not cause any SCC;

(b) *may mismatch a person's representation*, be unacceptable and rejected. This is a state of shock, known as SCC, as a result of a imbalance in a person's initial ideas, representations, attitudes to a fact, subject, or phenomenon based on new information. Imbalance is expressed as destabilisation of thinking, which gives a sense of insecurity (Buchs et al., 2004). So, in this case, the person often takes a closer look at new information to regain the balance as soon as possible. There is an internal dialogue taking place, in which a person receives new information, knowledge and integrates them into his/her system of knowledge and representations, or, after all, rejects it.

Some authors (Darnon et al., 2007) emphasise two different ways of reasoning and decision-making in case of the SCC: *focusing* and *de-centering*. When focusing, an individual attaches too much importance to the elements that he/she is observing, which he/she is paying attention to, he/she finds it difficult to perceive point of view of others. In case of de-centering, an individual is able to perceive attitudes of other people.

Where participants of a discussion focus solely on their own thinking or reasoning patterns and totally ignore other attitudes, problem solving approaches or possibilities, this situation can be considered as *focusing*. Otherwise, if participants of the discussion consider views of others and construct alternative models of problem solving on this basis, *de-centering* can be argued to take place. The de-centering occurs in the light of social representations of the

participants in the discussion. Therefore, most researchers who have dealt with the SCC (Johnson et al., 2009; Sacco et al., 2008) argue that de-centering in SCC is an essential source of adult-learning as the confrontation of opinions and attitudes becomes a driving force for learning.

However, the success of de-centering, and at the same time, of SCC is subject to certain conditions (Butera et al., 2005; Darnon et al., 2008; Darnon et al., 2007; Asterhan et al., 2010; Skoumios, 2008; 2009; Zaharia, 2008; 2013; Cahn, 2011; Galbraith, 2015, et al.):

- De-centering occurs, and SCC is positively addressed where opponents in a discussion have equal social and professional status;
- If people have different status (e.g., a teacher and a student), a person with a lower status has a tendency to keep to his/her opinion, which is based on own reasoning models. Sometimes, he/she may pretend to be in agreement with a higher status opponent, however, does not change his/her own attitude and ways of reasoning. A person with a higher status and in opposition to a person with a lower status feels much more secure in a discussion or debate. The latter, therefore, finds it easier to combine different attitudes, find alternative ways of problem solving, and, at the same time, decentralize opinions of others;
- If people come to an alternative attitude in SCC, participants in the discussion tend to verify whether this attitude belongs to the majority or the minority. If a new alternative comes from a minority, the participants in the discussion will not usually accept it, as such an attitude may be invalid (ineffective) and have no warranty. However, before rejecting the minority's alternative, it is necessary to "use one's brain" and look for sufficient arguments, which did not even come to mind at the beginning of the debate. Such a situation makes one learn, look for information, and deal with cognitive problems in one way or another. It is, however, believed that the majority's opinion, which needs the approval or support of the minority, is not always a learning factor, as it often lacks alternative approaches or related intense cognitive activities;
- So that to make SCC an educational and learning factor, the opposition of opinions and attitudes must be observed to occur solely on a cognitive rather than social level, i.e., the level of mutual relations.

Where adult learners hold discussions and have disagreements in opinions, a competence of the other person is often questioned. In this case, there will be no change in social representations or attitudes, as SCC becomes a purely interpersonal conflict that stresses unhealthy competition or influence. On the contrary, if the disagreements of attitudes occur at the level of ideas and

arguments (cognitive) rather than at the level of interpersonal relations, participants will try to accept different attitudes and integrate them into their own system of representations. Each teacher should have an aim to supervise a discussion where participants can express different views without compromising their competence. The previous studies claim (Belbase, 2014; Berthiaume, 2008) that the SCC solution is possible if participants in the discussion aim to master, learn, understand a subject of concern rather than to attain personal excellence or to demonstrate their knowledge. In the first case, participants of the discussion look focused, motivated, trying to solve the arisen cognitive problem together. In the second case, where participants are just concerned about demonstrating their knowledge to the group, attaining of excellence, other members usually sense and see it very well, so, may ignore the attitude of such persons toward the subject, phenomenon, or fact, and reject it.

Conclusions

Analysis of scientific literature allows stating that socio-cognitive conflict (SCC) in the contest of learning and study means destabilisation of the learning process, which develops in the course of a cognitive process through the interaction with others due of different social representations, attitudes to a fact, phenomenon, subject, information, knowledge, and other types of confrontation.

The mechanisms of SCC and cognitive conflict are identical, however, these phenomena are distinguished in the context of social interaction, which does not always exist in cognitive conflict.

The study suggests that the research hypothesis (socio-cognitive conflict (SCC) in the context of learning/study might become an educational factor in acquisition of new knowledge, in construction of new or reconstruction of existing social representations, provided that students and teachers understand the idea of the SCC and conditions for a positive solution of SCC are created) has been confirmed.

The study found that its participants (teachers and students) understand the idea of SCC, though, there are statistically significant differences in the estimates of teachers and students observed.

Certain conditions are needed to regard SCC as a positive phenomenon:
- *features of social affective interaction*: an emotionally secure and positive (as well as learning) environment for solving the SCC, which is safe from interpersonal stains;
- *symmetry of social relations*, whereby asymmetry thereof (e.g., a different social-occupational status) *hardly ever creates favourable conditions* for SCC solutions, while the SCC does not become an educational and learning factor. This is especially true of hierarchical

relationships, where SCC is resolved solely on the basis of mutual relations, rather than a cognitive problem. Such an SCC decision is inappropriate since it only emphasises, for example, a teacher's status or underlines a connivance of students;

- *intensity of socio-cognitive relations* (opinions of majority-minority) may have a positive impact on learning if account is taken of a positive verbal and nonverbal communication and the weight of the arguments put forward.

The study found that most teachers and more than half of students perceive the role of SCC as an opportunity to acquire new knowledge, images (representations), improve their existing knowledge, as a chance to make classes more interesting, while students' and teachers' activities – more dynamic. This, consequently, allows stating the SCC can be regarded as an educational factor in the context of learning/study.

Adult learning and educational situations are often complex, ambiguous, involve not only socio-cognitive conflict, but also identity of teachers, adult learners, competence, personal motivation, interpersonal relations, existing social representations, etc. It is, therefore, assumed that the above insights under the study presume further empirical narrative studies in this field to disclose the experience of adult education players (teachers, students, adult learners, etc.), their social representations upon coming through a social conflict as an educational and learning factor, in much more detail.

In summarising findings of the study and discussion, the following recommendations can be made:

1. To apply the SCC in the study process, by encouraging students to share their views and by searching a solution to a relevant problem;
2. To assign tasks to students that need the consensus of several possible attitudes;
3. To encourage a controversial approach by proposing group tasks to highlight the coherence and necessity of different attitudes;
4. To avoid interpersonal conflicts by expressing or commenting on the opinion of a speaker, to prevent personal criticism;
5. To encourage students to reason.
6. To avoid unhealthy competition, leadership, as there are neither winners nor losers in the case of SCC, where views, attitudes and ideas are shared. that is the subject of SCC.
7. To avoid negative assessment of other person's competences, whereby is important to present and discuss rules of discussion, to find answer to a problematic question, but not to acknowledge or deny the competence of another person.

8. To focus students on the task, rather than on public demonstration of knowledge, talents or abilities.

9. During the discussion, to try not to compare different competencies and knowledge of students, so as not to jeopardize self-confidence.

10. To encourage de-centering, trying to raise value to the performance of least involved participants.

11. In arranging group activities and handling the same information, to make sure that a less competent student does not get bored. Therefore, groups should engage students with different sources of information available and different competences.

12. To introduce a discussion strategy and its elements (through properly formulated questions, reasoning techniques, attentive listening techniques, etc.) to students; to make sure they have and apply it.

13. To remind students, whenever necessary, of the basic rule: the SCC is a debate on ideas, not individuals or competencies.

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PEER ASSESSMENT IN ADULT EDUCATION: CHALLENGES AND OPPORTUNITIES

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Abstract. *Adult education as a part of lifelong learning requires the use of modern teaching methods. Peer assessment is topical as it promotes the involvement of participants in the learning process more actively. The research aim is to explore challenges and opportunities of peer assessment in adult education. Structured interviews were used to achieve the aim of the research and to answer the question: what are the challenges and opportunities of peer assessment mentioned by participants of adult continuing education course. Main research results are related to opportunities of experience sharing, better understanding of the topic, but challenges relies to refers to lack of the ability to comment and emotional aspects.*
Keywords: *adult education; peer assessment.*

Introduction

Adult education can become a necessity in two cases: changes in employment (change of position, profession or even sector); the need to increase of professional competence. Changes in education take place in different levels and forms, including adult education. However, it must be aware pointed out that adults are the most conservative part of the society, which makes it harder to accept changes (Ivanova, 2016).

Policy makers and national governments starting to see lifelong learning as one of the major strategies for realizing the changes in national and international economic, demographic, social and organizational aspects (Hodgson & Kambouri, 1999). Learning is no longer just an individual's personality development, but it is a development component for society, and the community. Adult education is highlighted in the context of innovation stating that innovation is not just about outcomes, it concerns processes of learning and communication (Desjardins, Lans, & Ederer, 2016). Modern learning process integrates assessment, including self and peer assessment.

It was important to find out how peer assessment is perceived by adults attending courses; whether they see the benefits; maybe there are difficulties that can become challenges. The research aim is to explore challenges and opportunities of peer assessment in adult education. Structured interviews were used to achieve this aim and to answer the question: what are the challenges and

opportunities of peer assessment mentioned by participants of adult continuing education course.

Information on the context of the study: public administration employee, who attended courses in adult continuing education within the framework of a project were invited to participate in the research. The topic of the courses was related to written communication. There were different peer assessment tasks in the lessons. First of all, after small written tasks, discussions took place in pairs or groups on quality of the texts. Secondly, at the end of two lessons, there were practical trainings with more wide text writing, participants read colleagues' texts and evaluated after them according to previously jointly defined criteria. Around 500 participants attended these courses, 25 groups were organised, with about 20 members in each. Training took place two days per group, after the first day participants wrote small feedback papers. They showed notes about peer assessment, both positive and negative. The assumption was made that peer assessment is quite exotic in the adult education.

Regarding the terms of assessment and evaluation - there are many different uses of this term in literature, this publication will be based on the term "assessment", but in some instances evaluation used by author is left.

Literature on adult education

The need for adult education is justified. Adults need to develop and upgrade their generic competences throughout life, and adult education and training may give this opportunity (Gedviliene, 2017). Without knowledge on adult learning the individual's growth may be delayed and society possibilities for advancement are reduced (McGuire, 2011). It is therefore necessary to study adult education.

The term 'Adult learner' is used to describe any person socially accepted as an adult who is participating in a systematic learning process, either formal or non-formal or informal. This process can be self-mentored or corporate-sponsored; in addition, learning may be undertaken as full time or a part time learner, and last, adult learners include diverse groups of people (Kapur, 2015). So adult education is different, specific.

At the turn of the centuries, it was concluded about the lack of one dominant adult learning theory as well as little empirical evidence of exploring and comparison on efficiency of different adult teaching models (Hodgson & Kambouri, 1999). Researchers point out the relationship between theory and practice as the most relevant learning aspect in adult education as well as matching the learning gool with the interests and needs of adults (Hodgson & Kambouri, 1999; Ivanova, 2016). Of course, the aspect of adult learning group diversity still needs to be taken into account - every individual with own

experience, preparedness, beliefs (Hodgson & Kambouri, 1999; Ivanova, 2016). Referring to M. Knowles, in andragogy adults learning is described by the following characteristics: self-directed; actively involved in their learning; maximize prior experiences to absorb new knowledge; learn best in experiential environments; and are influenced by their life factors while in learning process (Dunlap, Dudak, & Konty, 2012).

Researchers have analyzed the characteristics of adult learners. I. Ivanova indicates that adult learners can be divided into three groups, firstly, target-oriented (learning as a necessity), secondly, interested to work and work together (improving capacity in action), thirdly, those for whom learning is a value (interested in the content) (Ivanova, 2016). Researchers describe the adult learner as a self-directed person who is the owner of rich prior experiences, is ready and oriented to learn related to the roles and responsibilities of adult life, and is internally motivated (Hodgson & Kambouri, 1999).

The educational process is also described. Adult education must be oriented to re-evaluate her/his experience (Hodgson & Kambouri, 1999). Adults assess information received in the learning process, and analyses how it can be applied at work. Sometimes ideas arise in this process on how information can be supplemented and improved - this shows a high quality learning process (Ivanova, 2016).

S. Hubackova and I. Semradova stress the role of motivation as an important component on the base of which an adult develops learning activity. Motivation factors of adult education are defined: social motives (leaving routine); professionally relevant reason; participation in community life; outward expectations. This study shows that the strongest motivation factor for adults is awarding of a degree, gaining of a new qualification (Hubackova & Semradova, 2014).

Research on learning avers to the growing recognition of the individuality of learning processes whereas a variety of social and environmental factors are important. As the goal of learning events the preservation of individual particularity and encouraging creativity must be set out (McGuire, 2011). Some researchers point to unanswered questions as to what specific factors of the learning environment contribute to the outcomes as well as discuss and explore quantitatively the effect of core self-evaluation (Diep, Cocquyt, Zhy, Vanwing, & Greef, 2017). Describing learning environment, it should be relevant, respectful, and supportive to best accommodate adult learning. Learner's support systems are primarily in advising, and academic support is important in adult education (Serowick & Cardelle, 2015).

The main evaluation (assessment) strategies used in adult education from teacher-trainers' perspective in order to optimize courses' design and development for adults, are discussed by M. Manolescu, M.L. Tâlvan and

A.C. Bozon. They stress the integration of evaluation in the educational process by modern didactic perspective. This is important to highlight that metacognition involves self-awareness of cognitive functioning (Manolescu, Tâlvan, & Bozon, 2014). According to M.F. Goulão and R.C. Mendez learners who know how learning occurs have better metacognitive knowledge and learn better (Goulão & Menedez, 2015). Assessment must be linked to metacognitive knowledge.

A.D. Rowe and J. Fitness draw attention to negative emotions (such as sadness, grief, boredom and anger) in the learning process in adult education (Rowe & Fitness, 2018). For adult learners it is difficult to accept that previously acquired knowledge and adopted concepts no longer apply. Changing of knowledge, awareness and skills is a difficult and often painful process (Pastogianni & Koutsoukos, 2018). The impact of emotional experiences on motivation and behavior is discussed.

In regards to different roles of adult educator, it is specified that it is important to become an active contributor on improving the context for adults as lifelong learners by research (Hodgson & Kambouri, 1999; Pastogianni & Koutsoukos, 2018).

Literature on peer assessment

In recent decades peers are considered as potential mediators in the learning process. Peer is someone who has the same learner status (Topping, 2017). In literature, peer assessment is described as fundamentally a social process whose central activity is feedback given to and received from others, with aim to enhance the performance (Gennip, Segers, & Tillema, 2009). Peer feedback is viewed and analysed from different aspect, for example age, educational level, or level of expertise of peers, but regarding feedback it is any information provided to learners about their performance (Panadero, Jonsson, & Alqassab, 2018).

Researchers talked about peer-assisted learning as an educational method particularly in andragogy that can be explained by adult learners as more heterogeneous (Olaussen, Reddy, Irvine, & Williams, 2016). Peer assessment is possibility of cooperation and provides several advantages to learners in educational frame such as constructing knowledge through interaction as well as sharing this knowledge with other members to achieve the common goals (Kilickaya, 2017). It is characterized as interpersonal and interactional process (Gennip, Segers, & Tillema, 2009). It is recommended to organize two-way feedback when the assessor will in turn be the assesse, thus this makes it simple to exchange products. Feedback groups can discuss simultaneously, consequently, oral feedback during class will not take much time. Three

necessary elements of the feedback process - verbal explanation, analysis and suggestions for revision - require face-to-face contact (Van der Berg, Admiraal, & Pilot, 2006).

Feedback from peers is different by aim: feedback for assessment (pointing) or feedback for collaborative purposes, the latter is more attentive to learning (Panadero, Jonsson, & Alqassab, 2018). K.J. Topping stress the difference between qualitative and quantitative peer assessment (Topping, 2017). Peer feedback primarily is about producing comments that help the document author improve (Elizondo-Garcia, Schunn, & Gallardo, 2019). Peer feedback pushes students to be constructive, focusing on how to improve work of a peer, and not just critique it (Reinholz, 2016). B. Proctor stress that peer assessment can be extremely formative as it is influenced by different personality characteristics, qualities and abilities, group sophistication and communication skill (Proctor, 2008). Peer assessment operating in relation to the products of learning – writing or oral presentations, portfolios, etcetera. Researchers linking it also with other associated skilled behaviours - learning behaviour or wider social behaviour (Topping, 2017). Thus, peer assessment considers both the product of learning, and also the process behaviours which lead to learning (Topping, 2017).

Peer assessment can make learning easier. Peer feedback is articulated in a language that is easier to understand and comes from a non-expert who faces similar challenges (Panadero, Jonsson, & Alqassab, 2018). Discussing the form of feedback (written versus verbal) it is stated that verbal communication can highlight the social aspects of the interaction, but it also requires additional time in lesson. Verbal discussions is an opportunity to practice explaining ideas in a way that other learners can understand and allow learners to receive immediate feedback if their ideas are understood or not (Reinholz, 2016). Often in the learning process peer assessment is reciprocal, and participants will be both assessed and be the assessor (Topping, 2017). Different interpersonal variables in peer assessment are defined: psychological safety, value diversity, Interdependence, ant trust (Gennip, Segers, & Tillema, 2009).

Peer assessment can promote self-assessment (for example, with a clearer understanding of the criteria), and it is important to analyze the connection between these two activities. Observations on flaws in peer writing must be made consistently, then they become a lens that they can later apply to own work (Reinholz, 2016). Peer assessment with constructive feedback can promote the goal awareness, performance awareness and gap closure in the learning process (Reinholz, 2016). Other important aspect of peer assessment is that both assessor and assessee have to think deeply, as well as negotiate a production, their thought processes stimulated, as well as their social skills (Topping, 2017). Learners can increase their own understanding by providing feedback. There is a

reflection on understanding when feedback is provided and received (Chin, 2007). Furthermore, use of feedback from peers can be a promoter of effective students emotions towards their self-regulation of learning. M. Yang and D. Carless describes usage of feedback from peers and tutors in three dimensions: cognitive dimension (self-regulation their own performance), social-affective dimension (facilitating by trust to relationships between participants), and structural dimension (strategy of using a multi-stage assignment) (Yang & Charless, 2013). The option that peer feedback may be less likely to be "correct" than teacher feedback is described in literature (Topping, 2017).

However, it should be concluded that there are almost no studies in the literature on peer assessment in adult education. It also appears in research on adult education literature content analysis in which peer assessment is not even mentioned (Cherrstrom, Robbins, & Bixby, 2017).

Methodology

Structured interviews were selected as a method for obtaining data. Participation in the research was voluntary, participants submitted email address for further communication. Presence interviews or telephone interviews were initially offered, but only email interviews could be realized due to the engagement of public administration employee. Ten interviews were conducted with employees of eight different public administration institution. The gender and age of the respondent was not asked because it is not analyzed in this research aspect.

Six questions were asked to participants: 1. What is your attitude to the need to assess the tasks performed by other colleagues? Why? 2. How was it to assess performance of other in these courses? Why? 3. How was it when your colleagues assessed your work in these courses? Why? 4. Please tell about your past experience in peer assessment - what courses you've visited before! What was this experience, what was your attitude? 5. In your opinion, what benefits could be gained from peer assessment? Why would it be necessary to apply it? 6. In your opinion, what negative features could peer assessment have?

Thematic data analysis was applied (Braun & Clarke, 2006), answers were sifted and formulated in statements. Then the statements were grouped according to both basic aspects of the research: challenges and opportunities. Thereby statements were combined into categories that allow to formulate the set of peer assessment challenges and opportunities.

Research results

Explanation of questions creating in short: the last two questions relate directly to the research question, but at the beginning of the interview there was a question about general attitude to the need to assess peer texts; then questions about the experience in these courses, as well as universal previous experience of peer assessment. Statements of opportunities and challenges were expected to be obtained from all questions.

In general, the overall attitude was positive, but some respondents highlighted it as a new experience. It is stressed that it allows you to look at the text from the other side, and it is a very good addition to theory. It was pointed out that it was easier in case then a colleague asks for advice himself and is interested in result.

The next question was about experience in these courses as an assessor. Of course, almost all respondents describe it as an interesting process. It was mentioned that easier to assess others than to hear criticism of themselves. Small technical aspect - difficulty in reading handwriting was mentioned.

The third question was about experience in these courses when being assessed. A diverse gamma of emotion was referred which included excitement, interest, pleasure, fear, disbelief. However, the overall attitude was positive, except for one pessimistic - the respondent was convinced that the texts should be evaluated by the lecturer.

Only four respondents indicated that there had been prior experience with peer assessment in other courses, but in two cases it was related to the assessment of the group's work, not individually. Experience in assessing of the lecturer's work was mentioned.

Next question was related to benefits in peer assessment. Some statements related to organizational aspects, for instance, pairs work combined with small groups; texts are 'live', just created by colleagues not artificially made for the courses. Peer assessment is considered to be a valuable addition to course teaching. It is noted that a new skill has been learned - to look at work from the sidelines.

Last question inquired about negative aspects of peer assessment. For the most part, respondents' answers were very short, related to emotions and objectivity. One of respondent discussed assessment situation - if a colleague himself has asked for an assessment, he or she will be motivated to hear another point of view, including criticism, in order to have a better outcome. Another specific acknowledgment was that unmotivated learners without a desire to do anything and learn can also attended courses.

As indicated above, statements from all questions were grouped in two categories according to both basic aspects of the research: challenges and

opportunities. 37 statements about opportunities were made, and 22 statements about challenges. The concept "opportunities" and "challenges" did not appear in questions to respondents in order to ensure free formulation for attitudes and evaluation of peer assessment process.

37 statements about opportunities were coded and combined into categories that allow to formulate the set of peer assessment (PA) opportunities:

- PA increases awareness of the subject, including that didn't understand or overlooked;
- PA informs whether everyone understands in the same way thus reducing misunderstandings (Goulão & Menedez, 2015);
- PA shows the ability to interpret tasks and solutions differently based on own experience, and different ways of thinking (Kilickaya, 2017);
- others' performance in PA can be an example of improving own work (Reinholz, 2016);
- in PA new knowledge is applied in practice both when carrying out a task and when assessing peer task;
- PA encourages valuable and interesting discussions about task, experience (Panadero, Jonsson, & Alqassab, 2018);
- PA provides a view from the sidelines because it's hard to spot the flaws of own work (Van der Berg, Admiraal, & Pilot, 2006);
- PA is an opportunity to learn to listen the objective criticism and to improve communication (Gennip, Segers, & Tillema, 2009).

The set of peer assessment challenges similarly obtained from statements:

- PA difficulty with unfamiliar people because it's impossible to know how they to take criticism (Rowe & Fitness, 2018); PA is risky for people with low self-esteem (Rowe & Fitness, 2018);
- lack of communication skills (Topping, 2017);
- excitement on how others will assess the work;
- inappropriate PA: too loyal or too harsh criticism, lack of objectivity or lack of knowledge on the specific nature of the sector (Gennip, Segers, & Tillema, 2009);

It appears that some of the opportunities are also identified as challenges because adult learners have very different skill levels and experience (Hodgson, & Kambouri, 1999; Ivanova, 2016; Pastogianni & Koutsoukos, 2018). These sets of peer assessment characteristics allow conclusions and recommendations to be drawn up.

Conclusions and recommendations

This study is an insight into the current problem in adult education providing empirical justification. The results of the study cannot be generalized

due to a small number of respondents, but this confirms the need for further researches on peer assessment in adult education.

Main research results are related to opportunities of experience sharing, better understanding of the topic, but challenges refers to lack of the ability to comment and emotional aspects. Of course, it is difficult for an educator to influence emotional readiness for assessment or lack of assessment skills. However, it is possible to create a supportive learning environment.

Recommendations for adult educator is to ensure cooperation, engagement and responsibility that is a prerequisite for valuable discussions. To realise it, educators must draw attention to motivation issues at the start of learning process, to base learning on the reflexion of practice and experience, as well as discuss peer assessment process aims and results.

Peer assessment should become an integral part of adult learning. Researches on peer assessment practice needs to be continued.

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THE IMPACT OF THE VIRTUAL LABORATORY ON THE PHYSICS LEARNING PROCESS

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Abstract. *ICT has invaded the educational process and is providing us with many opportunities to exploit. An additional challenge faced by Physic educators has been the integration of Virtual laboratories in the teaching process. In recent years, Inquiry-Based Science Education has proved its efficacy in education by expanding on "traditional" lessons and motivating students to actively participate in science. Digital technologies support necessary educational innovations and can be the catalyst for change in educational patterns (in regard to its form, space, functions, services, tools, roles, procedures). Virtual laboratories are an essential digital tool. In fact, many Latvian schools are equipped with computer classes, tablets and high-speed internet connection while using a huge variety of web-based learning applications, simulations and visualizations. The paper evaluates necessary skills and abilities which can be developed at the secondary level, analysing and planning the interaction between the physics education process and technological development. The article also highlights the direction of future research. The paper evaluates necessary skills and abilities which can be developed at the secondary level, analysing and planning the interaction between the physics education process and technological development. The article also highlights the direction of future research.*
Keywords: abilities, interactions, physics education, skills, strategic decisions, sustainable competitive advantage, virtual laboratory.

Introduction

Globalization, technological change, intense competition, changing labour market demand, economic and political change encourage young people to take higher risks when choosing future study pathways and career as well as appropriate strategies. What skills and abilities should be acquired in order to be flexible and adapt to technological change? What are the skills and abilities that allow you to develop dynamic capabilities and what are the benefits of physics education? This leads to the question of how some young people are able to successfully adapt to the changing labour market and the dynamics of change in general, also being able to develop their careers

The experimental activity is an indispensable practice in the process of knowledge development in Physics and the lack of modern and equipped laboratories is one of the main reasons of the separation between theoretical approach and the practical one. This problem is experienced by most of the

secondary schools in Latvia. The virtual lab can be defined as virtual studying and learning environment that stimulates the real laboratory. It provides the students with tools, materials and lab sets on computer in order to perform experiments subjectively or within a group at anywhere and anytime. These experiments are saved on localized data storage sites, recorded on different types of data carriers or on web site. The diverse and wide range of modern virtual labs often put physics teachers in a serious dilemma of when and how to choose... terms of selection of such programs and their adaptation to the subject matter in the pre-service and in-service teacher training processes (Bybee, 2014).

Regarding the enhancement of learning, the use of the computational resources contributed significantly to the understanding of the content by the students, allowing the better relationship between theory and practice. Empowering young individuals to construct their own learning by being autonomous, taking initiatives, analysing, synthesizing and evaluating their knowledge and understanding is the basis of constructivist pedagogy (Brooks & Brooks, 1999). The virtual laboratories are delivered with computer technology and offer investigations, which involve simulated material and equipment and are performed by the students. A physical process can be described using some different representations: text, diagrams, formulae, and applets. Showing animations of a dynamical system and tying it to a coordinated graph, diagram or plot can help the students develop skills in using different representations.

Materials and methods

Research methods:
1) analysis of scientific literature;
2) descriptive statistics and dependency analysis were used to process the data. The analysis of the research data was carried out using Classical Test Theory (CTT) (Ballantyne, 2000) and Test Analysis Program ITEMAN™ for Windows (Kehoe, 2005). The charts and tables were created using MS Excel and Tableau Public (Perez, 2010).

The aim of this study is to inform physics educators, teachers, and pre-service teachers of the virtual labs used in teaching physics nowadays, to demonstrate which skills and abilities can be improved and developed, as well as to present a comparison of the results of students (who worked in different types of laboratories). This research is intended to contribute to utilization of virtual physics labs by users with expected efficiency.

A virtual laboratory is an essential component of the Physics study

Over the last 10 years, virtual laboratories are constantly evolving and improving, a repository for online experiments has been developed which includes online labs, learning applications, and virtual inquiry learning spaces making them accessible to teachers all over the world (Pellegrino & Hilton, 2012). Laboratory course is an essential component of the physics study. To which extent can technology be used when organising laboratory exercises, investigation and experiments? Laboratory work is a typical form of experiential learning (Potkonjak et al., 2016). The role of experience in learning is well known. It is especially important in learning of the sciences. Learning models based on experience date back to the ideas of British empiricism and John Locke; John Dewey's philosophy of pragmatism; Jean Piaget's theory of cognitive development; David Kolb's experiential learning, etc. (Pellegrino & Hilton, 2012). These models imply a concrete experience, active laboratory experimentation, in which the earner 'touches all the bases' (Kolb, Boyatzis, & Mainemelis, 2001) and has a tactile contact with the object of study. Effective learning is seen when the learner progresses through a cycle of four stages: of (1) having a concrete experience followed by (2) observation of and reflection on that experience which leads to (3) the formation of abstract concepts (analysis) and generalisations (conclusions) which are then (4) used to test hypothesis in future situations, resulting in new experiences (Kolb, Boyatzis, & Mainemelis, 2001).

In classes, where the study was conducted, it was mainly used for virtual simulations of well-known experiments in Physics, which offered the opportunity to compare them directly with hands-on laboratories and were user-friendly, easily accessible online for all students, and provided a wealth of experimental skills to students of all learning levels (Kolb, Boyatzis, & Mainemelis, 2001).

*Table 1 **The main components of the virtual labs***

No	Tools	Notes
1.	The lab sets & equipments	The virtual lab is considered integral to the traditional lab but not an alternative to it. The existence of the traditional lab is very necessary, but in lower numbers and requirements, which help in the possibility of using it by several users outside the lab (Kolb, Boyatzis, & Mainemelis, 2001)
2.	ICT or/and mobiles devices	They are represented in personal laptops, Smartphone's, data loggers, which are linked to the local net or to the international net so that the student can work directly in the lab, or distantly at anywhere and anytime.
3.	Communication network & the related hardware	In case of performing experiments electronically, all the sets should be linked to the necessary device, because the link between the users with a lab will be through digital communication.

No	Tools	Notes
4.	The Software of the Virtual Lab	This software is represented in the simulation programs, which are designed by professionals. It is necessary to design this program in an interesting and attractive form; as these programs were designed to attract students' attention and urge them to complete the experiment. This is maintained by the animation and simulation techniques, video, and the three dimensions pictures (Potkonjak et al., 2016).
5.	Co-operation software/ Programs & Management.	These programs are concerned with the method of managing the lab and the ones who perform the experiment, including students and researchers. These special programs register students in the lab program and determine the kinds of access that should be provided to each user in the different experiments.
6.	Technical support	It is important that the educational organization has a technical team to support the training of teachers.
7.	Methodical support	According to the author and after discussions with Latvian physics teachers, the most essential part of the learning process is methodological support. Only by applying methodically multi-functional virtual laboratories it is possible to get the desired results. In Latvian schools, it is the most common problem.

An alternative learning environment, a virtual laboratory, seems to contribute to the occurrence of meaningful learning. It is gaining popularity in many ways: there are numerous educational applications, computer-assisted simulations, copying natural phenomena and conditions of an experiment (Basher & Isa, 2006). The main tangible and intangible benefits of a virtual lab in addition to a physical one are the following.

The benefits of a virtual laboratory:

- The general view is that simulations and virtual labs are learner-centred and inquiry-based, which promotes higher levels of thinking and retention. It also allows students to receive immediate feedback and correct their faulty understanding of a concept (González-Gómez et al., 2013). The physical labs reflect traditional learning (Basher & Isa, 2008).
- Virtual laboratories are seen as a low-cost solution for laboratory experiments. Experiments that would be too expensive (either cost of instrumentation/equipment or supplies), complicated or even dangerous to work with can be recreated safely in the virtual environment, thus bridging the gaps found in traditional laboratories (Tatli & Ayas, 2013), (Basher & Isa, 2006). In addition, experimentation time significantly reduces and routine procedures of processing experimental results become less complex.

- Remote labs are used as supplementary tools for complementing in-person laboratory education (Tatli & Ayas, 2013) including virtual elements which interact with real ones, thus exposing students to blended learning (González-Gómez et al., 2013). Another benefit offers more possibilities to simulate and visualise quite a number of complex scientific concepts. Students increase their knowledge regarding unobservable molecular and atomic level phenomena and acquire a better conceptual understanding (González-Gómez et al., 2013).

- Students become more positive toward using computers for learning. They find the simulation of laboratory assignments motivating and creating a lot of experience (González-Gómez et al., 2013). Simulation supports students in the accomplishment of cognitive tasks and enhances their learning processes (Tatli & Ayas, 2013).

Research analyses and findings

In order to emphasize the importance of experimental and research skills in the acquisition of subjects and to involve as many students as possible in the development of laboratory work, in 2016/2017 and 2017/2018 VISC (National Centre for Education) offered schools diagnostic laboratory works in grade 11 physics and chemistry. Physics and chemistry diagnostic laboratory works is organized at the same time. Educational institutions will be able to allow pupils to choose in which diagnostic job they will participate in (Cābelis, 2018).

In total, 243 students participated in this study. Participants were randomly assigned to 3 groups: 2 experimental groups (n1 = 109, n2= 109) and control (tests) group (n = 25). The first experimental group n1 was provided with a virtual lab-based inquiry learning environment, the second experimental group n2 was provided with a blended (virtual and traditional laboratory works). The control (test) group n was taught in a traditional format (teacher's instructions in book or worksheet). All students volunteered to participate in the experiment and the assessment process. They were curious to monitor their progress and receive feedback on their achievements. Students were provided with 3 learning environments: traditional in-class learning;

- blended learning – virtual laboratory combined traditional in-class learning;
- virtual laboratory combined with IT tools and mobile technologies (sensors, data loggers).

Laboratory sessions also include calculations, writing a lab report and a final assessment. In classes, where the study was conducted, it was mainly used for virtual simulations of well-known experiments in Physics, which offered the

opportunity to compare them directly with hands-on laboratories and were user-friendly, easily accessible online for all students, and provided a wealth of experimental skills to students of all learning levels. The effectiveness and results of laboratory work were evaluated by comparing these factors: the lab reports of the experimental group students with the lab reports of the control group students and test results which aimed to assess student achievement of learning objectives (development of such skills as analysis of results quality, data interpretation and analysis, research skills).

1. Is there a difference between the resulting applied knowledge and skills in the experimental groups and in the control group?
2. Are there any differences in the content of students' laboratory reports in the experimental groups and the control group?
3. Are there different results for pupils working in groups, which require collaboration, communication and information search skills?

The experiment has three stages: ascertaining, formative and summative. At the ascertaining stage, all groups were put to a pre-lab test to compare students in terms of their relevant prior knowledge of physic phenomena and experimental (laboratory) experience. Then, all students performed traditional laboratory work and wrote lab reports. These results were important for comparing all groups. Before each practical laboratory class, all students were given equal time-on-task to get prepared for a traditional lab.

First, they were tested about the knowledge of physics content and the understanding of physical processes. The test consisted of 25 tasks (20 multiple choice questions (Ballantyne, 2000) and 5 solving tasks). The time allowed for this test was 80 minutes. The tests included also the following tasks such as:

1. Describe the specifications of an instrument, the procedure and the use of instruments. (Given names and purpose of the instruments, you need to select and write a specification. It is possible to work with catalogues, device descriptions, search for information on the Internet).
2. Choose and describe the relevant method for determining the surface tension coefficient of a liquid, using available devices. The best-suited method should be chosen for research).
3. Determine key figures using the graph and summarise conclusion and give a recommendation. (Different graphs and images are provided (results of statistical data, changes of physical parameters).

The results of the physics content knowledge and physical process test are shown in Figure 1.
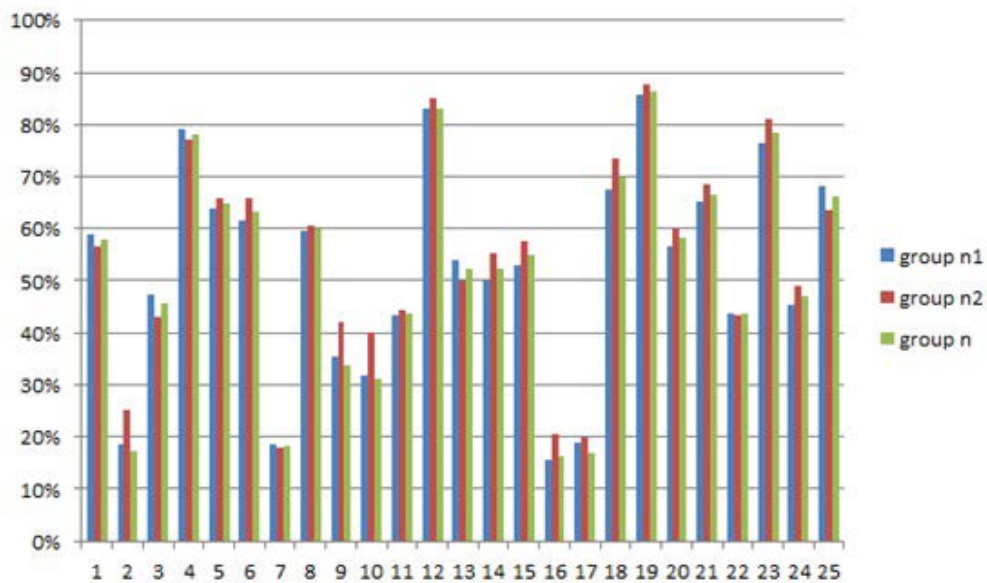
*Figure1 **The results of the physics knowledge and physical process***

As shown in Figure 1, students from the n2 group showed better results in solving tasks with graphical and visual information.

Lab reports they were instructed what requirements their reports should meet. The requirements for report writing in fact repeated 8 criteria (Physics diagnostic laboratory works criteria VISC, 2015) to evaluate the quality of student reports. They are as follows:

1. scientific validity and clearly formulated objectives;
2. relevant description of methods and instruments;
3. critical approach, depth and logic of theoretical background;
4. ability to make measurements;
5. ability to process obtained results (including graphics);
6. ability to critically analyse obtained results, to describe abnormal or unexpected results;
7. validity and clarity of conclusions;
8. practicality and clarity of recommendations.

The results of comparing student laboratory reports from the all groups based on 8 criteria at the summative stage are presented in Figure 2.
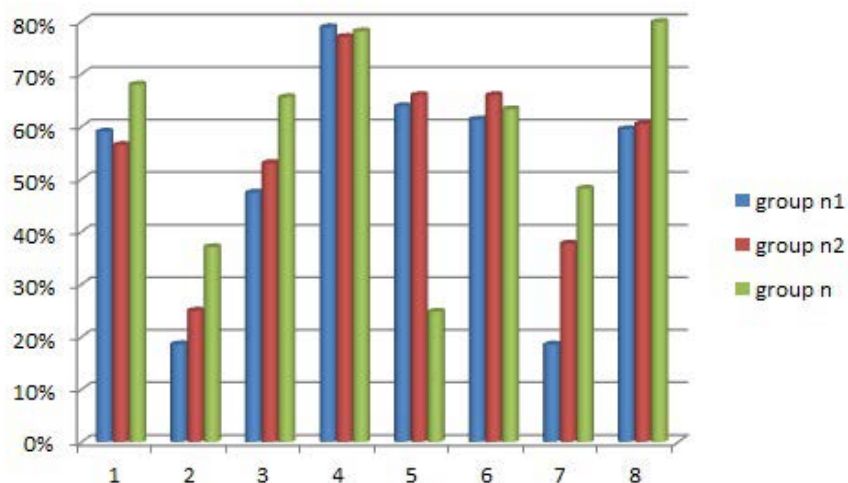
Figure 2 **The results of comparing student's laboratory reports**

As evident from Figure 2, it is apparent from data that the groups show statistically significant differences in some parameters. Students in the control (test) group n have outperformed students in another group in terms of research skills and practices. Statistically significant differences (Attali & Tamar, 2000) were observed for criteria 1, 2, 3, 5, 7 and 8. Thus, the null hypothesis that there is no difference in laboratory report writing skills in the experimental and control groups was rejected and the alternative hypothesis that the experimental and control students are different in terms of report writing skills was proposed. These differences are statistically significant with regard to the following specific abilities: clearly formulate research goals and objectives; describe methods and instruments; critically analyse obtained results; make valid conclusions, and offer practical recommendations. Can be seen despite some differences in some tasks that overall there are no statistically significant differences between the results (Attali & Tamar, 2000). Students who studied with virtual laboratory (Fig. 1) had better success with graphics and visual tasks, but for them, problems were caused by textual tasks and the tasks that included the elements of the research activity. At the summative stage, context-based testing was used as an assessment tool of context-based learning and cooperation skills. The latter aims are to help students gain a better knowledge of how to learn to find and use information according to context and to collaborate and communicate. Pupils were offered tasks that require productive collaboration between pupils throughout the group because the results depend on the performance of each member of the group. The members of the group have different skills and abilities; learn from each other, exchange ideas and relevant information, looking for information according to the context and providing unified answers.

Conclusions

The general studies and the research of the pedagogical experiment confirm that the best results in learning content can be achieved by using a mixed teaching method, i.e. virtual lab physics should only be used together with the traditional method, choosing methodically which of the laboratory works will be done virtually in the traditional way.

As the results show with the help of the virtual laboratory it is possible to strengthen students' ability to read and interpret graphic information, but to learn to work with text and understand the context, traditional methods are better. Cooperation and communication skills are strengthened by traditional works when pupils are forced to cooperate and help each other, which is necessary during traditional laboratory work.

It is better to teach the reports of laboratory work in the traditional environment. Students get used to a particular scheme, structure.

It might also provide hands-on experience with the physical phenomenon and build a fundamental understanding of physical concepts. Combinations of virtual and traditional laboratories offer advantages of attaining learning objectives.

A virtual laboratory might contribute to developing student scientific literacy and an appreciation for physics' place in society.

The author admits that there are limitations in the study, as the pedagogical experiment has been carried out in city schools (small regional schools were not included) and the total number of participants is not so big to make a comprehensive conclusion. This allowed to test existing knowledge and set up new research tasks that would make it possible to find out what specific elements of physics are best learned through virtual laboratories, as well as

To overcome these limitations, future work is planned aiming to enlist more participants, to collect more evidence and to make findings more representative.

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PROGRAMMĒTĀJU KONKURĒTSPĒJAS PAŠNOVĒRTĒŠANAS METODIKA MŪŽIZGLĪTĪBAS UN PROFESIONĀLĀS PAŠATTĪSTĪBAS KONTEKSTĀ

Self-Evaluation Methodology of Programmers' Competitiveness in the Context of Lifelong Education and Professional Self-Development

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Abstract. *Contemporary social sciences, including pedagogy and psychology, carry out researches in the field of competitiveness. The more competitive each member of the society is, the more competitive is the society as such. The aim of research was: experimentally approbate the developed methodology for evaluating the competitiveness of programmers. Research methods were: survey as pedagogical experiment, projective method for data obtaining; Wilcoxon test for data processing. The results of the pedagogical experiment testify that: during the pedagogical experiment, research participants changed their competitiveness self-assessment. Therefore it is very important to know self-evaluation indicators of professional development because it significant impacts both: programmers notions about professional self-development and competitiveness as result of this development, changing competitiveness self-assessment as well. During the experiment, the participants of the research gained new experience of reflection, reflecting on their professional development, including professionalism, career, in past, present and future, and this reflection experience can serve as a basis for programmer's professional development and adequate competitiveness self-assessment. The experimentally approbated self-assessment methodology of professional development and competitiveness is valid and can be used in further research.*
Keywords: *indicators system of self-assessment, programmers' competitiveness, projective method, reflection, survey as experiment.*

Ievads
Introduction

Divdesmitā gadsimta beigās un īpaši divdesmit pirmā gadsimta sākumā sociālajās zinātnēs, t.sk. pedagoģijā un psiholoģijā, ir aktualizējušies pētījumi

konkurentoloģijas jomā. Šo pētījumu aktualizāciju nosaka globalizācijas un glokalizācijas procesu pretrunīgums un ietekme uz sabiedrības ilgtspējīgu attīstību un konkurētspēju. Jo konkurētspējīgāks ir katrs sabiedrības indivīds, jo konkurētspējīgāka ir sabiedrība kopumā. To pašu var teikt par jebkura uzņēmuma kā organizācijas konkurētspēju. Tā kā cilvēks kā personība un arī kā speciālists pašattīstās mijiedarbībā ar savu dzīves un profesionālās darbības vidi, tad mijietekme ir abpusēja, proti, ne tikai katra indivīda konkurētspēja nosaka sabiedrības vai uzņēmuma konkurētspēju, bet arī nepārtraukti mainīgā sociālā un profesionālās darbības vide būtiski ietekmē katra cilvēka konkurētspēju.

Mūsdienu informācijas un zināšanu sabiedrībā katras nozares speciālistam, t.sk. programmētājam, ir jābūt konkurētspējīgam, t.sk. gatavam profesionāli pašattīstīties un dažādos veidos pilnveidoties, nepārtraukti mācīties gan IT uzņēmumā, gan ārpus tā, pašvadot savu karjeru, t.sk. savu pašvirzīto mācīšanos, lai varētu nodrošināt savu pieprasītību un nodarbinātību darba tirgū (Katane, 2011; Katane & Katans, 2016; Katane, Baltusite, & Katans, 2017; Katane & Katans, 2018; Turner-Trauning, 2017; Митина, 2003).

Lai spētu adekvāti izvērtēt un novērtēt savu konkurētspēju kā profesionālās attīstības rezultātu, t.sk. profesionalitāti, programmētājam būtu jāzina izvērtēšanas kritēriji un rādītāji jeb indikatori, kas ietekmē domāšanu, kā arī priekšstatus par konkurētspējīgu programmētāju un konkurētspējas jēdziena izpratni kopumā, palīdzot viņam novērtēt sevi kompleksi, proti, atbilstoši savai profesionalitātei, t.sk. kompetencēm, pieredzei, pašpilnveides motivācijai un reālajām aktivitātēm savas nepārtrauktās mācīšanās nodrošināšanā, karjeras pašvadībai mijiedarbībā ar IT uzņēmumu, kurā strādā, u.c. Savukārt adekvāts konkurētspējas pašnovērtējums ir priekšnosacījums tam, ka programmētājs pēc savu stipro un vājo pušu izvērtēšanas daudzaspektu skatījumā spēs pašvadīt savu profesionālo attīstību un karjeru, saskaņojot savus mērķus ar IT uzņēmuma mērķiem.

Pētījuma mērķis: eksperimentāli aprobēt izstrādāto programmētāju konkurētspējas izvērtēšanas metodiku.

Programmētāju konkurētspējas izvērtēšanas teorētiskais pamats
Theoretical basis for evaluating the programmers'competitiveness

Programmētāja konkurētspējas teorētiskais pamatojums atklāj šī jēdziena daudzšķautņaino nozīmi.

Raksta autoru teorētisko pētījumu rezultāti liecina, ka programmētāju konkurētspēju izglītības zinātnēs un psiholoģijas zinātnēs pamato no vairākiem aspektiem (Katane, Baltusite, & Katans, 2017): personības konkurētspēja; speciālista konkurētspēja jēdziena plašajā nozīmē; inženiera konkurētspēja; programmētāja konkurētspēja.

Konkurētspēja tiek definēta kā spēja maksimāli paplašināt savas iespējas ar mērķi realizēt sevi kā personību, sekmējot savu vispusīgo, profesionālo, sociālo un tikumisko attīstību. Konkurētspējīga personība ir refleksīva personība, kas spēj: 1) pašvadīt un pašizvērtēt savu darbību un uzvedību, t.sk. profesionālo darbību mainīgās vides dinamiskajās situācijās; 2) mainīt savu domāšanu, attieksmes, jo konkurētspējīgai personībai piemīt jauna tipa domāšana, netradicionālas pieejas problēmu risināšanā, adekvāta reakcija nestandarta situācijās (Митина, 2003).

Inženiera konkurētspēja veidojas un attīstās mijiedarbībā ar daudzkontekstu profesionālās darbības vidi, kurā var izdalīt: psiholoģiskās, ekonomiskās, informācijas, sociālās, likumdošanā noteiktās tiesiskās vides kontekstus, kur inženieris kā speciālists cenšas apliecināt savu profesionalitāti un gūt panākumus. Tajā pašā laikā arī inženieris ar savu konkurētspēju var ietekmēt savas profesionālās darbības vides (uzņēmuma, organizācijas) konkurētspēju. Tātad inženiera konkurētspēja nav atdalāma no vides konteksta, kurā speciālists vēlas gūt konkurences priekšrocības savā mērķtiecīgā, uz vērtībām balstītā darbībā, balstoties uz profesijas standartiem, ideāliem, profesijas etaloniem u.c.

Psiholoģijas un izglītības zinātnēs *inženiera konkurētspējas* pamatojumā tiek saskatāma pieeja, kad tiek zinātniski pamatota, raksturota inženierzinātņu speciālista kā **personības iekšējā sistēma**, kam ir dažādas izpausmes un **dažādas pazīmes** jeb **indikatori.**

Inženierzinātnēs konkurētspējīgs speciālists ir: 1) profesionālis, kas gatavs atbilstoši situācijai atrast vispiemērotāko uzdevuma vai problēmas risinājuma veidu; 2) speciālists, kam piemīt vairākas profesionālai darbībai atbilstošās speciālās spējas un kura profesionālās attīstības līmenis ļauj būt pieprasītam gan profesionālās darbības vidē, gan sabiedrībā kopumā, jo praksē ir apliecināta problēmu risināšanas efektivitāte nepārtraukti mainīgā vidē; 3) personība, kam piemīt sociāli orientētu kvalitāšu (īpašību) sistēma, kas kalpo par panākumu gūšanas iekšējo potenciālu, t.sk. spēja paredzēt, spēja atjaunoties un izmantot visas iespējas savai pašattīstībai (Арзуманян, 2016; Добрица & Иванова, 2016; Суязова et al., 2013). Tiek izdalītas gan vairākas kompetences kā konkurētspējas struktūras sastāvdaļas, gan arī citas programmētāja kā **konkurētspējīgas personības kvalitātes**, kas nodrošina konkurētspējīgu darbību un arī viņa konkurētspēju kopumā (Khairullina et al., 2015): 1) motīvi un vērtību orientācija; 2) vēlme un spēja pašattīstīties, pašrealizēties; 3) personības kvalitātes; 4) augsts profesionālās kompetences līmenis; 5) līdera īpašības; 6) sadarbības un kopdarbības kompetence; 7) kultūras humānā kompetence; 8) sociāli ekonomiskā kompetence; 9) radošums; 10) komunikatīvā kompetence; 11) pielāgošanās spējas.

Vairāki autori *jēdzienu* speciālista *konkurētspēja* aizstāj ar sekojošiem jēdzieniem:

- *pieprasītība* (*marketability*) darba tirgū un sabiedrībā kopumā (Katane & Katans, 2016; Swanepoel et al., 2003; Митина, 2003)
- *nodarbinātība* (*employability*) (Teijeiro, Rungo, & Freirea, 2013; Turner, 2002; Zaussinger et al., 2015).

Raksta autoru pētījumi liecina, ka ir arī otrā pieeja programmētāja konkurētspējas pamatojumā, proti, tiek veidoti **konkurētspējas struktūras** modeļi un uzskaitīti tās **komponenti**.

Piemēram, programmēšanas inženiera *konkurētspējas struktūrā* tiek izdalīti šādi komponenti: profesionāli personīgā kompetence (mērķtiecīgums, vispārējās un profesionāli specifiskās zināšanas, prasmes, iemaņas un spējas, patstāvīgums, vajadzība pēc panākumiem un veiksmīgas darbības, atbildīgums, informatīvā kompetence, t.sk. spēja informāciju kodēt un dekodēt); sociālā kompetence (tiesiskā un komunikatīvā kompetence); inženiera domāšana (t.sk. tehniskā domāšana, konstruktīvā domāšana, pētnieciskā domāšana, ekonomiskā domāšana), kur svarīga ir spēja analizēt un sintezēt, salīdzināt un izvērtēt, prasme operēt ar modeļiem, spēja domāt elastīgi, spēja ātri un kvalitatīvi risināt ordinārus un neordinārus uzdevumus, izmantojot dažādu tehnoloģiju arsenālu; inženiera refleksija un pašnovērtējums; radošais potenciāls. Katrs no komponentiem ir programmēšanas inženiera konkurētspējas struktūras patstāvīga apakšstruktūra un tajā pašā laikā visas apakšstruktūras kopā veido vienu nedalāmu veselumu (Каширин & Мустафина, 2012; Мустафина, Рахманкулова, & Короткова, 2010).

Teorētisko pētījumu rezultāti liecina, ka konkurētspējas struktūras modeļos īpaši tiek izcelts **kompetences** komponents, jo no speciālista kompetenču daudzveidīguma un to attīstības līmeņa lielā mērā ir atkarīga viņa profesionalitāte un gala rezultātā arī konkurētspēja kopumā, t.sk. pieprasītība un nodarbinātība.

Piemēram, D.V. Smotrova (Смотрова, 2012) uzsver, ka speciālista konkurētspēju nosaka viņa kompetentums un profesionalitāte, proti, atbilstība profesionālajiem standartiem, darba tirgus prasībām, t.sk. darba devēju prasībām, konkrētos sociāli ekonomiskos apstākļos.

Inženiera, t.sk. programmēšanas inženiera, konkurētspējas struktūrā var izdalīt šādas kompetences (Суязова, Мустафина, Ребро, & Рахманкулова, 2013): profesionālā kompetence; ekonomiskā kompetence, personīgā kompetence; sociālā kompetence; ekoloģiskā kompetence.

Daudzo programmēšanas valodu kompetences (Laaksonen, 2018a), kā arī spēja strādāt komandā (Lipowsky, 2017) būtiski ietekmē programmētāja profesionalitāti un kopumā arī konkurētspēju.

Ir vēl viena pieeja inženiera konkurētspējas pētniecībā: tiek pamatota inženiera **konkurētspējīga darbība**, kas ir personības un profesionāļa kompetentuma izpausmes veids (Laaksonen, 2018b).

Programmētāja profesionālā attīstība ir mūžilgs process, kas notiek gan IT uzņēmumā, gan ārpus tā. Veiksmīgas profesionālās attīstības, t.sk. karjeras pašvadības, rezultāts ir programmētāja konkurētspējas līmeņa celšanās.

Vairāki zinātnieki uzsver topošo inženieru izglītības un jau strādājošo speciālistu profesionālās pilnveides lielo nozīmi. Inženieru konkurētspējas veicināšanā tiek izceltas vairākas mācību teorijas un koncepcijas.

- *Pieredzē balstītā jeb pieredzes mācīšanās (Experience Based Learning or Experiential Learning)*. (Ghose, 2010; Nenzhelele, 2014; Pascual & Uribe, 2006).
- *Darba vidē balstītā mācīšanās (Work Based or Workplace Based Learning)*. (Aslin, Challis, & McEwan, 1995; Nikitin et al., 2016).
- *Problēmbalstītās mācības vai problēmmācības (Problem-Based Learning)*. (Beagon & Niall, 2015).
- *Studentcentrētās mācīšanas un mācīšanās stratēģija, aktīvā mācīšanās (Student-Centered Teaching and Learning Strategy, Active Learning)*. (Barte, 2015).
- *Pašvirzītā mācīšanās (Self-directed Learning)*. (Bary & Rees, 2006)

Konkurētspējīga programmēšanas inženiera profesionālās pašattīstības un karjeras pašvadības procesā īpašu vietu ieņem *pašvirzītā mācīšanās. Gatavība pašvadīt savu nepārtraukto mācīšanos* un *profesionālo pilnveidi, nodrošinot savu profesionālo pašattīstību,* ir svarīgs programmētāja kā konkurētspējīga speciālista rasksturotājrādītājs. Mūsdienās pašvirzītā mācīšanās piesaista daudzu zinātnieku uzmanību. Daži no zinātniekiem *pašvirzīto mācīšanos* sauc par *pašregulēto mācīšanos* un/vai *pašvadīto mācīšanos*. Pašvadītās jeb pašvirzītās mācīšanās nozīmē to, ka mācīšanās procesā iniciatīvu uzņemas pats izglītojamais bez citas personas (izglītotāja jeb pedagoga) aktīvas līdzdalības. Pašvirzītās mācīšanās procesam ir ciklisks raksturs, jo pats izglītojamais plāno, realizē un izvērtē savu mērķorientēto, motivēto mācīšanos un tā rezultātus, kas ir raksturīgi īpaši pieaugušo izglītojamo nepārtrauktās mācīšanās un profesionālās pilnveides procesā.

Metodoloģija
Methodology

Tika veikts pedagoģiskais eksperiments, kura piedalījās dažādu Latvijas IT uzņēmumu 60 programmētāji (eksperimenta A grupa), kā arī Latvijas Lauksaimniecības universitātes (LLU) Informācijas tehnoloģiju fakultātes (ITF)

maģistra studiju programmas 1. un 2. kursa 15 studenti (eksperimenta B grupa). Kopā pētījumā piedalījās 75 dalībnieki, kas eksperimenta sākumā un beigās pašnovērtēja savu konkurētspēju. Informācija par pētījuma dalībniekiem redzama 1. tabulā. Tabulā var redzēt kopējā skaita, dzimuma, vecuma, kopējās darba pieredzes un programmēšanas darba pieredzes aprakstošās statistikas rādītājus un iegūtās vērtības (skat. 1.tab.).

Pētījuma dalībnieki pārstāvēja 3 veidu IT uzņēmumus: 1) Latvijas uzņēmums bez pārstāvniecības ārzemēs, 2) Latvijas uzņēmums ar pārstāvniecību ārzemēs; 3) ārzemju uzņēmums ar pārstāvniecību Latvijā, no kuriem lielākā daļa darbojas Rīgā vai tās tuvumā, bet daži dalībnieki tika uzrādījuši, ka IT uzņēmums, kurā viņi strādā atrodas citās Latvijas pilsētās.

*1.tabula. **Informācijas par pētījuma dalībniekiem aprakstošā statistika***
*Table 1 **Descriptive statistics of information about participants of research***

N.	Raksturotājrādītāji	Eksp. A grupa	Eksp. B grupa
1.	**Skaits** (N)	60	15
2.	**Dzimums**		
	Sievietes (N)	7	0
	Vīrieši (N)	53	15
3.	**Vecums** (gadi)		
	Min (Minimālā vērtība)	20	23
	Max (Maksimālā vērtība)	50	37
	A (Amplitūda)	30	14
	Me (Mediāna)	28	25
	Mo (Moda)	23	25
	$\overline{x}$ (Vidējā aritmētiskā vērtība)	29.2	26,2
4.	**Kopējā darba pieredze (gadi)**		
	Min (Minimālā vērtība)	2	1
	Max (Maksimālā vērtība)	25	17
	A (Amplitūda)	23	16
	Me (Mediāna)	6	3
	Mo (Moda)	4	1a; 2b; 3c
	$\overline{x}$ Vidējā aritmētiskā vērtība	8,1	4,8
5.	**Par programmētāju nostrādātie pilnie gadi**		
	Min (Minimālā vērtība)	0*	0*
	Max (Maksimālā vērtība)	25	7
	A (Amplitūda)	25	7
	Me (Mediāna)	4,5	2
	Mo (Moda)	4	2
	$\overline{x}$ Vidējā aritmētiskā vērtība	7,2	1,8

*Vēl nav nostrādāts 1 pilns gads, tikai daži mēneši.
N (kopā)=75; A grupa n=60; B grupa n=15

Pedagoģiskais līdzeklis eksperimenta laikā bija *aptaujas anketa,* kuras saturs sastāvēja no vairākām apakšsadaļām: 1) profesionālās attīstības, t.sk. profesionālās pilnveides veidu, pašizvērtēšana, balstoties uz pieredzes refleksiju; 2) programmēšanas valodu apguves un iegūto kompetenču pašizvērtēšana; 3) cita veida kompetenču, t.sk. sociālās kompetences, ekonomikas un uzņēmējdarbības kompetences, pašizvērtēšana; karjeras pašvadības, t.sk. apmierinātības ar savu karjeru, pašizvērtēšana; 4) nākotnes nodomu un mērķu pašizvērtēšana; 5) konkurētspējas dažādo pazīmju un izpausmju darbībā pašizvērtēšana; 6) IT uzņēmuma kā zināšanu organizācijas, t.sk. zināšanu pārvaldības tajā, izvērtēšana.

Pētījuma jautājums bija: vai, aptaujas kā pedagoģiskā eksperimenta laikā iepazīstoties ar raksta autoru izstrādāto programmētāju profesionālās attīstības pašnovērtējuma metodikas indikatoru sistēmu, kā arī IT uzņēmuma kā zināšanu organizācijas izvērtēšanas metodikas indikatoru sistēmu, eksperimenta beigās respondentu konkurētspējas kā profesionālās attīstības rezultāta pašnovērtējums mainīsies, proti, vai pētījuma dalībnieku konkurētspējas pašnovērtējumi aptaujas sākumā un beigās atšķirsies? Ja atšķirsies, cik būtiskas ir šīs izmaiņas?

Pētījuma metodes. Balstoties uz vairākiem avotiem, kuros ir pamatota gan Dembo-Rubinšteina projektīvā metode (Дембо, 1962; Рубинштейн, 1999), gan uz tās bāzes modificētās autormetodikas (Katane, 2000; Katane, 2001; Прихожан, 1988; Яньшин, 2007), tika plānots pats pētījums un izveidota *projektīvā līnijskala* datu ieguvei, proti, pētījuma dalībnieku konkurētspējas (turpmāk - KS) pašizvērtēšanai. Līnijskalas augšgalā tika norādīts: *visaugstākais KS līmenis*, kas norādīja uz visaugstāko iespējamo KS pašnovērtējumu, bet apakšgalā: *viszemākais KS līmenis*, kas norādīja uz viszemāko iespējamo KS pašnovērtējumu. Iegūto datu apstrādei tikai izmantots Vilkoksona tests SPSS 21. lietojumprogrammā.

Pati aptauja tika iecerēta un organizēta kā pedagoģiskais eksperiments, kurā aptaujas anketa kalpoja par refleksijas pieredzes uzkrāšanas un adekvāta KS pašnovērtējuma veidošanās veicināšanas pedagoģisko līdzekli. Līnijskala tika veidota tā, ka datu nolasīšana bija iespējama 10 punktu jeb ballu ordinālajā skalā. Mērījumi tika veikti pirms un pēc aptaujas.

Pētījuma laiks. Pētījuma sagatavošanas posms, kurā tika izstrādāta programmētāju profesionālās attīstības pašizvērtēšanas metodika, kā arī plānota un sagatavota aptauja kā pedagoģiskais eksperiments, proti, tās metodoloģiskā bāze: 2018.gada pavasaris - rudens. Laika posmā 24.11.2018 - 05.12.2018 notika aptaujas organizatorisko jautājumu risināšana un nosacījumu saskaņošana ar potenciālajiem pētījuma bāzes IT uzņēmumiem un LLU ITF.

Dotajā rakstā tiek publicēta un analizēta tikai daļa no veiktajā pētījumā iegūtajiem rezultātiem.

Pētījuma rezultāti
Results of Research

1. Iegūto datu primārā matemātiskā apstrāde aprakstošās statistikas ieguvei. Ar modificēto Dembo-Rubinšteina projektīvo metodi aptaujas sākumā un beigās iegūtie dati tika primāri matemātiski apstrādāti, lai iegūtu aprakstošās statistikas rezultātus, kas redzami 2.tabulā. Iegūtie aprakstošās statistikas rezultāti liecina, ka aptaujas kā pedagoģiskā eksperimenta laikā abu grupu dalībnieku KS pašnovērtējumos ir notikušas izmaiņas. Salīdzinot abu grupu aprakstošās vērtības aptaujas sākumā, var secināt, ka B grupas dalībnieku KS pašnovērtējums kopumā ir zemāks par A grupas dalībnieku KS pašnovērtējumu. Aptaujas beigās šīs atšķirības ir mazinājušās, taču vēl aizvien pastāv.

*2.tabula. **Aptaujas sākumā un beigās iegūto A un B grupas dalībnieku KS pašnovērtējumu aprakstošā statistika***
*Table 2 **Descriptive statistics of competitiveness self-assessments by A and B groups participants obtained at the beginning and end of the survey***

Aprakstošās statistikas rādītāji	A grupas dalībnieku KS pašnovērtējums		B grupas dalībnieku KS pašnovērtējums	
	Eksp. sākumā	Eksp. beigās	Eksp. sākumā	Eksp. beigās
Min	5	4	3	3
Max	9	9	8	9
A	4	5	5	6
Me	7,5	7	6	6
Mo	8	7	6	7

Kopā N=75: A grupa n=60; B grupa n=15.

Lai varētu izskaidrot eksperimenta laikā iegūtos rezultātus, apskatīsim dažus aspektus no aptaujas satura, izvērtējot programmētāju profesionālo pašattīstību. Profesionālās attīstības pašizvērtēšanā svarīgs kritērijs bija profesionālā pilnveide. Daudzie indikatori palīdzēja pētījuma dalībniekiem apzināties un izvērtēt savas profesionālās pilnveides veidu daudzveidību (skat. 3.tab.).

*3.tabula. **Programmētāju profesionālās pilnveides daudzveidība***
*Table 3 **Diversity of programmers professional development***

N	Profesionālās pilnveides daudzveidības izvērtēšanas indikatori	A grupa (izvēļu biežums)	R	B grupa (izvēļu biežums)	R
1.	Uzsākot savu profesionālo darbību IT uzņēmumā, esmu saņēmis/usi palīdzību un atbalstu no mana mentora, kas dalījās savā pieredzē, kā arī deva iespēju man izzināt un apgūt to, ko vēl nezināju kā jaunais speciālists.	45 (75%)	2,5.	9 (60%)	3.
2.	Savu iespēju robežās apmeklēju zinātnieku, programmētāju-praktiķu un/vai lielo IT koncernu (zīmolfirmu) organizētās	27 (45%)	4,5.	4 (27%)	6.

N	Profesionālās pilnveides daudzveidības izvērtēšanas indikatori	A grupa (izvēļu biežums)	R	B grupa (izvēļu biežums)	R
	zinātniski praktiskās konferences un seminārus, kuros informē par jaunāko manas profesionālās darbības jomā un dalās ar jaunāko pieredzi.				
3.	Veicot savus darba pienākumus, arvien uzzinu daudz ko jaunu no pieredzes bagātiem kolēģiem - projekta vadītāja, sistēmanalītiķa, vecākā programmētāja/iem, citiem programmētājiem, sadarbojoties komandā.	45 (75%)	2,5.	12 (80%)	2.
4.	Apmeklēju programmētāju profesionālās pilnveides kursus ārpus IT uzņēmuma.	9 (15%)	7.	3 (20%)	7.
5.	Apmeklēju profesionālās pilnveides kursus un seminārus, ko saviem darbiniekiem rīko IT uzņēmums, kurā strādāju.	27 (45%)	4,5.	6 (40%)	5.
6.	Daudz ko esmu apguvis/usi pašmācības ceļā, jo savu programmētāja pienākumu ietvaros man jārisina daudzi problēmuzdevumi, meklējot radošus risinājumus koda izstrādē.	57 (95%)	1.	8 (53%)	4.
7.	Šobrīd turpinu studijas augstskolā IT jomā vai jomā, kas ir saistīta ar IT nozari, lai celtu savas profesionalitātes līmeni.	21 (35%)	6.	13 (87%)	1.

Kopā N=75: A grupa n=60; B grupa n=15.

Vērtējot savu profesionālo pilnveidi, pētījuma dalībniekiem bija dota iespēja izvēlēties vairākas atbildes. Sniegto atbilžu biežuma vislielākais rādītājs liecina par to, ka: 1) A grupas dalībnieku profesionālā attīstība notiek, iegūstot arvien jaunas zināšanas, prasmes un kompetences, *pašmācības ceļā* (1.rangs), *pieredzes apmaiņā un sadarbībā ar saviem darba kolēģiem* (2,5.rangs), kā arī, pateicoties *pirmā gada mentoringam* (2,5.rangs), uzsākot savu profesionālo darbību IT uzņēmumā; 2) savukārt B grupas dalībnieku sniegto atbilžu biežums liecina par to, ka pētījuma dalībnieki profesionāli attīstās, *turpinot studijas augstskolā* (1.rangs), *pieredzes apmaiņā un sadarbībā ar saviem darba kolēģiem* (2.rangs), kā arī, pateicoties *pirmā gada mentoringam* (3.rangs).

Tādējādi var secināt, ka abu grupu dalībnieku rezultātos atšķiras atbildes, kas ieguva 1. rangu, proti: A grupas respondenti, kas ir programmētāji - praktiķi, apgūst visu jaunāko pašmācības ceļā, bet B grupas dalībnieki, kas ir LLU ITF maģistranti, izvēlējušies formālo izglītību mūžilgās mācīšanās procesā, lai veicinātu savu profesionālo attīstību**.**

4.tabula. ***Programmētāju profesionālās kompetences programmēšanā***
*Table 4 **Programmers professional competences on programming***

N	Pētījuma dalībnieku grupas	Kompetence 1 progr. valodā	Kompetences 2 progr. valodās	Kompetences 3 progr. valodās	Kompetences 4 progr. valodās	Kompetences vairāk kā 4 progr. valodās
1.	A grupa	6 (10%)	9 (15%)	15 (25%)	3 (5%)	27 (45%)
2.	B grupa	1 (6.7%)	6 (40%)	3 (20%)	2 (13,3%)	3 (20%)
	Kopā:	7 (9%)	15 (20%)	18 (24%)	5 (7%)	30 (40%)

Kopā N=75; A grupa n=60; B grupa=15.

Profesionalitātes izvērtēšanā programmētājiem svarīgi bija pašizvērtēt savas programmēšanas kompetences dažādās programmēšanas jomās (skat. 4.tab.). Pētījuma rezultāti liecina, ka A grupā vislielākais īpatsvars ir to pētījuma dalībnieku, kas norādījuši, ka viņiem ir kompetences vairāk nekā 4 programmēšanas valodās, savukārt B grupā pētījuma dalībnieku vislielākais īpatsvars attiecas uz pazīmi: kompetences 2 programmēšanas valodās. Tas nozīmē, ka *A grupas pētījuma dalībnieki ir* **elastīgāki** *savā profesionālajā darbībā, veicot programmētāja dažāda veida pienākumus IT uzņēmumā, kas paver iespējas pašrealizēties dažādās programmēšanas jomās*, kas ietekmē arī viņu konkurētspējas pašnovērtējumu. Tā kā netika veikti padziļināti pētījumi katras apgūtās programmēšanas valodas kompetences līmeņa izvērtēšanā, nevaram apgalvot, ka A grupas dalībnieki ir arī kompetentāki programmēšanas valodu jomās, jo var būt augsta līmeņa profesionālās kompetences 1-2 programmēšanas valodās, padziļināti apgūstot šo programmēšanas sfēru specifiku, un var būt zināšanas 4 un vairāk programmēšanas valodās, bet profesionālās darbības augstu kvalitāti un produktivitāti programmētājs uzrāda tikai vienā no tām, kurā viņš profesionāli specializējas, jo pārējās programmēšanas valodās zināšanas ir virspusējas, iespējams nav arī pieredzes šajās jomās. Pastāv arī vēl tāda varbūtība, ka daļa pētījuma dalībnieku, būdami paškritiski, uzrādīja tikai tās valodas, kurās viņi patiešām ir kompetenti, bet otra daļa uzrādīja visas valodas, ko kaut kad un kaut kādā veidā ir mācījušies, neskatoties uz valodu apguves jeb kompetences līmeni.

2. Iegūto datu sekundārā matemātiskā apstrāde secinošās statistikas ieguvei. Nākamajā datu sekundārās matemātiskās apstrādes posmā, izmantojot Vilkoksona testu SPSS 21.0 lietojumprogrammā, tika salīdzinātas A grupas dalībnieku KS pašnovērtējuma divas saistītās pazīmju paraugkopas, kā arī B grupas dalībnieku KS pašnovērtējuma divas saistītās pazīmju paraugkopas, kas iegūtas aptaujas sākumā un beigās (skat. 1.att.), lai noskaidrotu, vai aprakstošās statistikas rezultāti par atšķirībām KS pašnovērtējumos ir statistiski būtiski.
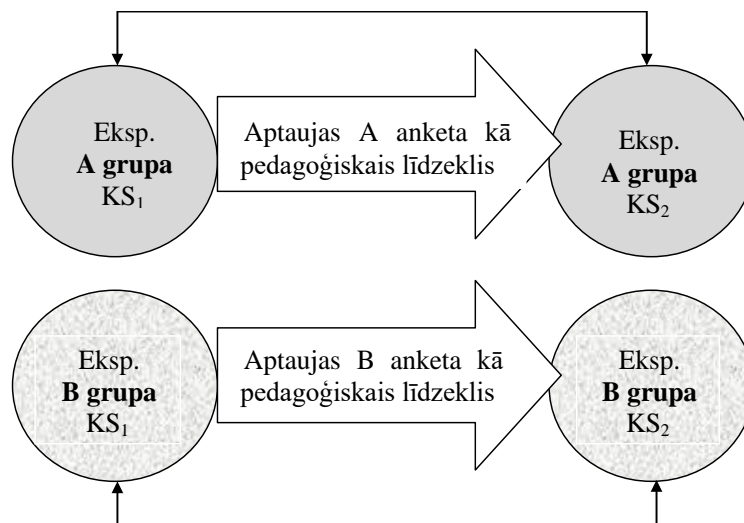
*1.attēls. **Aptaujas sākumā un beigās iegūto A grupas dalībnieku KS pašnovērtējumu salīdzināšana** (Autoru veidots)*
*Figure 1 **Comparison of competitiveness self-assessments by A group participants obtained at the beginning and end of the survey** (Created by authors)*

Iegūtie secinošās statistikas rezultāti un ar tiem saistītie secinājumi ir redzami 5.tabulā.

*5.tabula. **Secinošās statistikas rezultāti***
*Table 5 **Results of conclusive statistics***

Izvirzītās hipotēzes	Iegūtie rezultāti	Secinājumi
H_0: A grupas KS_1=A grupas KS_2 H_1: A grupas $KS_1 \neq$ A grupas KS_2	p = 0,008 < α = 0,01	Pastāv statistiski būtiskas atšķirības starp A gr. KS pašnovērtējumiem aptaujas sākumā un beigās.
H_0: B grupas KS_1= B grupas KS_2 H_1: B grupas $KS_1 \neq$ B grupas KS_2	p = 0,546 > α = 0,05	Aptaujas laikā B gr. KS pašnovērtējumu aprakst. statistikas rezultātos konstatētās izmaiņas ir statistiski nebūtiskas.

Kopā N=75; A grupa n=60; B grupa=15.

Gan aprakstošās, gan secinošās statistikas rezultāti ļāva nonākt pie vairākiem secinājumiem.

- Eksperimenta beigās gan A grupas, gan B grupas dalībnieku konkurētspējas pašnovērtējumos ir konstatētas divu veidu atšķirības, proti, pētījuma dalībnieku konkurētspējas pašnovērtējums: 1) palielinājies, jo respondenti, izmantojot profesionālās attīstības un konkurētspējas pašizvērtēšanas metodiku, pētīja un novērtēja savas stiprās puses, kas līdz šim nav pienācīgi novērtēts; 2) samazinājās, jo respondenti, izmantojot pašizvērtēšanas metodiku, atklāja savas nepilnības, kurām līdz šim nav pievērsta pienācīga uzmanība.

- Diferenču skaits abās grupās kopumā ir lielāks par to gadījumu skaitu, kur nav notikušas izmaiņas, tikai A grupas dalībnieku pašnovērtējumos ir notikušas statistiski būtiskas izmaiņas, bet B grupas dalībnieku pašnovērtējumos konstatētās atšķirības nav statistiski būtiskas.
- Ir ļoti svarīgi zināt profesionālās attīstības izvērtēšanas indikatorus, jo šīs zināšanas ietekmē programmētāju priekšstatus gan par profesionālo attīstību, gan par konkurētspēju kā šīs attīstības rezultātu, mainot konkurētspējas pašnovērtējumu.

Diskusija. Ideja jeb iecere aptauju veidot kā pedagoģisko eksperimentu tika eksperimentāli aprobēta arī pētījumā, ko I. Katanes vadībā veica S. Īriste (Īriste, 2018; Īriste & Katane, 2017), tikai pētījuma dalībnieku KS pašnovērtējuma datu ieguvei bija izmantota eseja, nevis projektīvā metode (modificētā līnijskala). Zinātnieču veiktās aptaujas laikā tika aprobēta topošo viesmīlības uzņēmumu vadītāju KS izvērtēšanas indikatoru sistēma un KS līmeņa noteikšanas metodika. Šī pētījuma eseju kontentanalīzes rezultāti liecināja par būtiskām izmaiņām studentu kā topošo viesmīlības uzņēmumu vadītāju priekšstatos par konkurētspējīgu speciālistu, jo pēc aptaujas studentu esejās bija daudz plašāk aprakstīta viesmīlības speciālista konkurētspēja, palielinājās KS pazīmju skaits un paplašinājās KS raksturojuma spektrs.

Secinājumi
Conclusions

Aptaujas kā pedagoģiskā eksperimenta rezultāti ļāva secināt, ka:
- A grupas dalībnieku KS pašnovērtējumā pedagoģiskā eksperimenta laikā ir notikušas statistiski būtiskas izmaiņas;
- arī B grupas pētījuma dalībnieku KS pašnovērtējums eksperimenta beigās atšķiras no KS pašnovērtējuma eksperimenta sākumā, par ko liecina aprakstošās statistikas rezultāti, taču secinošās statistikas rezultāti rāda, ka šīs izmaiņas nav statistiski būtiskas;
- ir ļoti svarīgi zināt profesionālās attīstības izvērtēšanas indikatorus, jo šīs zināšanas ietekmē programmētāju priekšstatus gan par profesionālo attīstību, gan par konkurētspēju kā šīs attīstības rezultātu, mainot konkurētspējas pašnovērtējumu;
- pētījuma dalībnieku norādījuši dažādus savas profesionālās pilnveides ceļus, kur nozīmīgu vietu ieņem pašmācības process, IT uzņēmumā organizētie profesionālās pilnveides kursi un pieredzes apmaiņa, universitātē iegūstamā formālā izglītība mūžilgās mācīšanās

kontekstā, kā arī pirmā gada mentorings sadarbībā ar kompetentu kolēģi;

- viens no konkurētspējas pašnovērtējumu ietekmējošiem faktoriem ir kompetenču daudzveidība dažādās programmēšanas valodās;
- konkurētspējas pašnovērtējumu ietekmē arī pētījuma dalībnieku vecums un darba pieredze;
- eksperimenta beigās ir konstatētas divu veidu pašnovērtējuma atšķirības, proti, pētījuma dalībnieku konkurētspējas pašnovērtējums: 1) palielinājies, jo respondenti, izmantojot profesionālās attīstības un konkurētspējas pašizvērtēšanas metodiku, pētīja un novērtēja savas stiprās puses, kas līdz šim nav pienācīgi novērtēts; 2) samazinājās, jo respondenti, izmantojot pašizvērtēšanas metodiku, atklāja savas nepilnības, kurām līdz šim nav pievērsta pienācīga uzmanība;
- eksperimenta laikā iegūtie rezultāti sasaucas ar citā pētījumā gūtajiem rezultātiem, aptauju plānojot un organizējot kā pedagoģisko eksperimentu, lai ietekmētu pētījuma dalībnieku konkurētspējas pašnovērtējumu;
- eksperimenta laikā pētījuma dalībnieki guva jaunu refleksijas pieredzi, reflektējot par savu profesionālo attīstību, t.sk. profesionalitāti, karjeru, pagātnē, tagadnē un nākotnē, un šī refleksijas pieredze var kalpot par pamatu programmētāju konkurētspējas attīstībai un adekvātam konkurētspējas pašnovērtējumam;
- eksperimentāli aprobētā profesionālās attīstības un konkurētspējas pašnovērtēšanas metodika ir valīda un izmantojama turpmākos pētījumos.

Summary

In pedagogical and psychological sciences the programmers competitiveness is based on the three aspects: the competitiveness of a personality; the competitiveness of a specialist in the broad sense of the term; the competitiveness of an programmer, focusing on the engineer's specialization area in the computer science.

Various tendencies are observed in the validation of the programmer's competitiveness, such as: 1) the programmer's competitiveness is defined in terms of the competitiveness of a personality and the competitiveness of a specialist; 3) the attributes or the qualities of a programmer's competitiveness are identified; 3) the models of the programmer's competitiveness are created and scientifically grounded, identifying its various elements; 4) in the opinion of many scientists, the competency is one of the most important components of the programmer's competitiveness structure.

The concept of the programmer's competitiveness is often replaced by the concept of marketability and employability.

It is important not only to study the programmer's competitiveness, but also to provide the scientific grounds and experimentally approbate the ways of its development promoting, where continuous learning in the context of lifelong and lifewide learning and various types of professional development play an important role.

The results of the survey as a pedagogical experiment testify that:

- there are statistically significant changes in the competitiveness self-assessment by A group participants during the pedagogical experiment;
- the competitiveness self-assessment by B group participants at the end of the experiment differs from the competitiveness self-assessment at the beginning of the experiment as well, but the results of the conclusive statistics show that these changes are not statistically significant;
- it is very important to know self-evaluation indicators of professional development because it significant impacts both: programmers notions about professional self-development and competitiveness as result of this development, changing competitiveness self-assessment as well;
- the participants of research have indicated different ways of his/her professional development, where the self-directed learning, professional development courses organized in the IT company and exchange of experience, university-level formal education in the context of lifelong learning, as well as the first year mentoring in cooperation with a competent colleague, occupy an important place;
- one of the factors influencing the self-assessment of competitiveness is the diversity of competences in different programming languages;
- self-assessment of competitiveness is also influenced by the age and work experience of the research participants;
- there are two types of self-assessments differences after approbation of research methodology (at the end of the experiment), namely, the research participants' competitiveness self-assessment: 1) increased as respondents, through the methodology, studied and assessed their strengths, which had not been properly assessed so far; 2) decreased as respondents, through the methodology, found out their weaknesses, which had not been given due attention so far;
- during the experiment the obtained results correlate with the results obtained during other research, where was planned and organized the survey as a pedagogical experiment to influence the self-assessment of the competitiveness of the research participants;
- during the experiment, the participants of the research gained new experience of reflection, reflecting on their professional development, including professionalism, career, in past, present and future, and this reflection experience can serve as a basis for programmer's professional development and adequate competitiveness self-assessment;

- the experimentally approbated self-assessment methodology of professional development and competitiveness is valid and can be used in further research.

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ОСОБЕННОСТИ ОРГАНИЗАЦИОННОЙ КУЛЬТУРЫ В ЖЕНСКОМ ТРУДОВОМ КОЛЛЕКТИВЕ

Features of Organizational Culture in the Women's Labor Collective

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Abstract. *The article is devoted to one of the topical in modern management the problem of organizational culture. The problem of organizational culture is currently of increased interest in connection with the solution of practical problems of increasing the efficiency of organizations, taking into account the human factor. The basis of the life potential of an organization is its organizational culture, which involves certain ways and forms of people's activities, based on a specific system of values, norms, ideals of both the organization and society as a whole. The activity of modern organizations depends on many factors, including the gender composition of the organization and the level of general and professional culture of employees, their personal profile.*

Therefore, the purpose of this research was to study the insufficiently investigated aspect of this problem - the features of the organizational culture in the women's labor collective. The main method was chosen test method. The study was conducted using the method OCAI (Organizational Culture Analyze Instrument) by C. Cameron, R. Quinn, which allows to determine both the existing and the preferred type of organizational culture.

As a result, differences in the profiles of organizational culture in the women's labor collective are shown, compared with the men's labor collective: the current state is characterized by the prevalence of hierarchical organizational culture and a slight severity of indicators of market and clan organizational cultures. It was found that the current state of the organizational culture is not satisfactory for the employees of the organization, preference is given to the clan and adhocratic types of organizational culture and the values of the hierarchical organizational culture currently expressed are rejected. Thus, the organizational culture is determined by the gender characteristics of the employees of the organization and is manifested in their values, norms of behavior and attitudes.

Keywords: adhocratic organizational culture, clan organizational culture, hierarchical organizational culture, market organization culture, women's labor collective.

Введение
Introduction

Организация становится базисным основанием современного российского общества, представляя собой сознательно координируемое социальное образование с определенными границами, реализующее в своей

деятельности конкретные социально значимые цели (Кочеткова, 2009). На этой основе строится не только прогнозируемое поведение работников, но и отношения между членами организации. В этом смысле организационная культура является доминантой, определяя эффективность ее работы и оптимизируя процесс реализации миссии организации (Cameron & Quin, 2011; Schein, 1985; Занковский, 2002). Причем для каждого типа оргкультуры могут быть свои индикаторы эффективности.

Носителем культуры организации является ее персонал, при этом немаловажную роль играют гендерные особенности персонала. Так M. Henning и A. Jardin выявили, что мужчины и женщины по-разному осуществляют мыслительную и перцептивную деятельность в трудовой деятельности (Henning & Jardin, 1977). По данным отечественных исследователей, женские коллективы более эмоциональны, конфликтны, чем мужские коллективы. Доказано, что коллективы, которые в основной массе представляют собой смешанные группы, сбалансированные по гендерному признаку, не обладают таким своеобразием, как женские.

Поэтому целью настоящего исследования явилось изучение психологических особенностей организационной культуры как одного из параметров эффективности организации в женском трудовом коллективе. Предмет исследования - психологические особенности организационной культуры в женском трудовом коллективе.

Гипотеза исследования: женский трудовой коллектив характеризуется специфическими особенностями по основным параметрам организационной культуры, отражая как гендерную принадлежность в целом, так и ценности, нормы и поведенческие модели, разделяемые всеми работниками трудового коллектива.

В качестве основной задачи стало изучение проблемы женского трудового коллектива и особенностей организационной культуры, по сравнению с мужским трудовым коллективом, в психологии.

Методы исследования: метод организации исследования – метод поперечных срезов; методы сбора данных – тестирование; методы обработки данных: количественный и качественный анализ массива данных, статистическая обработка данных (непараметрические U-критерий Манна-Уитни для несвязанных выборок и Т-критерий Вилкоксона для связанных выборок).

Обзор
Overview

Проблема организационной культуры возникает при рассмотрении организации как системы, имеющей общее понимание целей, ценностей и

поведения. Как отмечает А.Н. Занковский, организационная культура позволяет сгладить проблему согласования индивидуальных целей с общей целью организации, формируя общее культурное пространство, включающее ценности, нормы, поведенческие модели (Занковский, 2002).

Существуют различные точки зрения на определение понятия организационной культуры. Так, по мнению одних авторов (Schein, 1985; Peters & Waterman, 1982), организационная культура представляет собой некое вторичное образование, которое можно использовать как инструмент для достижения целей. Сторонники другого подхода (Hendry, Pettigrew, & Sparrow, 1989) полагают, что оргкультура – это индивидуальность организации.

Таким образом, культура организации представляет собой сложную композицию важных представлений, принимаемых членами коллектива. В обычных условиях организационная культура присутствует как естественный и незаметный элемент внутренней среды организации, лежит в основе норм поведения, принятых в данной организации. Организационная культура помогает поддерживать устойчивые связи как внутри самой организации, так и ее отношения с внешней средой.

В современной литературе получили довольно широкое распространение различные типологии организационных культур (Blake & Mouton, 1969; Handy, 1978). Так классификация C. Handy базируется на распределении власти и связанных с нею ценностных ориентаций личности, обуславливающих специфический характер отношений индивида и организации, структуру организации и характер ее деятельности на различных этапах эволюции. G. Hofstede определил, что большинство различий в рабочих ценностях и отношениях объясняются национальной культурой, а также зависят от места в организации, от профессии и пола (Hofstede, 1980). C. Cameron, R. Quinn выделяли 4 типа культуры в рамках теоретической модели «Рамочная конструкция конкурирующих ценностей». В основании каждого типа лежат 4 группы критериев, определяющих стержневые ценности организации: гибкость и дискретность, стабильность и контроль, внутренний фокус и интеграция, внешний фокус и дифференциация (Cameron & Quinn, 2011).

Организационная культура включает не только глобальные нормы и правила, но и текущий регламент деятельности, она отличается в зависимости от сферы деятельности, формы собственности, положения на рынке и в обществе в целом. Поэтому организационная культура в женских коллективах обладает своеобразием, тем более с учетом сферы профессиональной деятельности (педагогическая деятельность).

Однако на сегодняшний день в научной литературе мало комплексных работ, посвященных социально-психологическим особенностям женских

трудовых коллективов. Как отмечает Л.А. Осьмук, на практике организации достаточно часто позиционируют себя как «мужские» или «женские», при этом указывая на тот факт, что достаточно часто можно говорить о «смешанной» организационной культуре (Осьмук, 2015). Но даже при таком сближении гендерных поведенческих схем различия в конструировании своего социокультурного пространства у мужчин и женщин внутри организации сохраняются.

Женщины в большей степени, чем мужчины, заинтересованы в санитарно-гигиенических условиях труда, в улучшении организации работы. Они больше ориентированы на оценки их труда другими участниками совместной деятельности (Обозов, 1995). Женщины больше всего чувствительны к отношениям, складывающимся на производстве. M. Gibbs отмечает, что женщин больше всего привлекает в работе возможность помогать другим (Gibbs, 1985).

Итак, можно выделить социально-психологические особенности женских коллективов, которые также присущи и женским педагогическим коллективам: высокая эмоциональная чувствительность; ориентация в деятельности на личностные моменты; большая значимость взаимо-отношений; легкость перенесения неблагоприятных условий труда в условиях благоприятного социально-психологического климата.

Описание исследования
Research methodology

Теоретической основой исследования выступили концептуальные позиции системного и субъектно-деятельностного подхода в психологии; теоретическая модель организационной культуры «Рамочная конструкция конкурирующих ценностей» C. Cameron, R. Quinn (Cameron & Quinn, 2011).

Для определения доминирующего типа организационной культуры часто используется Organizational Culture Analyze Instrument (Cameron & Quinn, 2011). Эта методика позволяет определить доминирующий тип культуры. Для адхократической культуры доминантными индикаторами организационной эффективности являются: новая продукция, творческое решение проблем, идеи на передовом рубеже знаний и рост на новых рынках. Для клановой культуры наиболее значимыми индикаторами организационной эффективности являются: сплоченность организации, высокий уровень морали и удовлетворенности наемных рабочих условиями труда, развитие человеческих ресурсов, бригадная форма работы. Индикаторами организационной эффективности, которые характерны для бюрократической культуры, являются: рентабельность, своевременность, плавное функционирование и предсказуемость. Индикаторы

организационной эффективности при рыночной культуре: достижение целей, опережение соперников, увеличение рыночной доли и обретение достойных подражания уровней оборота денежных средств.

Выделенные базовые типы организационных культур и характерные для них индикаторы организационной эффективности лежат в основе данной методики, которая позволяет определить доминирующий тип организационной культуры и ее силу, а также проявления каждого типа культуры в шести ключевых организационных измерениях: важнейшие характеристики организации; общий стиль лидерства в организации; принципы, на которых строится управление сотрудниками; ценности и идеи, объединяющие сотрудников; стратегические цели; критерии успеха, на которые ориентируется организация. Сотрудникам предлагается анкета, содержащая шесть вопросов, имеющих четыре альтернативы ответов. Методика позволяет определить как существующий, так и предпочтительный тип организационной культуры организации.

Эмпирическое исследование проводилось на выборке педагогов дошкольных образовательных организаций г. Йошкар-Олы в количестве 40 человек. Это женщины в возрасте от 25 до 55 лет с трудовым стажем от 2 до 25 лет. Для выявления специфических только для женского трудового коллектива характеристик организационной культуры исследование также было проведено в мужском трудовом коллективе – представителях правоохранительных органов общим количеством 20 человек. Это мужчины в возрасте от 28 до 50 лет с трудовым стажем от 5 до 20 лет.

Результаты
Results

Результаты исследования, полученные по методике «Диагностика организационной культуры» (Organizational Culture Analyze Instrument) C. Cameron, R. Quinn, были подвергнуты тщательному количественному и качественному анализу. Рассмотрим доминирующие профили организационной культуры в женском трудовом коллективе (Рисунок 1).
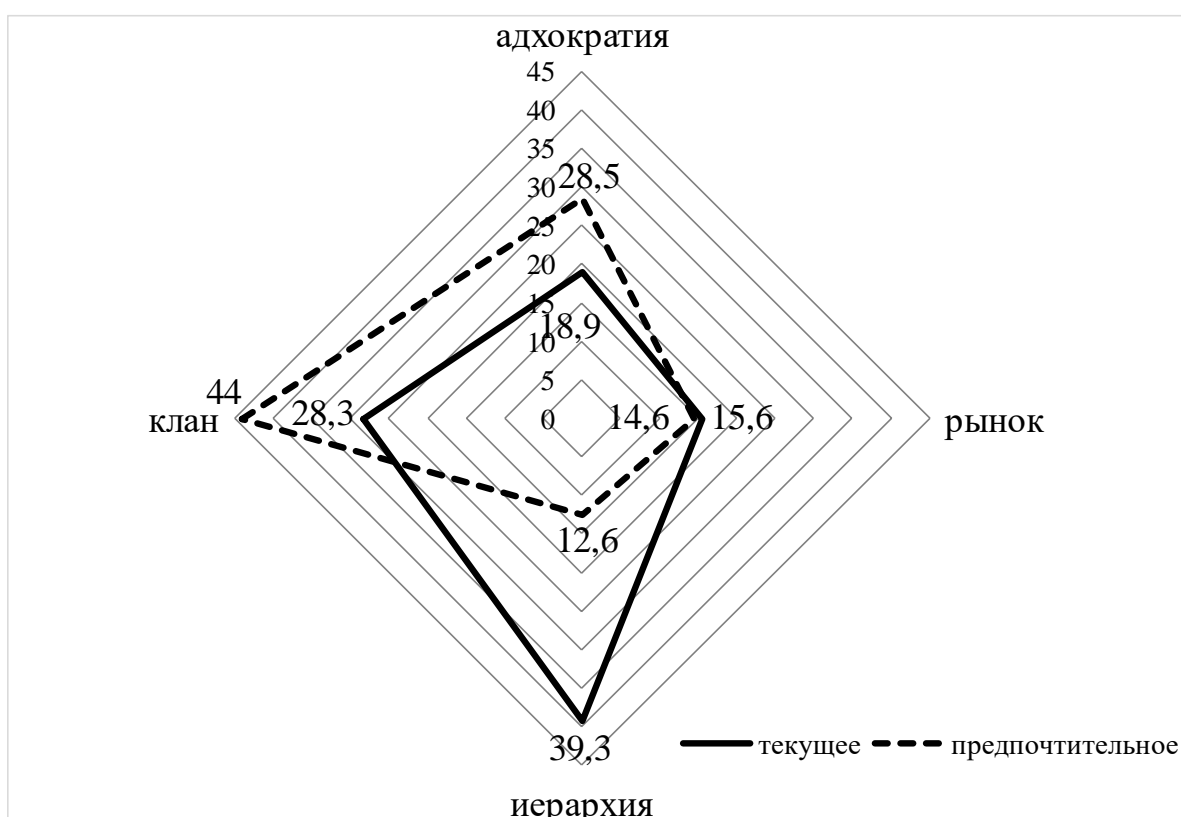
Рисунок 1. **Профили организационной культуры в женском трудовом коллективе**
Figure 1 **Profiles of organizational culture in the women's labor collective**

Итак, в женском коллективе на текущее время доминирующим является иерархический тип организационной культуры (39,3 б.), что свидетельствует о поверхностных отношениях между сотрудниками. Они ценят стабильность своего положения и гарантии сохранения их рабочих мест при условии ответственного трудового поведения. В меньшей степени представлена рыночная оргкультура (15,6 б.), которая проявляется в стремлении побеждать, сохранять свою конкурентоспособность, целеустремленности и соперничестве сотрудников между собой.

При этом мы наблюдаем расхождение между доминирующими и предпочтительными типами организационной культуры. Статистическая значимость различий текущего и предпочтительного состояний по типам организационной культуры проверялась с помощью непараметрического Т-критерия Вилкоксона. Если в отношении рыночной культуры сохраняется ее незначительная выраженность, в отношении остальных культур мы видим сдвиги: клановая и адхократическая культуры – предпочтение проявляется в усилении их признаков ($T_э$=0, p≤0,01 и $T_э$=80, p≤0,01 соответственно), в то же самое время стремление уменьшить проявления иерархической культуры ($T_э$=0, p≤0,01).

Подобное исследование проводилось также на выборке мужчин, показавшее, что в мужском трудовом коллективе типы организационной культуры находятся в несколько ином соотношении (Рисунок 2).
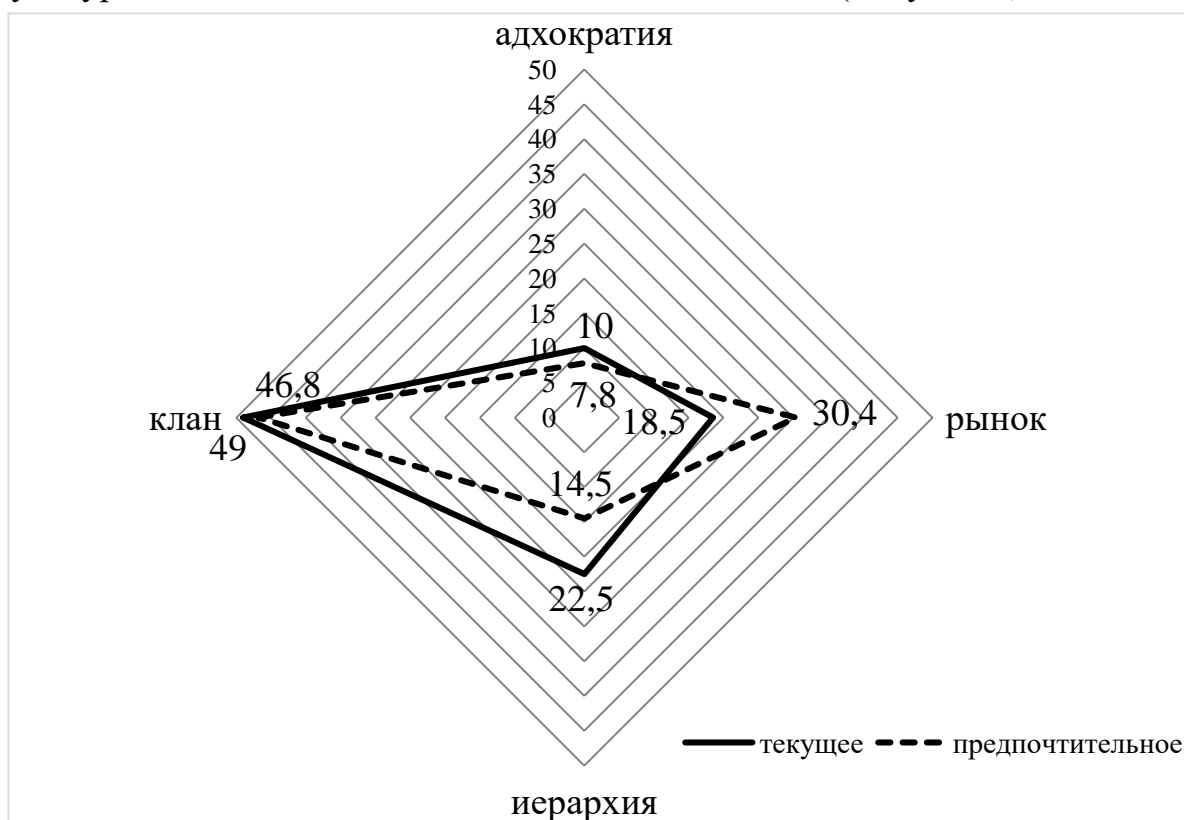
*Рисунок 2. **Профили организационной культуры в мужском трудовом коллективе***
*Figure 2 **Profiles of organizational culture in the men's labor collective***

В мужском коллективе на текущий момент доминирующим типом организационной культуры является клановая культура (49 б.): наличие атмосферы событийной реальности, восприятие коллектива как семьи.

Одновременно для мужского трудового коллектива характерна незначительная выраженность признаков как адхократической (10 б.), так и рыночной (18,5 б.) организационной культуры. Эти результаты позволяют заключить, что в организации не позиционируется стремление к риску и инновациям, инициативность и стремление к свободе действий.

Статистическая значимость различий текущего и предпочтительного состояний по типам организационной культуры также проверялась с помощью непараметрического Т-критерия Вилкоксона. Как и в женском трудовом коллективе, наблюдается расхождение между текущим и предпочтительным состоянием организационной культуры, однако в меньшей степени и относительно только рыночной (Т$_э$ =7, р≤0,01) и иерархической (Т$_э$=10, р≤0,01) организационной культур.

Для выявления особенностей организационной культуры в женском трудовом коллективе был произведен сравнительный анализ с мужским трудовым коллективом по степени выраженности различных типов организационной культуры как на текущий момент времени, так и в перспективе, с применением U-критерия Манна-Уитни (Рисунок 3).
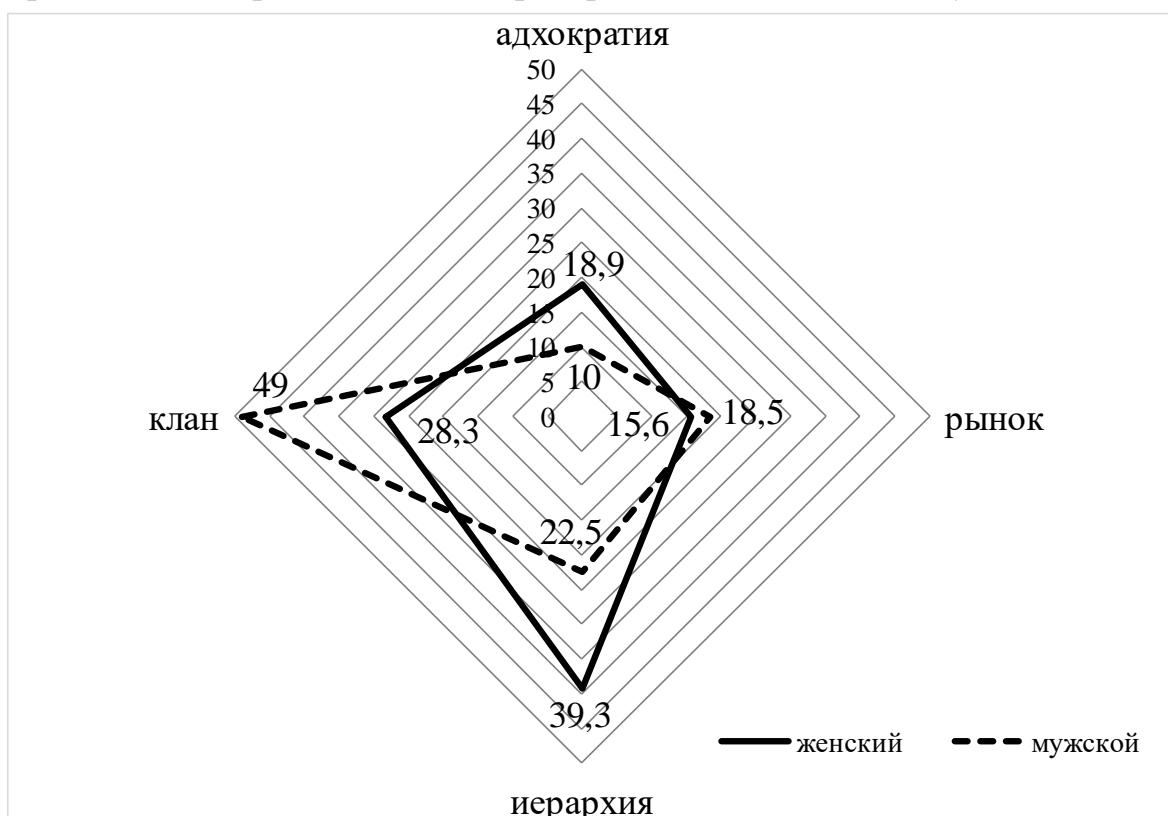
Рисунок 3. **Профили организационной культуры в женском и мужском трудовых коллективах (текущее состояние)**
Figure 3 **Profiles of organizational culture in women's and men's labor collectives (present state)**

Видим, что в женском коллективе преобладает иерархический (U$_э$ =57,5, p≤0,01) и адхократический (U$_э$ =209,5, p≤0,01) типы организационной культуры, а в мужском – клановый тип (U$_э$ =56, p≤0,01).

В связи с эти выделим особенности организационной культуры в женском коллективе по ключевым организационным измерениям:

- организация динамична, жестко структурирована и строго контролируется, люди готовы жертвовать собой; однако отсутствует семейственность в отношениях сотрудников;
- общий стиль лидерства в организации являет собой пример координации, четкой организации, а также новаторства и склонности к риску, но стремление помочь или научить сотрудников отсутствует;

- стиль менеджмента в организации характеризуется требованием подчинения, стабильности в отношениях, поощрением индивидуального риска, свободы и самобытности, но нет бригадной работы и единодушия;

- организацию связывают воедино формальные правила и официальная политика, акцентируется необходимость быть на передовых рубежах, не придается значение преданности делу и взаимному доверию;

- организация акцентирует внимание на стабильности и обретении новых ресурсов, при этом не поддерживаются доверие, соучастие;

- организация определяет успех на базе рентабельности, обладания уникальной продукцией, не рассматривая при этом развитие человеческих ресурсов, увлеченности сотрудников делом.

Полученные результаты, с одной стороны, показывают выраженность только части характерных для женского коллектива особенностей, что объясняется влиянием факторов организационной культуры, в частности, недоверием к руководителю, неблагоприятным социально-психологическим климатом, невысокой сплоченностью, часто меняющимся педагогическим составом, что было также выявлено эмпирическим путем, но не нашло отражение в данной статье.

Подобному анализу повергрлись показатели предпочтительного состояния оргкультуры в женском и мужском коллективах (Рисунок 4).

По клановой и иерархической типам организационной культуры предпочтения женщин и мужчин совпадают, однако их выраженность у мужчин соответствует текущему состоянию, в то время как в женском коллективе именно по этим параметрам предполагается изменение – усиление клановой культуры и минимизация иерархической культуры.

Очевидны различия в предпочтениях женщин и мужчин относительно адхократической ($U_э$ =22, p≤0,01) и рыночной ($U_э$ =93, p≤0,01) организационных культур. При этом наравне с одинаковой значимостью клановой культуры как для женского, так и мужского коллективов, женщины выражают необходимость проявлений адхократии (что отсутствует на текущий момент), а мужчины – рыночной культуры, которая на настоящее время слабо выражена.

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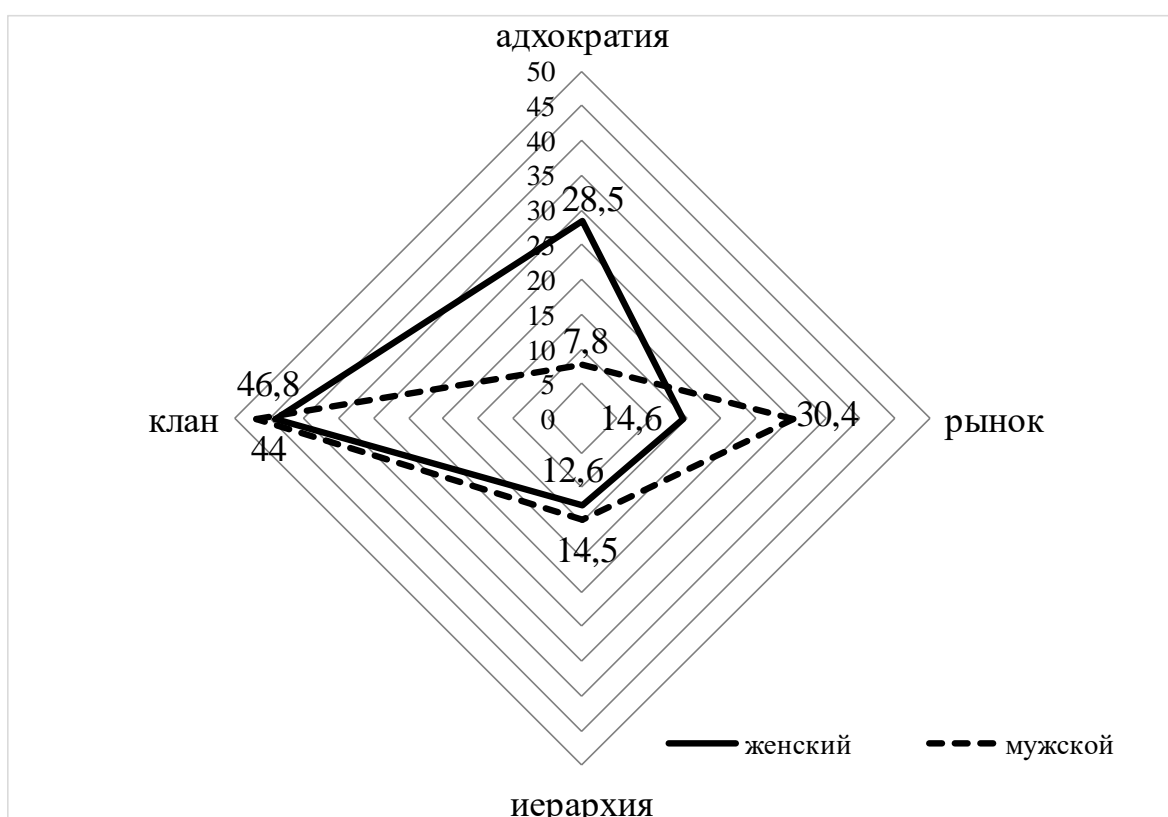
Рисунок 4. **Профили организационной культуры в женском и мужском трудовых коллективах (предпочтительное состояние)**
Figure 4 **Profiles of organizational culture in women's and men's labor collectives (preferable state)**

Очевидны различия в предпочтениях женщин и мужчин относительно адхократической (U$_э$ =22, p≤0,01) и рыночной (U$_э$ =93, p≤0,01) организационных культур. При этом наравне с одинаковой значимостью клановой культуры как для женского, так и мужского коллективов, женщины выражают необходимость проявлений адхократии (что отсутствует на текущий момент), а мужчины – рыночной культуры, которая на настоящее время слабо выражена.

Если описывать присущие женскому коллективу особенности предпочтительной организационной культуры, то на первый план выступают динамичность, семейственность в отношениях, слабая ориентированность на результат, отсутствие жесткой структурированности организации и контроля; новаторство, риск, стремление помочь сотрудникам, доброжелательность; акцент менеджмента на поощрении совместной работы, свобода, отсутствие чрезмерной требовательности; преданность делу и взаимное доверие, необходимость занимать передовые позиции, а не соблюдение правил; открытость; развитие человеческих ресурсов, увлеченность сотрудников, избегание конкуренции.

Выводы
Conclusions

Организационная культура женского коллектива отличается своеобразием, отражающимся на поведении, ценностях, установках сотрудников: особое внимание вопросам поддержания стабильности отношений и контроля за деятельностью, формализации управления, что не находит отклик у сотрудников; предпочтение клановой и адхократической организационных культур. Это предполагает формирование показателей именно этих типов культуры.

Проведенное исследование позволило определить основные особенности организационной культуры в женском трудовом коллективе, детерминированные особенностями данного именно женских коллективов: жесткая структурированнность и контроль, динамичность, готовность жертвовать собой; стабильности отношений, поощрение индивидуальности; внимание на неизменности, обретении новых ресурсов; переживание недостаточности общности интересов, сотрудничества, взаимопомощи, открытости, доверия, увлеченности и преданности делу.

Однако допускаем, что полученные результаты отражают не только гендерную, но и профессиональную специфику организационной культуры. Тем не менее, как показал теоретический анализ, характерные черты женского коллектива также присущи и педагогическому коллективу, т.к. образование представлено преимущественно женщинами, в то время как среди оперативных работников преобладают мужчины.

Summary

The organizational culture of the women's labor collective is distinguished by its uniqueness, as compared with the men's labor collective, which affects the behavior, values, and attitudes of employees. In the women's labor collective, special attention is paid to the issues of maintaining stability of relations and control over the activities of employees, the formalization of management, which does not resonate with employees. Women's preferences lie in the area of clan and adhocratic organizational cultures, which implies purposeful work on the formation of the main characteristics of these particular types of culture.

The study made it possible to find out the main features of the organizational culture in the women's labor collective, determined by the characteristics of this particular women's team: rigid structuredness and control, dynamism, willingness to sacrifice themselves; stability of relationships, encouraging individuality; focus on immutability, the acquisition of new resources; experiencing a lack of common interest, cooperation, mutual assistance, openness, trust, enthusiasm and commitment.

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IESPĒJAS PEDAGOGU EMOCIONĀLĀS ATSAUCĪBAS PILNVEIDOŠANĀ

The Possibilities For Improving Teachers Emotional Responsiveness

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Abstract. *The article "The possibilities for improving teachers' emotional responsiveness" is part of the research "Improvement of teachers' emotional responsiveness in further education". It is devoted to a burning topic of the current times – the development of teachers' emotional responsiveness. The study is methodological in nature. The research aims to develop appropriate teaching methods and techniques, which will contribute to the development of teachers' emotional responsiveness throughout their professional education career. The purpose of the article is to describe and evaluate a set of teaching methods and techniques used in the development of teachers' emotional responsiveness. The study summarises theoretical knowledge about the role of feelings and emotions in the teaching process. It includes the author's created structured scheme of methods and techniques for the development and improvement of teachers' emotional responsiveness, which has already been successfully approved in teacher's lifelong learning. The study discusses each teaching methods' and methodological techniques' deeper meaning and effects on the development of teachers' emotional responsiveness. The author has also provided a detailed description of her methodology "What do I learn about myself?" and analyzes its influence and role in the world of educators' feelings. The results of the research are important for the requirements of the 21st century and the cultivation of healthy pedagogical thinking and habits. The results of the study show that successful continuous development of teachers' emotional responsiveness can be achieved by using such methods as "Working with symbols", "Self-awareness" and the "Drama method", each of which include a variety of techniques, along with the author's created ones, for example, "What do I learn about myself?", "See! Do! Assess!" and "Practicing gratitude".*
The research shows how regular work with teachers' self-study can create healthy habits, which contribute to and expand the personality growth and pedagogical thinking.
Keywords: *emotional responsiveness, lifelong education, personal growth, self-cognition, teacher.*

Introduction

The 21st-century education consists of more than just the academic knowledge. It intuitively senses the need for person's feeling and a spiritual world's development. Currently, there is a lot of discussion around the world

about how to link the learning processes with real life. The aim of the OECD initiative "Education 2030: OECD core competencies' system" is to conduct an in-depth comparative analysis of international curricula and assess which competencies will be essential in the students' future development. Thus, with the project "School 2030", the Latvian education system is also undergoing an ambitious long-term reform of transitioning to a competency-based learning processes and content. (National Centre for Education of the Republic of Latvia, 2016)

Communication is the heart of pedagogical processes. Therefore, the desired result of a teacher, who interacts with children in class should be someone endowed with the following characteristics: nobleness and generosity, patience and restraint, creativity, sincerity, the ability to inspire and fascinate, the ability to think good thoughts and say good words, the desire for improvement, a wide range of knowledge. Therefore, it is essential to evaluate the current methods and techniques used in teachers' lifelong education as well as find new innovative methods, which encourage the improvement of teachers' emotional responsiveness.

Many researchers (Vorobjovs, 2000; Goulmens, 2001; Shchurkova, 2016; Robinsons, 2013; Vilbers, 2013; Dispenza, 2015; Purēns, 2017; Amonašvili, 2017) admit that emotions are an important component in the learning process. Emotions allow the individual to adapt to the surrounding world, motivates them for a particular activity, affects how they perceive and interpret the surrounding world and gives them additional energy.

While conducting the research, the author's assertion was confirmed, to follow the holistic approach, the teacher must experience emotion-based self-inquiring and personality enhancing learning process within the professional lifelong learning process. This can be achieved by paying attention to the methods and techniques used in teacher lifelong education. Thus, this scientific paper summarizes the existing learning methods and proposes new methods created by the author, which contribute to the improvement of the teachers' emotional responsiveness.

The author has developed a set of methods and techniques used by teachers in lifelong education, which fosters the development of emotional responsiveness in teachers. These teaching methods and techniques have been applied and highly valued in teachers' lifelong education processes throughout all of the Latvian regions.

The work aims to outline and evaluate a set of learning methods and techniques used to improve teachers' emotional responsiveness.

The materials and methods combine identification and assessment of the psychological, pedagogical and scientific literature as well as reflections on self-experience, observations of teachers' actions, a questionnaire and a summarization of results

As a result, a set of teaching methods and techniques has been created that stimulates the formation of teachers' emotional responsiveness throughout their lifelong education process. Individual methods and sections have been highly rated in the teachers' lifelong education process, as well as at local and international conferences and seminars.

Feelings and emotions in the pedagogical process

The competency-based approach in modern education and the TOP 10 skills of the humans' future encourages teachers to learn methods and techniques which promote the development of emotional responsiveness. In the pedagogical interaction process, the teacher can only pass on to their students what they themselves have deep in their hearts. Emotions are closely related to feelings. For example, prolonged happiness about the other person's presence may over time grow into love, while loving - into fear, contempt, and hatred.

The psychologist Ilyin (Ilyin, 2017) distinguishes four viewpoints about emotions and feelings:
- these concepts are synonyms;
- feelings are a type of emotion;
- feelings include various types of emotions;
- feelings reveal attitude; they are separated from emotions (Ilyin, 2017).

Currently, fourth is the most popular approach in the world stating that feelings are a person's emotional process revealing a relatively subjective attitude towards real subjects important to people. They are formed as a result of socialisation and usually affect values important to society. In his research, Braden (Bradens, 2008) shows that feelings arise when thinking is combined with the emotional power that comes from the lower energy centres. Thus, feelings are formed from thoughts of love or fear that a person feels towards a particular fact or event.

Emotional intelligence, which involves the interconnection of emotions, characteristics and moral tendencies, is not genetically conditioned, it can be taught and developed (Goulmens, 2001).

Meikshane (Meikšāne, 1998), however, believes that feelings characterise and reflect the person's attitude towards their surrounding life as a whole. Therefore, nurturing them has an essential part in human's life. Emotions are formed by repetition and consolidation of certain emotional experiences. An

important study has been done by Vorobyov (Vorobjovs, 2000) on feelings being a system for evaluating the human's subjective world. To his words, the connection of subject's feelings with the subjective evaluation actualisation process, is called emotions. The author has classified the following peculiarities of feelings:

- the polarity of feelings – a range of feelings in response to the experience – joy, happiness, love, cheerfulness, suffering, sadness;
- the ambivalence of feelings – the simultaneous experience of polar feelings about the same object, phenomenon;
- the intensity of feelings – strong, weak and turbulent;
- the asthenia of feelings – feelings, which activate the human activity, increase energy, feelings that can provoke a depressive condition.

Depending on the attitude towards different situations, feelings serve as a motivating factor for human activity, therefore feelings play an important role in the person's life and actions (Vorobjovs, 2000). Science refers to feelings and emotions as the source of human energy.

Schmitz (Šmits, 2013) expresses a contemporary view on feelings by recognising that acknowledging an awareness of feelings helps to understand the other people both, on an intellectual and instinctive level.

By knowing and understanding the meaning of feelings in human lives teachers can give light to the children, assist them, dismiss the negative thoughts with the help of positive ones. This can only be done by a teacher with a bright and lively heart. That is the source of light in education. Live with your heart, talk from your hear and listen with your heart.

Methodology

The study was conducted to review and create methods for improving teachers' emotional responsiveness. It happened from August 2017 to March 2018 and gathered results from 240 teachers of different age groups and levels of experience from all regions of Latvia, creating a total of 11 groups. The research design used mixed methods approach with the focus being put on observing and interviewing teachers. Qualitative research and scientific strength authentication criteria, their definitions and means of provision are taken as the basis for the scientific approach of the research (Pipere, 2011). These criteria - justice, ontological authenticity, educational authenticity, catalytic authenticity, tactical authenticity - indicate that the research carried out is important for a sustainable development of education.

The educators' work with the various teaching methods and techniques offered by the author was observed throughout the entire day in author-led

professional competence development classes. Each class followed a certain structure:

- setting and coordinating performance goals;
- awareness of the achievable results;
- self-awareness "Here and Now" by using body movement and thinking integration;
- ensuring an empathic link within the group by using the "Inspiration Story", "Wish", "Emotion Awareness", "See! Assess! Do!" methodical techniques;
- learning process using methods based on the theme offered – Drama, Working with symbols, Awareness method;
- selection and creation of methods and techniques in the active process, while observing and recognising the needs of the participants;
- reflection on the self-experience and experiences gained in action by using the "What do I learn about myself?", "Gratitude", "Questions and answers", etc. methodical techniques.

During the study, teachers were asked the following question to find out the effectiveness of each chosen method: What are the benefits of using the proposed method? Does the method used, stimulate the development of teachers' emotional responsiveness? How does the method used in the teaching process affect the teacher's personal growth?

A very important methodological tool, the Personality Growth Map, was developed and put into practice for gaining feedback from the teachers' education process by organising and managing the teachers' learning process. By working with this technique, the teachers can come to a conclusion of which methods used in the study process contribute to the improvement of emotional responsiveness in themselves. Hence, the teachers are motivated to adopt the acquired methods and techniques to their own structured cooperation process with the students. This stands as a great benefit and support for the long-term development of pedagogical thoughts based on self-experiences gained in the learning process.

Results and discussion

The author has created a structured scheme of teaching methods and techniques usable in life-long education (Table 1), which contributes to the improvement of teachers' emotional responsiveness. It is based on the author's long-standing work experience as well as the research and evaluation of scientific, psychological and pedagogical literature published by other authors (Shchurkova, 2016; Muhin, 2012; Robinsons, 2013; Fišers, 2005; Grofs, 2006; Špona & Čamane, 2009; Vedins, 2011, Purēns, 2017; Amonašvili, 2017). The

scheme also includes methodological techniques "See! Do! Assess!", "What do I learn about myself", "Inspiration story", "Practicing gratitude" developed by the author.

The teaching methods and techniques have been tested in practice by Latvian teachers in pedagogue professional competence development programs initiated and managed by the author. The used methods' deepest essence and influence on the development of teacher's emotional responsiveness were identified during the learning process. It was done by considering the teachers' answers to the questions asked, observing the practical work and mutual communication, evaluating the feedback gained after the lessons and observing teachers' communication after the lessons.

Table 1 **The set of the methods and approaches for the development of teachers' emotional responsiveness**

The learning methods	Approaches	Benefits
DRAMA METHOD	Situation role-playing	– Problem situation resolution
	Role-playing	– Cultivation of talents and abilities – Self-expression – Reacting to emotions
	Etudes	– Tension relief – Creativity – Interplay – Brainstorming – Expressing emotions
	Staging fairy-tales and myths	– Self-cognition – Self-analysis – Self-regulation
WORKING WITH SYMBOLS	See! Assess! Do!	– Problem recognition, resolution – Positive emotion actualisation – Promotion of collaboration – Elimination of egoism, the joy of sharing – Development of mental habits – Experiencing revelations
	Association building What do I learn about myself?	– Imagination training, an impulse for spiritual growth – Promotion of creativity – Awareness of cultural and personal subconsciousness – Personality growth promotion – Empathy strengthening

	Inspiration story, wish	– Awareness of life-force resources – Creative thinking training – Providing trust and safety – Promotion of kindness
AWARENESS	Breathing exercises	– Self-awareness – Defeating tension and stress
	Awareness of emotions	– Empathy strengthening – Development of emotional intelligence
	Awareness of action	– Broadening of consciousness – Awareness of mind's and body's entirety
	Practising gratitude	– Faith, reliance – Overcoming Ego – Feeling elated emotions – Flow of life-energy
	Meditation	– Skill to observe your own thoughts, emotions – Harmony – Awareness of your own self-existence

98% of the 240 surveyed teachers acknowledge that working with the chosen methods and techniques in the learning process ensured the following:

Table 2 **Summary of answers provided by the teachers**

Question asked	Number of respondents per answer	Frequency expressed in % of the total respondents	Received answers
What are the teachers' benefits when studying according to the proposed methods and techniques at the professional competences development courses?	130	54%	A wide range of positive feelings are repeatedly experienced in the lessons - joy, passion, lightness, love, satisfaction, surprise, friendship, optimism, inspiration, affinity, interest, gratitude, support.
	55	23%	Self-acquired experience creates motivation to work with yourself, evaluate and improve learning methods in collaboration with the students.
	26	11%	By associating the learning process with yourself, knowledge is strengthened in memory and becomes more personal.
	14	6%	There is a chance to self-actualize during the lessons; self-experience is gained by observing yourself and listening to others.
	10	4%	By actively engaging in the process of

			thinking and acting, co-responsibility for the results is being increased
	3	1%	The inner protest that the person themselves should be actively involved during classes.
	2	1%	Surprise that the person must observe themselves and express their feelings.

As a result, the author has observed that the methods providing the better results for the improvement of teachers' emotional responsiveness are the ones with improvable and expandable techniques by taking into account the needs of the target audience while being used in real time. Methods achieve higher results if they simultaneously involve mind, heart, body, emotions and breathing. This is shown by the surveyed teachers' answers to the lesson reflection question "What feelings was I experiencing during the lessons?":

- ease and relaxation;
- joy and flow of energy;
- openness to cooperation and overcoming of internal barriers;
- pleasant memories and positivism during classes;
- self-awareness;
- peace, kindness, creativity, responsibility;
- mental and emotional enrichment;

The author's observations about group members during classes:

- elated emotions, kindness between the participants in the classroom;
- experiencing elevating self-esteem;
- return of belief in their own abilities;
- professional confidence strengthening;
- becoming more attentive to one another;
- smiling more, working actively;
- learning to recognise and express their feelings;
- members of the group become internally more harmonious by being aware of themselves as "Here and Now".

The author's methodological technique "What do I learn about myself?" is created in the style of personality growth cards (the set consists of 70 cards). They are based on the cultural code derived from the poet Aspazija's autobiographical memory collection "The blue sky in the golden clouds" (Aspazija, 1968). By using this methodology in the learning process, teachers have the opportunity to get to know and improve themselves through personal, collective and cultural subconsciousness. The developed methodological techniques contribute to the personal growth through associative thinking. The cards contain 140 nouns, which encourage strengthening feelings of nobleness and being aware. They also encourage attracting true and pure thoughts, such as

child, morning, life, beauty, path, development. Through the 70 verbs, it is possible to exercise self-education by emphasising strong verbs in your consciousness and life, such as stop, touch, gather, spiritualize, hear, play, trust. 30 of the cards contain the conjunction "and", which prompts new impulses from subconsciousness and become support for one's personal growth. By using the author's created personality cards, teachers are encouraged to follow their own sensations during the learning process to learn to feel themselves, set aside previously developed thinking patterns, listen to the impulses of their inner voice, dispose of the stereotypes and assumptions of "correct" and "incorrect". After group observations, it can be concluded that working with the "What do I learn about myself?" technique paves the way for creative thinking, understanding and strengthening of feelings and removing the inner safeguard mechanisms. After applying the personality growth cards to different learning stages and situations and gathering feedback, the participants acknowledge that the methodical technique:

- provides an extensive range of usability options, thus helping to expand pedagogical thinking;
- is an opportunity to feel and listen to yourself;
- shows the influence words can have on thoughts, emotions and feelings;
- allows the development of mental and emotional habits;
- is an opportunity to recognise and use the internal energy resources.

By using this methodical technique, the author's practical work confirmed Vorobjov's (Vorobjovs, 2000) statement on the importance of working through feelings to strengthen them. Listening to the stories of other colleagues and hearing the similarities increased teachers' empathy levels. Similarily as acknowledged by Shmit (Šmits, 2013), it was possible to see how kindness from thoughts and words influences mutual relationships. This is how the development of teachers' emotional responsiveness takes place in the learning process. After experiencing the methodical technique "What do I learn about myself?" in various learning situations, f.e. realization of one's professional skillset through stories ("My most beautiful teacher's life story", "A story on cooperation with pupils", "Today I'm thanking you for…", "My character trait – strength or weakness", "Me – a happy person", etc.), the participants were asked a question - "What are the personality development benefits of using the chosen method?". Acknowledgement in teachers' answers confirmed the previously expressed thought on how the experienced technique improves the following:

- the ability to stimulate thinking based on cultural and personal subconsciousness;
- the reception of both direct and indirect impulses for personality development through words;

- intentionally amplifying the awareness of feelings and emotions;
- the skills to take notice, listen to and hear the other person;
- the self-cognition process through the culture code;
- the opportunity to purposefully reach results in a short period;
- creating a transition from learning processes to the real-life environment;
- the teachers' inner motivation to grow, learn, change and be unique "Here and Now".

An important aspect worth noting from the teachers' feedback on the appliance of "What do I learn about myself" methodical technique is the experienced personal growth leading to:

1. returning to pleasant memories and recognising them as a source of strength;
2. finding new sources of energy by becoming more self-aware;
3. self-cognition leads to a surprise about one's true abilities;
4. smiles and positive emotions creating benevolent and creative environment for teaching process;
5. broadening of person's sensitivity and depth of thought by allowing peace to enter their inner space;
6. formation of friendly relationships with others by being in touch with and understanding yourself.

Conclusions

The study described and evaluated 3 learning methods and 13 techniques that contribute to the development of teachers' emotional responsiveness. 3 of these are the author's created learning techniques - "What do I learn about myself?", "See! Assess! Do!", "Practicing gratitude".

Teachers' lifelong learning should include learning methods such as the Drama Method, Working with Symbols, Awareness and a range of learning techniques - staging fairy-tales and myths, association building, "What do I learn about myself?", "Practicing gratitude"," See! Assess! Do!", awareness of emotions, breathing exercises, meditation. This creates the possibilities for the teacher to learn to be self-conscious and express feelings, to experience the inner-feeling of peace and gratitude, to work on self-knowledge and do self-analysis, to learn self-regulation.

By working with the author's own personality growth technique "What do I learn about myself?" at the teachers' professional competences development courses, it was discovered that through a practical application of this technique, teachers experience a better inner sense of culture and personal subconsciousness, strengthen empathy, gain positive emotions, gain a more

personal nature towards learning, develop motivation to work with themselves, evaluate and improve learning methods when interacting with students.

Each of the learning methods and techniques chosen are considered to be positive when improving the teachers' emotional responsiveness. As a recommendation for teachers' further education, the methods and techniques mentioned in the research should be adapted depending on the teaching situations. It is an opportunity to enrich the emotion-based self-experience of learning, to improve self-knowledge and self-regulation skills, to motivate towards life-long education.

The practical application of the summarized and evaluated methods and techniques in teachers' professional competences development courses facilitates the development of teachers' emotional responsiveness, which is an important indicator for a sustainable development of education.

Summary

This article "The possibilities for improving teachers' emotional responsiveness" gives insight into the theory of feelings and emotions in the pedagogical process. The article provides an insight into a study aimed at characterizing and evaluating a set of learning methods and techniques for improving teachers' emotional responsiveness. As a result, a set of teaching methods and techniques has been compiled and evaluated to facilitate the development of teachers' emotional responsiveness in the process of professional lifelong education. The study involved 11 groups of teachers, altogether 240 pedagogues of all ages and different experiences from all regions of Latvia. The study describes the author's created personal growth technique, "What do I learn about myself?", which has been well-accepted and appreciated by teachers in the processes of lifelong education, conferences and seminars of international importance.

The teaching methods and techniques summarized and described in the research contribute to the improvement of the teachers' emotional responsiveness. They have been tested in practice at the teachers' professional development program courses for Latvian teachers developed and managed by the author. A deeper meaning of the applied methods and their influence on the formation of the teachers' emotional responsiveness was observed during the learning process by reviewing the teachers' answers to the questions asked, observing the practical activities and communication between the groups as well as evaluating the feedback received and teachers' communication after the classes.

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PEDAGOGA PAŠATTĪSTĪBA: PEDAGOGU PAŠATKLĀSMES PAR PEDAGOGA PERSONĪBAS VEIDOŠANĀS NOZĪMĪBU PEDAGOĢISKAJĀ PRAKSĒ

Teacher's Self-Development: Teacher's Self-Discoveries Regarding the Significance of Pedagogical Personality Development During Pedagogical Practice

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Abstract. *In the 21st century, a special place in education is occupied by sustainable development issues, which emphasize the unique role of education in shaping the public opinion. New pedagogical approaches, which show how education could contribute to the evolution of consciousness, are being sought. A shift of paradigms is happening in education: from knowledge memorization to skills, character, meta-learning (Education 2030: Organisation for Economic Cooperation and Development competency framework). The research confirms, to successfully implement the proposed changes in modern pedagogical practice, it is valuable for the teachers to learn the psychology methods and techniques on how to improve and advance personality growth based on the knowledge shared by K.G. Jung, K. Wilber, and A. Maslow. research confirms it is valuable to acquire these methods during theoretical and practical activities for professional development.*
The study revealed that teacher's professional competencies, such as communicative, methodological, organizational, creative skills and self-management, improve through familiarization and practical application of this knowledge.
The aim of the study is to show the importance of how the psychological insights regarding the development of personality impact the pedagogical practice. Main tasks include literature studies and evaluation, working with a target audience. Research methods: survey.
Keywords: *lifelong education, personality development, self-evaluation, self-management, self-observation, teacher.*

Ievads
Introduction

Viens no transpersonālās psiholoģijas pamatlicējiem, S. Grofs ir norādījis, ka mūsdienu zinātne ir izgudrojusi iedarbīgus līdzekļus, ar kuriem varētu

atrisināt lielu daļu aktuālo pasaules problēmu: uzveikt daudzas smagas slimības, novērst badu un nabadzību, samazināt rūpnieciski radītos zaudējumus (Grof, 2006). Tomēr, kā uzsver Staņislavs Grofs, šīs problēmas nav ne ekoloģiskas, ne tehnoloģiskas, to īstais cēlonis meklējams cilvēka personībā. Tieši cilvēka personība ir tā, kas traucē pārorientēties no ekonomiskām un politiskām interesēm uz ekoloģiskajām prioritātēm, kas ir būtiski, lai saglabātu dzīvību uz planētas Zeme.

21.gadsimtā izglītībā īpašu vietu ieņem ilgtspējīgas attīstības jautājumi (Education & Training, 2020), Eiropas komisijas izstrādātā vienotā skolas pieeja akcentē izglītības unikālo lomu sabiedriskās domas veidošanā. Pasaules izglītības politikas elite (Delors, 1996; Robinsons, 2013; Hattie, 2008; Hattie & Zierer, 2018; Biesta, 2009, 2017) atzīst, ka nepieciešams mainīt esošo izglītības un mācīšanas, un mācīšanās praksi un veidot izglītību kā iekļaujošas sabiedrības pamatu. Jau otro gadu desmitu visā pasaulē tiek meklētas iespējas, kā to izdarīt efektīvi (OECD CERI, 2008; UNESCO IBE May, 2015). Šobrīd dažādo pedagoģisko pieeju centrā ir izvirzīta pašaudzināšanas kā audzināšanas procesa ideja, rakstura un ieradumu veidošanas pieejas (Izglītība, 2030, OECD pamatkompetenču sistēma) .

Zinātnieks Džons Hetijs ir pierādījis, ka skolotāja zināšanas, prasmes un attieksmes par izglītību, mācīšanu, mācīšanos un audzināšanas procesu ietekmē skolēnu sasniedzamos rezultātus (Hattie, 2008; Hattie & Yates, 2013; Hattie & Zierer, 2018). Šī pētījuma rezultāti apstiprina, ka pedagogam ir jāiegulda nepārtraukts darbs sevis pilnveidošanas procesā, jo tieši pedagoga profesionālajai kompetencei ir ilgstoša ietekme uz indivīda sasniegtajiem rezultātiem mācību un audzināšanas procesā, kā arī tālākā dzīvesdarbībā.

Starptautiskie izglītības eksperti ir radījuši kompetenču aprakstu nākotnes mācību saturam, izvirzot ilgtspējīgu attīstību kā vienu no izglītībā sasniedzamajiem rezultātiem (Marope, 2017). Mantsetsa Marope norāda, ka šajā dokumentā kā svarīgi komponenti tiek izvirzīti: informācija, dati, tehnoloģijas, zināšanas, prasmes, vērtības un attieksmes. Savukārt, kā 7 makroprasmes, kuras jāapgūst ir: mūžizglītība, pašvadība, spēja un prasme lietot dažādus resursus un ierīces, mijiedarbība ar citiem, mijiedarbība ar pasauli, starpdisciplinaritāte, multiprasmes (Marope, 2017).

Šim pētījumam tika izvirzīts šāds darba mērķis: parādīt psiholoģijas atziņu par personības tapšanu nozīmi pedagoģiskajā praksē.

Pētījuma metode: I. Kušneres veidotā aptauja šī pētījuma ietvaros.

Pētījumam tika izvirzīti trīs pētījuma jautājumi. Pirmais pētījuma jautājums – "Kāda nozīme pedagogu personības pašizziņai ir pedagoģiskajā praksē?". Otrais pētījuma jautājums – "Kādas ir pedagogu piedzīvotās izjūtas profesionālās kompetences pilnveides nodarbībās, mācoties pēc piedāvātā

pedagogu profesionālajā mūžmācībā izmantojamā mācīšanās modeļa?". Trešais pētījuma jautājums – "Kā mainās pedagogu pārliecības, iepazīstot sevi?".

Teorētiskais apskats par sevis iepazīšanu personības tapšanas procesā
Theoretical review of getting to know yourself through the process of personality development

Izglītībā notiek paradigmu maiņa - no zināšanu faktoloģiskas iegaumēšanas uz spēju kompleksi lietot zināšanas, prasmes un paust attieksmes, risinot problēmas mainīgās reālās dzīves situācijās (Izglītība, 2030, OECD pamatkompetenču sistēma). Augstāku mācīšanās rezultātu iespējams sasniegt, mainot mācīšanās pieeju un skolas darba organizāciju (Marope, 2017; Hattie & Zierer, 2018). Tādējādi 21.gadsimta izglītībā tiek pievērsta arvien lielāka uzmanība skolotāju profesionalitātes kompetencēm, kas sevī ietver: komunikācijas prasmes, izziņas un izziņas vadību, zināšanas metodikā, organizatoriskās prasmes, radošumu (Špona & Čamane, 2009). Lai pedagogs profesionalitātes kompetences uzturētu augstā līmenī, ir pievēršama uzmanība pašvadības prasmju pilnveidošanai pedagoģiskajā praksē (Marope, 2017; Hattie, 2008, Hattie & Yates, 2013; Hattie & Zierer, 2018; Biesta, 2017).

Cilvēkam, lai viņš apzinātos sevi, ir nepieciešama informācija. Sevis apzināšanai cilvēki izmanto informāciju, ko saņem no fiziskās pasaules, no sociālās vides un "psiholoģiskās" pasaules jeb saviem psiholoģiskajiem procesiem (Jungs, 1996; Grofs, 2006; Dispenza, 2015, 2016).

Galvenās atziņas no fiziskās pasaules ir saistītas ar ķermeņa pastāvēšanu un tā funkcionēšanu. Sociālā vide (Jungs, 1996) ir saistīta ar atrašanos un darbošanos sabiedrībā. Galvenās atziņas cilvēks iegūst caur attiecībām, vietu un lomu sabiedrībā (Jungs, 1996; Maslow, 1943). Kā uzskata K.G. Jungs, tad psihiskā pasaule sākas ar psihi un beidzas ar sociālpsihiskiem raksturojošiem procesiem un būtiskās atziņas, ko šajā izziņas procesā iegūstam, ir psihei raksturīgo iezīmju atklāšana, attiecību ar citiem cilvēkiem veidošanās likumsakarību izprašana un pieņemšana (Jungs, 1996). Psiholoģijā ir daudz teoriju par personības pašizziņas procesiem – Psihodinamiskā teorija (Freids, 1996; Jungs, 1996; Adlers, 1992; Ēriksons, 1998), Humānistiskā teorija (Maslovs, 1943; Rogers, 1959), Bihevioristiskā teorija (Skinner, 1979) un citas teorijas. To, ka cilvēks var izzināt pats sevi, nodrošina mūsu nervu sistēma, kā arī atmiņas un domāšanas procesi, kas palīdz informāciju saglabāt un analizēt piedzīvoto (Oberman & Ramachandran, 2009).

Pašizziņas procesa rezultātā cilvēkam veidojas paškoncepcija. Tā ir uzskatu sistēma, caur kuru cilvēks raksturo pats sevi "Kas es esmu?" (Myers, 2009). Amerikāņu psihologs K. Rodžers paškonceptā saskata trīs galvenās sastāvdaļas: paštēlu, pašnovērtējumu, ideālo paštēlu. Pašnovērtējums attēlo to, kā cilvēks

pats sevi uztver, to kāds ir cilvēks pašlaik, pēc paša domām, savukārt, ideālais paštēls parāda uz ko cilvēks tiecas. K. Rodžers savā paškoncepta jeb pašuztveres teorijā norāda, ka paškoncepcija ir mainīga un dinamiska. Cilvēks vienmēr vērtē to, kāds viņš ir, un tiecas pēc tā, kāds vēlas būt (Rogers, 1959). K.G. Jungs norāda uz četrām galvenajām psihes funkcijām:

1. sajūtu funkcija: redze, dzirde, oža, garša, tauste un proprioreceptīvās sajūtas, kas nāk no organisma iekšienes - muskuļu kustībām, vestibulārā aparāta;
2. domāšanas funkcija – analīze, slēdzienu izdarīšana;
3. vērtējošā jūtu funkcija - izjūtu, ka tas ir labi, un es izjūtu, ka tas ir slikti;
4. intuīcijas funkcija – mēs kaut ko uztveram, sākam saprast, bet nezinām, no kurienes, tas nāk, nespējam paskaidrot un argumentēt (Jungs, 1996).

Personības attīstības procesu K.G. Jungs dēvē par individuāciju, kas ir personības integrācija, sevis iepazīšanas process (Jungs, 1996). Šo procesu – individuāciju, K.G. Jungs apskata kā pakāpenisku sevis atklāšanu. Pirmā individuācijas stadija ir *personas* atklāšana. Tā ir sevis apzināšanās, ne tikai savas sociālās lomas, ko cilvēks spēlē, bet tā ir sapratne, ka cilvēkam ir savs "*Es*", kas ir atšķirīgs no *personas* vai *maskas*. Otrā stadija ir satikšanās ar savu "*ēnu*". Trešā stadija satikšanās ar "*anima*" vai "*animus*" jeb sievišķo vai vīrišķo dvēseles daļu. Noslēdzošajā stadijā ir savas patības apzināšanās, sapratne, ka mūsos ir kaut kas vairāk nekā tikai "*Es*" kā apziņas centrs, bet ir vēl *Dievišķā dzirksts*, kas ir personības būtība (Jungs, 1996). Kā vecuma priekšrocību K.G. Jungs atzīst cilvēka prasmi sākt ieklausīties sevī. Savās terapijās viņš daudz izmantoja meditāciju, zīmēšanu, regresiju – atgriešanos bērnībā, regresijas procesā cilvēks spēja atgriezties atmiņās, kas sniedzās līdz pat divu gadu vecumam. Šāda pieredze aktualizēja pārdomas par to, cik būtiski nozīmīgs periods cilvēka dzīvē ir bērnība (Jungs, 1996).

Amerikāņu filozofs K. Vilbers (Vilbers, 2013) runā par psiholoģisko attīstību, kas pamatota strukturālajā pieejā. Šajā pieejā viņš izvirza septiņus galvenos personības attīstības līmeņus:

1. *Arhaiskais*. Tas sevī ietver ķermeni, maņu sajūtas, uztveri, emocijas (Vilbers, 2013). Šis līmenis pēc Vilbera uzskatiem atbilst A. Maslova fizioloģiskajām vajadzībām (Maslow, 1943).
2. *Maģiskais*. Šis iekļauj sevī tēlus, simbolus, pirmo priekšstatu aizmetņus vai pirmos zemākos psihes veidojumus, kas ir "maģiski", tos raksturo domas par savu visvarenību. K. Vilbers norāda, ka tas atbilst Z. Freida norādītajam primārajam psihes procesam (Vilbers, 2013), bet A.Maslovs to izvirza kā vajadzību pēc drošības (Maslow, 1943).

3. Mītiskais. Šī līmeņa būtību izsaka konkrēta operatīvā domāšana (Vilbers, 2013). Salīdzinot ar A. Maslova vajadzību piramīdu, tā ir vajadzība pēc piederības (Maslow, 1943).
4. *Racionālais.* Šajā līmenī dominē formāli operatīvā domāšana, hipotētiski deduktīvā spriešana, integrējošā loģika. Šī ir "Sirdsapziņas" un individuālisma stadija (Vilbers, 2013). Salīdzinot ar A. Maslova vajadzību piramīdu, tā atbilst vajadzībai pēc pašcieņas (Maslow, 1943).
5. *Parapsihiskais.* Šajā līmenī tiek norādīts uz psihi kā augstāku attīstības līmeni nekā racionālais prāts. Tā iekļauj sevī vīzijas un integrējošo loģiku (Vilbers, 2013). Salīdzinot ar A. Maslova vajadzību piramīdu tas atbilst sava "Es" aktualizēšanas vajadzībai (Maslow, 1943).
6. *Smalkais līmenis.* Šis ir arhetipiskais līmenis, apgaismotā prāta līmenis, īsteni pārracionāla struktūra, intuīcija augstākajā un nopietnākajā nozīmē, nevis emocionālisms vai tikai ķermeniski izjusta jēga (Vilbers, 2013). Salīdzinot ar A.Maslova vajadzību piramīdu, tas atbilst "Es" vajadzību pārsniegšanas līmenim (Maslow, 1943).
7. *Cēloniskais.* Šis ir visu līmeņu nemateriālais pamats un būtība, izaugsmes un attīstības robeža. Mūžīgā eksistence (Vilbers, 2013).

Kā atzīst K. Vilbers (Vilbers, 2013), tad vispārējās struktūras studijas var reducēt līdz trīs vispārējām sfērām: *pirmsracionālā* (zemapziņa), *racionālā* ("Es" apziņa), *pārracionālā* (virsapziņa). Līdz ar to indivīds sevi var pārveidot ne tikai vertikāli, lai mainītu līmeni (augtu/ attīstītos vai degradētos), bet arī horizontāli – līmeņu maiņa paša cilvēka "iekšpusē". Vertikālā izmaiņa ir transformācija, bet horizontālā ir translācija. K. Vilbers norāda divus galvenos translācijas dialektiskos spēkus, kuri parādās saskarsmē ar kādu konkrētu struktūru un indivīdam ir dziņas un izvēles: saglabāt to vai to mainīt. "Saglabāšanas faktors" cenšas nostiprināt, aizvērt, stiprināt pašreizējās struktūras elementus. "Struktūra nemainās, tai tiek pielāgota vide" (Vilbers, 2013). K. Vilbers uzskata, ka arī "saglabāšanas faktoru" var grozīt, pārkārtot vai mainīt tieši, pašreizējo struktūru atbilstoši tās videi (Vilbers, 2013).

Tātad, kā norāda Dž. Dispenza, konkrētajā līmenī notiek indivīda darbības struktūras saglabāšanas, ietekmēšanas un uzturēšanas dialektika no vienas puses, un šīs struktūras mainīšana, pārkārtošana vai atbrīvošana no otras puses. Lai šāda veida evolucionēšana notiktu, cilvēkam sevi jāiepazīst, atrodot atbildes uz jautājumiem: "Kāds es izskatos?"; "Identitāte, ko projicēju ārējā vidē?"; "Ko vēlos, lai par mani domātu?"; "Kas ir mans pasaules ideāls?"; "Kā es jūtos?"; "Kas es patiesībā esmu?"; "Kāds esmu iekšēji?"; "Kāds ir mans personības ideāls?" (Dispenza, 2015).

Cilvēkam atbildot uz šiem jautājumiem var rasties disonanse starp iedomāto un reālo sevis redzēšanu, tas var būt labs pamats personības pārmaiņām. Par šo disonansi Dispenza norāda, ka cilvēkam ieraugot plaisu, starp to, kas mēs esam un kādi mēs patiesībā izskatāmies, tā rezultātā cilvēks var no kāda nevēlama ieraduma atbrīvoties (Dispenza, 2015).

Lai minētās atziņas par personības tapšanu iedzīvinātu pedagoģiskajā praksē un pedagogi apzināti varētu ieguldīt darbu sevis pilnveidošanā, tad organizētās pedagogu profesionālās kompetences pilnveides nodarbībās tiek vadītas pēc iepriekš izstrādātā pedagogu profesionālajā mūžmācībā izmantojamā mācīšanās modeļa (1.att.).
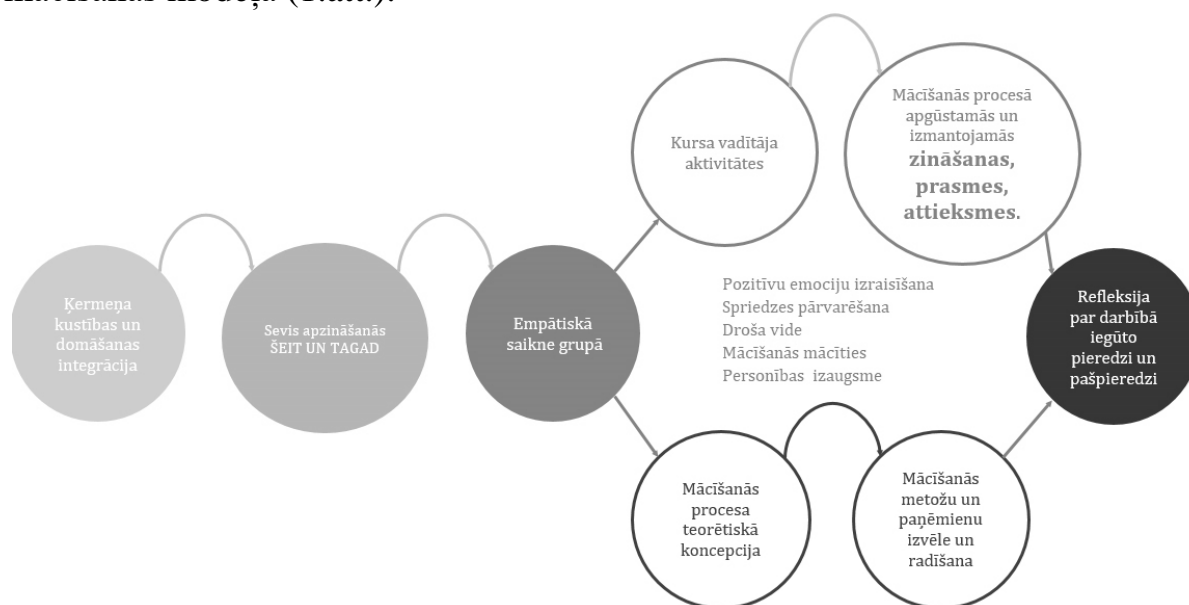
1.attēls. **Skolotāju profesionālajā mūžmācībā izmantojamais mācīšanās modelis**
(Kušnere, 2018)
*Figure 1 **Model for teaching professional teachers in the context of their own lifelong learning** (Kušnere, 2018)*

Pašizziņas process ir ļoti svarīgs ne tikai pedagogam, kurš strādā ar skolēnu, bet šis process ir svarīgs jebkuram cilvēkam, jo, kā ir norādījuši K.G. Jungs un K. Vilbers (Jungs, 1996; Wilbers, 2013), tad procesā notiek personības tapšana. Tāpat arī filozofs R. Rudzītis (Rudzītis, 2008) apgalvo, ka "augstākais eksperiments ir mēģinājums ar sevi."

Metodoloģija
Metodology

Izlases apraksts

Pētījums tika veikts skolotāju profesionālās kompetences pilnveides kursos, kuri notika 2018.gada maijā, septembrī un oktobrī aptverot visus Latvijas

novadus: Latgali, Vidzemi, Kurzemi, Zemgali. Pētījumā piedalījās 275 pedagogi. Izlases sadalījums pēc dzimuma: 42 bija vīrieši, no tiem 35 bija vecumā no 45 – 50 gadiem, ar augstāko izglītību, vairāk nekā 20 gadu darba pieredzi; 2 vīrieši vecumā no 25 – 30 gadiem, ar augstāko izglītību un 5 gadu darba pieredze pedagoģijā; 5 vīrieši vecumā no 35 – 40 gadiem, ar augstāko izglītību un vairāk nekā 10 gadu darba pieredzi.

No aptaujātajiem dalībniekiem 233 bija sievietes, to skaitā 160 sievietes bija vecumā no 45 – 50 gadiem, ar augstāko izglītību un vairāk nekā 20 gadu darba pieredzi; 30 sievietes vecumā no 35 - 40 gadiem, ar augstāko izglītību un vairāk nekā 10 gadu darba pieredzi; 23 sievietes vecumā no 25 – 30 gadiem, ar augstāko izglītību, 3 - gadu darba pieredzi; 10 sievietes bija vecumā no 50 – 65 gadiem, ar augstāko izglītību un darba pieredzi pedagoģijā 20 līdz 30 gadu intervālā.

Pētījuma instrumenti un datu ieguves procedūra

Pētījums tika veikts izmantojot divus pētījuma instrumentus: Likerta skalu, aptaujas metodi (Pipere, 2011), izmantojot I. Kušneres izveidotās aptaujas anketas. Anketā tika ietverti šādi jautājumi: Kādas izjūtas piedzīvoji mācīšanās procesā? Kā profesionālajā mūžmācībā piedzīvotās sevis iepazīšanas metodes un paņēmieni ietekmēs Tavu vadīto pedagoģisko procesu? Tava pārliecība par pedagoga lomu? Kā savas piedzīvotās izjūtas vari integrēt pedagoģiskajā praksē? Pētāmajiem tika lūgts nosaukt 2 – 3 pašizziņas metodes, ko izmantos pedagoģiskajā praksē. Jautājums par pedagogu piedzīvotajām izjūtām tika uzdots pēc katras praktizētās metodes. Nodarbību sākumā pedagogi pāros dalījās par savām rīta izjūtām, izmantojot asociatīvās mākslas darbu kartītes. Nodarbību "apjēgšanas fāzē" pedagogi piefiksēja savas izjūtas uz atsevišķām lapām un dalījās iegūtajā pieredzē mazās grupās. Nodarbību "refleksijas fāzē" tika lūgts rakstiski atbildēt uz pārējiem anketas jautājumiem.

Četri pedagogu profesionālās kompetences pilnveides grupu dalībnieki iegūtās izjūtas attēloja ar ķermeni, veidojot skulptūras. 8 grupās pedagogi piedzīvotās izjūtas pauda caur vizualizāciju un vārda mākslu, izmantojot vidē esošos atribūtus. Iegūtie rezultāti tika fiksēti, apkopoti un analizēti, ņemot vērā pedagogu radītos darbus. Grupās pedagogu starpā notika jaunās iegūtās pašpieredzes apmaiņa. 6 grupās pedagogi veidoja Personīgās un profesionālās izaugsmes kartes, kurās tika ietverti jautājumi: Ko es vēlos piedzīvot pedagogu profesionālās kompetences nodarbībās? Ar kurām mācību metodēm, paņēmie-niem, piedzīvotajām situācijām sasniedzu rezultātu? Kā vēlamo rezultātu varu integrēt pedagoģiskajā procesā? Darbībā piedzīvotās sajūtas pedagogi atzīmēja Personīgās un profesionālās izaugsmes kartēs katras apgūtās tēmas beigās.

Rezultāti
Results

Pētījumā iegūtie dati tika apkopoti un veikta to analīze (1.tab.). Atbildes, kuras tika saņemtas uz pirmo jautājumu varēja sadalīt deviņās kategorijās, savukārt atbildes, kuras tika sniegtas uz otro jautājumu tika sadalītas desmit kategorijās, bet uz trešo jautājumu sniegtās atbildes tika sadalītas astoņās kategorijās.

1.tabula. **Pedagogu sniegto atbilžu kopsavilkums** *(Dombrovskis & Kušnere, šajā pētījumā)*
Table 1 **Summary of answers provided by educators** *(Dombrovskis & Kušnere, in this research)*

N. P.K.	Uzdotais jautājums	Atbildē-jušo respondentu skaits	Pieminējuma biežums izteikts % daļās no kopuma	Saņemtās atbildes
1	Kādas izjūtas piedzīvoji mācīšanās procesā?	63	23%	Harmoniju, dvēseles mieru
		62	22%	Atvēršanās, pārdomas par savu dzīvi
		38	14%	Daudzveidīga emocionāla gamma: no "piano" līdz "forte"
		35	13%	Prieks par pašatklāsmi
		26	10%	Mīlestība
		25	9%	Pozitīvisms, zinātkāre
		23	8%	Iedvesmu darbībai
		2	0.7%	Iekšējais protests, kad jārunā par sevi
		1	0.3%	Mulsums, vai skolotājam par sevi tik daudz jāzina
2	Kā profesionālajā mūžmācībā piedzīvotās sevis iepazīšanas metodes un paņēmieni ietekmēs Tavu vadīto pedagoģisko procesu?	70	26%	Mudina apzināties savas vērtības un ieklausīties citos
		42	15%	Vairāk ienest prieka mācīšanās procesā
		40	15%	Mācību procesā ietveršu pašizziņas uzdevumus
		19	7%	Mīlēt un pieņemt sevi
		20	7%	Uzdrīkstēšos citiem teikt labu
		20	7%	Stundas sākumā skolēniem piedāvāšu atbrīvojošus vingrinājumus
		17	6%	Jāmācās bērnam būt blakus, nevis valdīt pār viņu
		17	6%	Stundās uzdrīkstēšos piedāvāt radošas aktivitātes
		17	6%	Centīšos vairāk pamanīt bērnu veiksmes
		13	5%	Jāizmanto apzinātie resursi dzīvesspēka uzturēšanā

3	Tava pārliecība par pedagoga lomu?	60	22%	Dot cerību, ka bērnam izdosies
		45	16%	Pedagogs var palīdzēt bērnam sevi atrast dažādās dzīves jomās
		38	14%	Ieraudzīju pedagoga lomu caur citu leņķi
		36	13%	Cik iekšēji sakārtots, inteliģents ir skolotājs, tik piepildīts ir viņa mācību process
		30	11%	Pedagogs ir nozīmīgs cilvēks bērna personības izaugsmē
		25	9%	Novērtēt katra devumu kopējā attīstībā
		23	8%	Pedagogs ir iedvesmotājs ar savas darbības paraugu
		18	7%	Skolotāja profesija ir misija un dzīvesveids

Apkopojot pedagogu atbildes par jautājumu (1.tab.) - "Kādas izjūtas piedzīvoji mācīšanās procesā?", redzams, ka pedagogi visvairāk ir norādījuši uz tādām kvalitātēm kā "harmonija un dvēseles miers" (23%) un "atvēršanās, pārdomas par savu dzīvi" (22%), kas norāda, ka gandrīz pusei (45%) no pētījuma dalībniekiem procesa gaitā ir notikusi fokusēšanās uz savu "iekšējo pasauli", izjūtas, kas saistītas ar savas eksistences jautājumiem.

Pētījuma dalībniekiem atbildot uz jautājumu "Kā profesionālajā mūžmācībā piedzīvotās sevis iepazīšanas metodes un paņēmieni ietekmēs Tavu vadīto pedagoģisko procesu?", visvairāk (26%) ir to dalībnieku, kuri norāda, ka "iegūtā pieredze viņus mudinās apzināties savas vērtības un ieklausīties citos", nedaudz mazāk aptaujāto atbildēja (15%), ka "vairāk ienesīs prieka mācīšanās procesā" un "mācību procesā ietvers pašizziņas uzdevumus". Šādu atbilžu īpatsvars norāda uz to, ka pedagogi vēlas savā, sevis organizētajā, turpmākajā pedagoģiskajā procesā, ieviest savu pozitīvo pieredzi.

Atbildot pētījuma dalībniekiem uz jautājumu par pedagoga lomu "Tava pārliecība par pedagoga lomu?" visvairāk no aptaujātajiem tika norādījuši, ka pedagoga galvenā loma ir "cerības nesējs", jo 22% no aptaujātajiem atbildēja: "Dot cerību, ka bērnam izdosies".

Savas izjūtas mācību procesa dalībnieki vērtēja 5 ballu skalā (pēc Likerta skalas). Vērtējot izvirzītos kritērijus (sadarbība grupā, radošums, izvirzītā mērķa sasniegšana), tika iegūti šādi rezultāti: 255 pedagogi jeb 93% no aptaujātajiem deva novērtējumu skalā ar vērtējumu 5 balles; 18 pedagogi jeb 6.3% no aptaujātajiem deva novērtējumu skalā ar vērtējumu 4 balles un tikai 2 pedagogi jeb 0.7% no aptaujātajiem deva vērtējumu skalā ar atzīmi 3 balles par kritēriju sadarbība grupā.

Aptaujātie pedagogi paši aprakstīja, kādas ir piedzīvotās izjūtas. Kā biežāk minētās ir: pārdomas par savu dzīvi, emocionāli pārdzīvojumi, prieks, izvēles brīvība, griba darboties, jauna, pozitīva pieredze, harmonija, mīlestība, augsta

saskarsmes kultūra. Visvairāk tika izdalītas kategorijas: prieks, izvēles brīvība, harmonija, mīlestība, jauna, pozitīva pieredze, emociju iepazīšana. Mazāk parādījās tādas kategorijas kā griba darboties, nepiespiesta atmosfēra, augsta saskarsmes kultūra. Šīs piedzīvotās izjūtas caur mūziku, mākslas izpausmēm, ķermeņa kustībām atbrīvo pedagoga sasprindzinājumu, rosina atraisīt iekšējos resursus jaunu domu radīšanā, savu pedagoģisko pārliecību stiprināšanā.

Aptaujas rezultāti liecina, ka mācīšanās procesā piedzīvotās pozitīvās izjūtas, iegūtā psiholoģiskā pieredze sevis izzināšanā, saprašanā un pieņemšanā stiprina pedagogu pārliecības, ka pedagoģiskajai darbībai jābūt pieredzē balstītai, pašvadītai, emocionālai, izziņu virzošai un ar teorētiskām koncepcijām pamatotai.

Novērtējot piedzīvotās mācību darbības sekas, izmēģinot apgūtās metodes pedagoģiskajā praksē un ieklausoties kolēģu pieredzē, pedagogi pamana, kā profesionālajā mūžmācībā piedzīvotās sevis izzināšanas metodes un paņēmieni pozitīvi ietekmē turpmāk vadīto pedagoģisko procesu. Jo, kā rāda aptauja, tiek stiprināta pedagoga pārliecība par savu lomu pedagoģiskajā praksē. Pedagogu profesionālās kompetences pilnveides nodarbību laikā tas redzams situācijās, kad pedagogi savstarpēji dalās iegūtajā pašpieredzē. Līdz ar to pedagogi sāk domāt par vērtībām, kuras pedagoģiskajā praksē nodod bērniem. Tā tiek aktualizēta izglītības loma sabiedrības un vides ilgtspējai. Pedagogs, mācoties pieņemt savas rakstura ēnas puses, apzinoties, ka pastāv plaisa starp viņa reālo un iztēloto "Es", apzinoties, kādas lomas vēl savā dzīvē veic, stiprina sevī pārliecību, ka mācību procesā jāatvēl laiks pašattīstībai, sevis pilnveidei. Mācību stundā jāpiedāvā situācijas, lai skolēni nevardarbīgi varētu izreaģēt gan negatīvās, gan pozitīvās emocijas, radīt mācību situācijas, kurās skolēni var teikt un saņemt labus vārdus par sevi un citiem.

Pedagogi mācīšanās procesā, piedzīvojot situācijas, ka grupas dalībnieki cits citam saka atbalstošus vārdus, atzīst, ka savā pedagoģiskajā praksē kolēģiem reti saka atbalstošus vārdus, tāpat arī ļoti reti paši saņem "paldies" par ikdienā paveiktu darbu. Pētījumā apstiprinājās fakts uz kuru ir norādījis Dž. Hetijs, ka skolotāji caur piedāvāto mācīšanās modeli, saņemot no mācību procesa vadītāja atbalstu savu iekšējo barjeru pārvarēšanā, stiprina sevī pārliecību, ka skolotāja darbības virsmērķis ir palīdzēt bērnam iepazīt un atrast sevi, atrasties blakus, iedegt un uzturēt izziņas dzirksti, ar mīlestību apstiprinot labāko, kas bērnā ir un, izzinot un iepazīstot sevi, ļaut būt un augt. Līdz ar to pedagoģiskajā praksē skolotājs sāk veidot ieradumu regulāri runāt ar bērniem par pašaudzināšanas jautājumiem, par prasmi vadīt sevi un citus, par emociju apzināšanās nozīmi dzīvesdarbībā (Hattie, 2008; Hattie & Zierer, 2018).

Secinājumi
Conclusions

Atbildot uz pētījuma pirmo jautājumu – "Kāda nozīme pedagogu personības pašizziņai ir pedagoģiskajā praksē?" - secināts, ka pedagogam iepazīstot un pieņemot sevi, pedagogs ir motivēts pilnveidot pedagoģisko praksi tā, lai tajā tiktu ietverti pašizziņas uzdevumi, kas veicina indivīda personības izaugsmi ilgtermiņā.

Atbildot uz otro pētījuma jautājumu – "Kādas ir pedagogu piedzīvotās izjūtas profesionālās kompetences pilnveides nodarbībās, mācoties pēc piedāvātā pedagogu profesionālajā mūžmācībā izmantojamā mācīšanās modeļa?", pēc iegūtajiem pētījuma datiem var secināt, ka visvairāk pedagogi piedzīvo pozitīvas izjūtas, kuras saistītas ar savas eksistences un savu augstāko vajadzību apzināšanos.

Trešais pētījuma jautājums – "Kā mainās pedagogu pārliecības, iepazīstot sevi?", no iegūtajiem rezultātiem var secināt, ka pedagogam iepazīstot un pieņemot sevi, notiek pedagoga personības pašattīstība horizontālā un vertikālā līmenī un paralēli pašpilnveides un pašattīstības procesiem, pedagogs pilnveido arī savas profesionalitātes kompetences.

Summary

This article gives an insight into self-discovery while being in the process of personality development. Multiple authors' thoughts (Jungs, 1996; Jungs, 2009; Maslow, 2013; Wilber, 2013; Robinsons, 2013; Dispenza, 2015, 2016; Marope, 2017) about the creation of personality were explored by studying and evaluating different sources of literature. The acquired theoretical findings were applied in the teachers' professional competence development courses. The teacher groups' educational process was organized based on the previously developed and in practice tested model "Educational model for teachers' professional lifelong learning". Results of the study show how the teachers' confidence changes when faced with the opportunity to familiarize themselves with their inner-self, accept it and set further self-development goals during the learning process. Observations gained during the study process confirm that by working on the teachers' personality growth matters, the teachers improve their professional competences - communicative, cognitive, organizational, methodical, creative skills and self-management (Špona & Čamane, 2009; Marope, 2017). By using the psychological insights about personality development, it is possible to better implement the competence approach in education and pedagogical practice. The methods and techniques of self-cognition reinforce the teacher's confidence that not just knowledge, but the balance between the exploration and application, is the best way to work on the development of their own personality. The result of the study was achieved by using a survey method. By getting to know and accepting their inner-self, the teachers work on their personality development on horizontal and vertical levels. The conclusions of the research confirm the idea that psychological knowledge about personality development is topical in contemporary pedagogical practices.

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PERFORMANCE OF VOCATIONAL EDUCATION IN LATVIA IN DEVELOPING EMPLOYABILITY OF GRADUATES

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Abstract. *As the labour market changes at increasing pace, education systems need to respond. Facilitating employability of graduates and preparing them for lifelog learning and constant changes throughout their careers requires new education methods. In order to assess the current approach to developing employability of graduates in vocational education in Latvia, this article aims at evaluating the attitudes of employers on performance of vocational education in developing employability competencies, as well as investigating the practical education methods applied by vocational education institutions to facilitate employability.*
Total 750 companies participated in this research. A list of 17 employability competencies was rated using a four-point Likert scale. Employers rated the relative performance of vocational education in developing employability competencies. In order to investigate education methods applied to facilitate development of employability competencies, interviews with managers of 12 vocational education institutions were conducted. The research results show that vocational education in Latvia is best at developing computer skills and presentation skills, however it performs worst at developing the ability to take responsibility, ensuring relevant work experience, developing problem-solving skills and appropriate attitude to work. Overall, performance of vocational education received almost as many negative evaluations as positive evaluations. The main education methods to facilitate employability of graduates used by vocational education institutions are practical learning and extra-curricular activities.
Keywords: competencies, education methods, employability, performance, vocational education.

Introduction

As the technology evolves, the working environment also changes as it requires continuous improvement of employees and new skills acquisition. According to World Economic Forum (WEF, 2018), 42% in required workforce skills will change over the 2018–2022 period which will require significant proportion of employees to be upskilled. Education system needs to respond to

these changes both by adapting to the needs of adult learners, as well as by developing education methods in initial education provision in order to facilitate sustainable employability of graduates and preparing them for lifelog learning throughout their careers.

Employability of graduates is especially relevant in vocational education policies. Vocational education has an important role to play by educating younger and older individuals to acquire appropriate skills and work-related competences, increasing worker motivation and satisfaction as well as increasing productivity to achieve economic growth (Cedefop, 2014). In Latvia, ensuring links with the labour market, as well as increasing involvement of vocational education institutions in providing lifelong learning are important elements in vocational secondary education reforms (Ministry of Education and Science, 2014). However, little progress has been achieved so far. Only 59% of vocational secondary education graduates (2017/2018) work or continue education in the chosen field (Ministry of Education and Science, 2018). According to the data of the Public Employment Service of Latvia, most of the registered unemployed in 2018 were those with vocational qualification (36%). Half of them are at least 50 years old (Employment Agency of Latvia, 2018). The number of unemployed young people (of age 15 – 24) with vocational qualification was twice as high as the number of young people with higher education (Employment Agency of Latvia, 2016). Although participation in lifelong learning is important for employability throughout career, people who have completed secondary education level, including vocational education, are significantly less active adult learners comparing to higher education graduates (Central Statistical Bureau, 2018; European Commission, 2015). Moreover, average adult participation in lifelong learning in Latvia is very low: 7.3% of adults of age 25-64, while in EU on average – 10.8%, and, for example, in Finland – 26.4% (European Commission, 2017).

No research had been done so far on how well vocational education in Latvia facilitates employability of graduates to ensure their competitiveness in the labour market in the long term. This article aims at evaluating performance of vocational education in developing employability, as well as investigating the practical education methods applied by vocational education institutions to facilitate employability. The research methods used include both, quantitative and qualitative research methods. The performance of vocational education was assessed by carrying out a nationally representative survey of employers. The methods applied by vocational education institutions to develop employability were investigated through interviews with managers of 12 vocational education institutions.

Literature review

The rapid labour market changes in the context of future skills needs have been studied by many researchers and international organisations (for example, De Grip, van Loo, & Sanders, 2004; Humburg, van der Velden, & Verhagen, 2013; WEF, 2018). Considering ever more rapid changes in technologies, markets and societies, graduates should become more flexible and better prepared for lifelong learning. Lee Harvey even defines individual's employability as lifelong-learning: employability "is about developing attributes, techniques, or experience for life. (…) In essence, the emphasis is on developing critical reflective abilities, with a view to empowering and enhancing the learner." (Harvey, 2005).

Although employability is a contentious concept (Sumanasiri, Yajid, & Khatibi, 2015), it has become important in education research and policy making. Employability researchers have developed models that help to explain the factors facilitating employability (for example, Bridgstock, 2009; Dunne & Carre, 1999; Fugate, Kinicki, & Ashforth, 2004; Hillage & Pollard, 1998; Yorke & Knight, 2006). One of the most well-known is the CareerEDGE model which was developed by Pool and Sewell (2007) and operationalised by introducing and exploring its factor structure by Pool, Qualter and Sewell (2014). The model explains the way in which five factors, namely, career development learning, experience, degree subject knowledge, understanding and skills, generic skills, and emotional intelligence can lead towards employability through a complex interaction with self-esteem, self-efficacy and self-confidence. Employer surveys, conducted both, in Latvia and internationally, confirm that students should develop social and emotional, as well as other generic competencies, in addition to academic skills to ensure better employability (Līce, 2017; Project and Quality Management Ltd., 2013; Project and Quality Management Ltd., 2014; WEF, 2018).

Methods used to facilitate graduate employability are analysed in several international comparative reports (for example, European Commission, EACEA, Eurydice, 2015; European Commission, EACEA, Eurydice, 2014) which demonstrate that involving employers in different processes of planning, implementing and evaluating education, as well as integrating skills demanded in the labour market into curriculum are the most common methods for promoting employability across different countries. Success factors of vocational education systems with good employability results have been analysed to help policy makers and practitioners design vocational education system reforms (for example, Bliem, Petanovitsch, & Schmid, 2014; Ecorys, IES, & IRS, 2013). Eichhorst, Rodrigues-Planas, Schmidl and Zimmermann (2015) concluded that the use of apprenticeships combined with institutional

learning tends to be more effective than school-based vocational education in terms of labour market outcomes for young people. It has been, however, empirically proven that the success factors of vocational education systems might change depending on the national context (Van der Velden, Welter, & Wolbers, 2001).

In Latvia, vocational education system is school-based with the main on-the-job training element – work placements, recently also work-based learning. Līce (2018) offer analysis of examples of good practice in organising work placements in Latvia and recommends targeting only motivated companies in the need of qualified workers, as well as establishing multidimensional partnership between employers and vocational education institutions, engaging employers also in the elaboration of education programmes. As it was confirmed by Klāsons and Spuriņš (2015), not all students in Latvia enjoy work placements of good quality.

Methodology

The methods of research included the analysis of scientific publications, a survey of employers (n = 750) and the interviews with the managers (directors or deputy directors) of vocational education institutions (n=12).

A sample for the survey was created by multistage cluster sampling method. The answers to the questionnaire were collected by the research centre SKDS Ltd. First, the companies which were in the database of "SKDS" were contacted, then the companies from the public databases of companies were selected according to the random sampling method. The data were collected in two phases: 1) from 27.03.2017 until 04.04.2017, when 499 internet questionnaires were collected, and 2) from 05.04.2017. – 03.05.2017, when 251 telephone interviews were conducted by 19 interviewers. For telephone interviews, there were 587 cases of non-response: in 87.6% of these cases respondents didn't want to participate in the interview, 7% - didn't have time and 5.5% stopped answering during the interview. The collected data were weighted according to the statistics of the Central Statistical Bureau of Latvia of 2015 on the distribution of companies by industry, size and location of a company to ensure their representativeness. Considering the size of the general population, the margin of error (MOE) at 95% confidence level is +/- 4.0 %.

Considering that the companies might have limited knowledge of vocational education, in addition to the commonly asked questions about the company profile, the questions on whether they have employees with vocational qualifications was included in the questionnaire. The companies that responded positively were considered experts, considering their direct experience with the results of vocational education. To assess the performance of vocational

education, the Likert-type question on employer perception of the extent to which certain employability attributes (skills, competencies, attitudes, experience) could be developed in vocational education in Latvia was included in the questionnaire. The scale was bi-directional with 4 possible answers. An option "difficult to answer" was included as well. The list of 17 items to be assessed was elaborated, based on the list of employability attributes which resulted from operationalisation of the CareerEDGE employability model (Pool, Qualter, & Sewell 2014; Pool & Sewell, 2007). The list of items was adapted to the needs of the target audience of employers and limitations of the questionnaire.

For data analysis of the survey results, descriptive statistics was used: indicators of central tendency or location (arithmetic mean, mode, median) and indicators of variability (range, standard deviation, standard error of mean), relative frequencies, as well as other methods of statistical analysis (Kruskal–Wallis test, or one-way ANOVA; Wilcoxon–Mann–Whitney test; Factor analysis).

The interviews with VET managers were semi-structured, face-to-face, in-depth interviews. The interviews covered all types, subordinations of vocational education institutions, as well as all regions in Latvia in a balanced way. The interviewees were invited to comment the methods applied in their vocational education institutions to develop each of 17 employability attributes.

Research results

A Kruskal-Wallis test and a Wilcoxon–Mann-Whitney test were conducted to determine, whether there are significant differences in evaluations between companies which employ employees with vocational education ("experts in vocational education"), and which do not. Both tests confirmed that there is no statistically significant difference between evaluations of both groups. Therefore, evaluations of all respondents were considered in further analysis.

The main statistical indicators of evaluations of employers' survey are included in Table 1.

Table 1 **Descriptive Statistics of Employer Evaluations of Performance of Vocational Education in 2017**

	Empoyability Attribute	Median	Mean	SE of Mean	Mode	SD	Range	Min	Max	NA
1	Attitude to work	3	2.26	0.03	2	0.77	3	1	4	234
2	Ability to work independently	2	2.48	0.03	3	0.73	3	1	4	224
3	Work motivation	2.5	2.32	0.03	3	0.77	3	1	4	224

4	Responsibility for own decisions	3	2.17	0.03	2	0.73	3	1	4	220
5	Problem solving skills	2	2.27	0.03	3	0.72	3	1	4	212
6	Easily adapt to new situations	2	2.38	0.03	3	0.68	3	1	4	206
7	Work in a team	2	2.61	0.03	3	0.70	3	1	4	210
8	Communication skills	3	2.56	0.03	2	0.66	3	1	4	224
9	Target orientation	2	2.40	0.03	3	0.72	3	1	4	256
10	Planning and organizing skills	3	2.32	0.03	2	0.70	3	1	4	245
11	Computer skills	3	3.19	0.03	3	0.58	3	1	4	234
12	Create new ideas	3	2.44	0.03	2	0.73	3	1	4	249
13	Relevant work experience	3	2.22	0.03	2	0.74	3	1	4	232
14	Mathematical skills	2	2.54	0.03	3	0.72	3	1	4	225
15	Clarity for career goals	3	2.44	0.03	2	0.76	3	1	4	216
16	Presentation skills	2	2.75	0.02	3	0.66	3	1	4	171
17	Achievements in education (academic skills)	3	2.63	0.03	2	0.67	3	1	4	239

Source: Authors' calculations based on employer survey conducted in 2017, evaluation scale 1-4, where 1-2 – negative evaluations; 3-4 – positive evaluations. Option – "difficult to answer" (NA) was included, n=750

As there are rather many evaluated aspects and all of them are important as it is indicated by scientific publications and by employers in Latvia evaluations, a factor analysis was applied to find complex factors. Only one component was extracted in the factor analysis using varimax rotation and extraction method Principal Component Analysis. It means that the analysed employability attributes cannot be divided into groups.

Relative frequencies of all positive and negative evaluations by employers of Latvia are included in Figure 1.

Data of Table 1 and Figure 1 show that evaluations on the extent to which vocational education develops employability attributes are mediocre. There are almost as many negative evaluations in total (48.28%) as positive evaluations (51.72%). The mode for all attributes was either 2 (for 8 items) or 3 (for 9 items); the median evaluations were between 2 and 3, the arithmetic mean – between 2.17 and 3.19. The variability of evaluations (characterised by indicators of variability or dispersion: standard error (SE) of mean and standard deviation (SD)) by the respondents were quite similar for all attributes.

"Computer skills" received significantly more positive evaluations (92%) than other employability attributes. Other employability attributes which received more positive than negative evaluations, were: "presentation skills", "ability to work in a team", "achievements in education", "mathematical skills", "good communication skills" and "ability to work independently". The employability attributes which received most negative evaluations were: "ability

to take responsibility for own decisions"; "relevant work experience", "problem-solving skills" and "attitude to work".
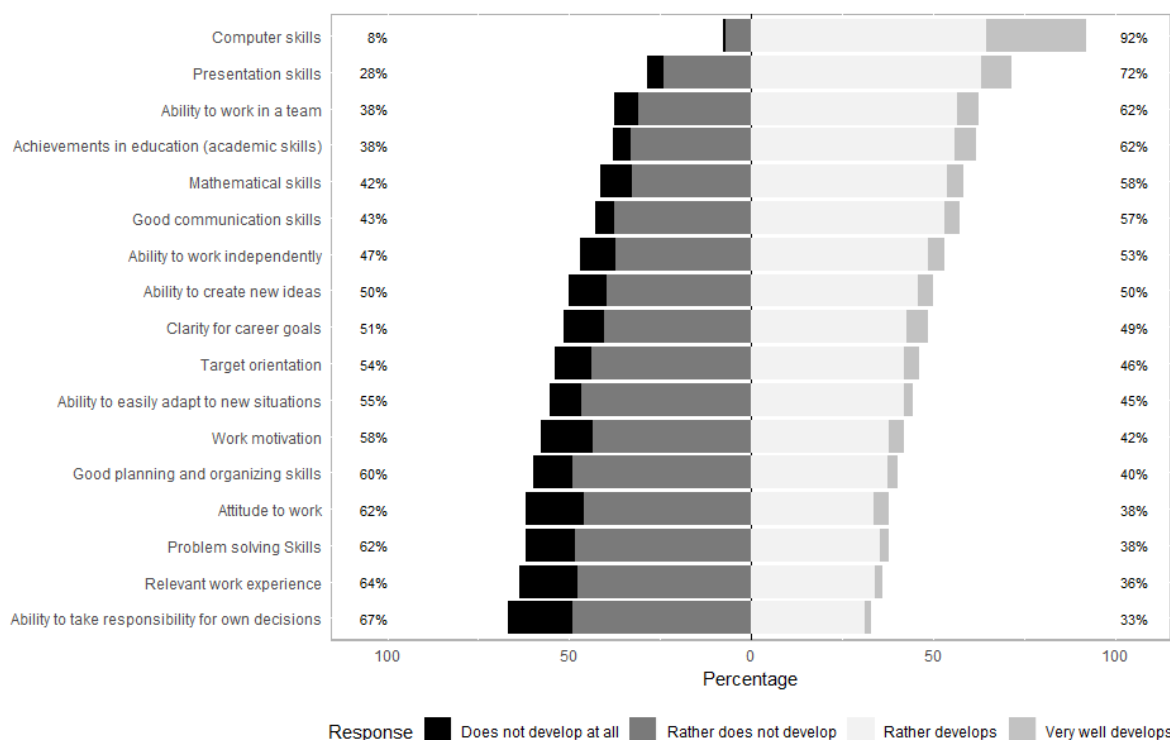
Figure 1 **Distribution of Evaluations by Employers in Latvia of Performance of Vocational Education in Developing Employability Attributes in 2017** *(n = 750)*

Results of interviews with VET managers showed that the most common methods applied by vocational education institutions to facilitate development of employability attributes are: practical learning and extra-curricular activities. They were mentioned most frequently in relation to majority of employability attributes. International mobility was also frequently mentioned, but not as much as those.

Practical learning may include practical lessons at school, work placements and work-based learning at the company. Sometimes students can go also abroad for work placements. Practical learning may not just ensure relevant work experience, but also improve communication skills, ability to work in a team and independently, as well as facilitate development of motivation to study and work, appropriate attitude to work, sense of responsibility and ability to adapt. Although there were vocational education institutions with certain processes in place to ensure the quality of work placements, several admitted that the work placements may also be of poor quality whereas it depends on the interest of employers.

Vocational education institutions offer a wide range of free extra-curriculum activities: workshops, artistic collectives, chorus, dancing, self-

government of students, organisation of conferences, balls and other events, etc. According to the managers of vocational education institutions, all students have an opportunity to get involved in extra-curriculum activities, but the real involvement depends on their motivation and free time. Vocational education institutions also actively offer international mobility opportunities. Some vocational education managers estimated that there are much more extra-curriculum activities and opportunities for international mobility at vocational education institutions in Latvia than in general secondary schools. Some estimated that around 20-50% of students take part in these activities. Extra-curriculum activities are successful at facilitating development of social competencies, for example, co-operation and communication, planning and organising skills, as well as ability to create new ideas and to adapt to different situations.

Conclusions and recommendations

As the labour market changes at increasing pace, it is important to evaluate, how efficient education systems and methods they apply in teaching and learning process are in facilitating employability of graduates.

According to employers, vocational education in Latvia is best at developing skills and competencies which are considered to be more traditional for education curriculum: computer skills, presentation skills, ability to work in a team, as well as academic skills. In contrast, vocational education rather does not develop competencies and attitudes which are linked to person's self-management and emotional intelligence, for example, ability to take responsibility, attitude to work, planning and organizing skills, work motivation, ability to adapt to new situations (which includes ability to learn), target orientation, which are very important for employability in the context of changing labour market.

The main methods applied by vocational education institutions to develop employability are practical learning activities and extra-curriculum activities in which students participate on voluntary basis. It should be noted, however, that the positive effect of these activities does not reach all students. Not all of work placements are of good quality as there are vocational institutions without procedures in place to ensure quality of work placements and it depends solely on the interest of employers. This might serve as a reason for low evaluation by employers on ensuring "relevant work experience" in vocational education – 64% of all evaluations were negative.

When it comes to involvement in extra-curriculum activities, only around 20-50% of most motivated students who can afford to spend time on these activities, free from studies and work. Therefore, extra-curriculum activities

offered by vocational education institutions might benefit just the students who are motivated and comparatively more well-off.

To improve employability of vocational education graduates, attention should be paid to facilitating employability for all students within the mandatory curriculum of vocational education, including by offering specific support to disadvantaged students. Vocational education institutions should implement measures to ensure quality of all work-placements, as well as diversify teaching and learning methods to facilitate not just academic skills, but also development of social, self-management and emotional competencies, including motivation, attitude to work, sense of responsibility and adaptability.

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NATIONAL INSIGHTS FROM LITHUANIA, LATVIA AND POLAND FOR EU ADULT EDUCATION POLICY DEVELOPMENT

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Abstract. *The discovery of the power of adult education in facilitating smart, sustainable and inclusive growth has increased the demand for adult learning. Education in European countries had always been seen as a national affair. The education systems and objectives had been closely related with each country's history, political system and location. However, due to the increasingly global character of the way national and supranational policy is created, education policymaking is increasingly framed by national economic imperatives and driven by the need to be globally competitive. The education of adults is a component of these politics, and has become a powerful lever for shifting the boundaries between education and work, state and market, formal and informal education. The aim of the present article is to highlight the national perspectives of Lithuania and such neighbourhood countries as Latvia, Estonia and Poland. Despite national diversities, a cursory glance at contemporary processes in adult education across European states brings to light many common or similar characteristics in systems and mechanisms. Moreover, comparative perspective of countries' experience and expertise is beneficial for improving of the quality of adult education. The novel contribution of the work is revealed in recommendations on policy for adult learning.*
Keywords: *adult, adult education, education formalization, education institutionalization, policy, quality.*

Introduction

Ageing European population and workforce, the recent economic downturns and the labour market's increased flexibility (Maniscalco, 2013) have widened the search for opportunities to ensure smart, sustainable and inclusive growth (European Commission, 2010). The joint efforts made by the European Union's countries to offer solutions to such challenges as population ageing, workforce ageing and labour market's increased flexibility have brought the European Union to the discovery of the power of education in general and adult

education in particular (Zaščerinska, Aļeksejeva, Aļeksejeva, Andreeva, Gloņina, & Zaščerinskis, 2015). Since then, the demand for adult learning is permanently increasing.

Education in general and adult education in particular in European countries had always been seen as a national affair. The education systems and objectives had been closely related with each country's history, political system and location. It has been perceived as an instrument for strengthening national identity and culture. The nation state also provided a major framework in the provision of formal education. However, due to the increasingly global character of the way national and supranational policy is created, education policymaking is increasingly framed by national economic imperatives and driven by the need to be globally competitive. The education of adults is a component of these politics, and has become a powerful lever for shifting the boundaries between education and work, state and market, formal and informal education.

More recently, the EU – led by the European Commission – has encouraged state representatives to share and exchange knowledge about their national systems in peer-to-peer activities, working groups and networks (EPALE conference 2018, 2018a). Such cross-national communications and initiatives are also the result of joint political will and agenda-setting at European Council meetings, and find further expression in the work of such shared political institutions as the European Parliament and the Council of the European Communities. All member states, therefore, are now involved in debates – domestic and international – on the status and development of adult education.

The aim of the present article is to highlight the national perspectives of Lithuania and such neighbourhood countries as Latvia, Estonia and Poland. Despite national diversities, a cursory glance at contemporary processes in adult education across European states brings to light many common or similar characteristics in systems and mechanisms. Moreover, comparative perspective of countries' experience and expertise is beneficial for improving of the quality of adult education. The comparison of Lithuania, Latvia and Poland is especially relevant as these countries have similar historical background, transition period and traditions in adult education, and are currently seeking to re-arrange their educational systems (Melnikova, Ahrens, & Zaščerinska, 2017).

The present manuscript is built on use of such research methods as theoretical and empirical methods. The theoretical method implies analysis of scientific literature. The methodology of theoretical analysis proceeds from "research politization" through the definition of such a term as "adult" to "formalization of adult education". The empirical study is qualitative. The data were collected at EPALE organised a pan-European conference, Budapest, Hungary, October 2018. Semi-structured interviews were carried out for data

gathering. The novel contribution of the paper is revealed in recommendations on policy for adult learning.

Literature review

In the light of 'politization' of research (Roger, 2002), analysis of adult education and learning is based on rooted-in-the-policy definitions (Kuļšs, 2014, 141).

Adult is identified as a person who has reached the age of 15 years, "that after a break continues general or professional education (formal, informal)" (Basic Guidelines of Lifelong Learning Policy for 2007–2013, 2007).

Adult learning or, in other words, adult education is understood to cover all formal, non-formal and informal learning undertaken by adults after they have left their initial education and training, whether for professional reasons (such as re-skilling and up-skilling) or for private purposes (e.g. social, cultural, artistic and societal learning) (European Commission, 2011).

Formalization of adult education and learning (Handler, 2015) has attracted a lot of interest. Formalization is literally understood as a progressive generalization and standardization of the learning process (Zürcher, 2015, 74).

Discussions on the formalization of the learning process bring to the light another issue such as the institutionalized educational process in formal and non-formal adult education (Ahrens & Zaščerinska, 2015a, 44). By formal and non-formal adult education, an organized adult education model (university, institution, college, academy, summer school, etc), systematic, structured and administered according to a given set of laws and norms is meant (Ahrens & Zaščerinska, 2015a, 44). Thus, the institutionalized educational process is organized, systematized, structured and administered within formal and non-formal adult education according to a given set of laws and norms (Zaščerinska, Aļeksejeva, Aļeksejeva, Andreeva, Gloņina, & Zaščerinskis, 2015).

Hence, adult learning is inter-connected with the process of adult education politization, formalization and institutionalization shaped by the policy of adult education.

Methodology

The guiding question of the empirical study was as follows: What are national perspectives of Lithuania, Latvia and Poland on policy of adult learning?

The purpose of the present empirical study was to analyse the opinion of respondents from Lithuania, Latvia, Estonia and Poland on the policy of adult learning underpinning the formulation of recommendations on adult learning.

The empirical study was carried out at the EPALE organised a pan-European conference with the slogan "Growing together: fostering an inspiring adult learning community" in Budapest, Hungary, on the 15–16th October 2018. The adult learning event gathered over 230 national government representatives, EPALE members, European stakeholders and representatives from the European Commission. One of the aims of the event was to gather participants' views on how the European Agenda for Adult Learning and the EU programmes in this field could evolve after 2020. With that aim, National Support Service (NSS) representatives with their selected delegates were expected to work to prepare some thoughts and recommendations on the future of adult learning policy at the European level. That was an opportunity for the national perspective to feed into the conference. The national perspectives were presented in the poster's format and further on captured in the final conference report (EPALE conference 2018, 2018b). Countries had to prepare recommendations under such three key topics as policy issues, area of focus within adult learning, and lessons learnt within adult learning sector. Consequently, semi-structured interviews were carried. Semi-structured interviews are used when knowledge on the research field is obtained by the researcher (Kroplijs & Raščevka, 2004, 99). A semi-structured interview is open, allowing new ideas to be brought up during the interview as a result of what the interviewee says (Edwards & Holland, 2013). The interviewer in a semi-structured interview generally has a framework of themes to be explored (Edwards & Holland, 2013). The study was based on such a theme framework as policy issues, area of focus within adult learning, and lessons learnt within adult learning sector.

The method of interpretive analysis was applied (Cohen, Manion, & Morrison, 2007; Taylor & Medina, 2013). The researcher is the interpreter (Ahrens, Melnikova, & Zaščerinska, 2018).

The sample was composed of the participants of the EPALE organised a pan-European conference in Budapest, Hungary, on the 15–16th October 2018. The respondents were from Lithuania, Latvia, Estonia and Poland. The sample was composed on the principles of (Ahrens & Zaščerinska, 2015b) sample appropriateness, sufficiency, and confidence. The sample size was shaped by the external and internal factors (Ahrens & Zaščerinska, 2014). External factors included (Ahrens & Zaščerinska, 2014)

- access to the sample and
- resources such as time, personnel and its competences and experiences, technical support, and measurement procedures.

Internal factors comprised (Ahrens & Zaščerinska, 2014) researcher's

- aims of research,
- aims of generalisation (Mayring, 2007, 2) such as categorisation,

- research methodology,
- motivation,
- interest,
- skills, and
- experience.

The collected data were processed via summarizing content analysis (Mayring, 2004). Summarizing qualitative content analysis leads to phenomenon's categorization (Mayring, 2000). Categorization implies that ideas and/or objects are grouped into categories, usually for some specific purpose (Rothenberg, 2014).

Research results

1. Recommendations – three key recommendations on policy for adult learning.

One of the major recommendations both from Lithuania and Latvia was to deepen the understanding of the adult education policy on different levels.

In the opinion of Latvian colleagues, adult education policy is very disputed at the international and national level. The implementers of the policy are formally aware of it and do not always see possibilities for influencing the policy and ways to focus on the priorities in their work. Wider and more constructive discussions should be organised to provide for a higher level of understanding among all stakeholders.

As noted by Lithuanian team, adult education policy should not be designed in isolation from other important social, economic, etc. factors. It is important to ensure links with such important areas of society as medicine, economics, law enforcement, etc. These interfaces would stimulate the growth of people's social and economic well-being.

Moreover, adult education policy should respond both to the needs and goals of the entire society as well as of the individual adult. That means that an adult should be able to realize, by means of adult education, his or her individual needs (e. g. employment, career, citizenship, etc.). In this case, adult education becomes effective and creates added value for various social areas: social, economic, etc.

The respondents from Latvia highlighted the shift of learning theory focus from cognitive to holistic approach that requires a development of a new concept within adult learning (Babajeva, 2012, 456). An adult must be seen as a whole who learns by transforming experience into bodily feeling, soul emotions and ideas of mind (Babajeva, 2012, 456). This transformation of common expriences provides a large understanding on how to help an adult to gain new

competences and adjust oneself in this ever changing world (Babajeva, 2012, 456-457). Latvian team has also emphasized that there should be national guarantees for every EU citizen to have access to adult education in both the Labour Law and Law on Education.

Lithuanian team has stressed that adult education is characterized by great diversification. When designing an adult education policy, it is important to foresee strategies for the inclusion of different target groups, especially those difficult to achieve. In addition, it is important to create learning bases that will meet the needs of these target groups. It is necessary to pay more attention to the activation of the Third age persons.

Polish colleagues agreed with this idea and mentioned that employers and society in general need knowledge and skills for diversity (ethnic, race, religious, gender, age etc.) management among staff and within communities. We should cater for each individual person's ability to function in compliance with the basic values of democracy, such as equal rights, social inclusion, national and state identity etc.

Moreover, Lithuanian team pointed that the design of an adult education strategy should be based on coherent co-operation between politicians, theorists, practitioners, learners themselves, employers and other stakeholders. Such cooperation would result in the consistency and quality of this system.

To sum up, adult education, although implemented nationally, can no longer be understood as a policy concern which is delimited by the nation-state. Uncovering the reasons and mechanisms that sustain regional transnationalism in adult education constitutes a pre-requisite to broadening our understanding of what enables European citizens to engage in learning – or precludes them from doing so.

2. Areas of focus–three key areas that policy within adult learning should focus on.

Adult education has been conceptualised at the European level predominantly in terms of vocational training or training for the job. Accordingly, it has received growing attention in those divisions of the European Commission charged with employment and social inclusion.

According to Latvian colleagues, the major focus of the adult education policy should be on the coordination of the information available on the development trends of the labour market and demographic situation. It is very important to take into account the data to forecast the education demand trends and develop the range of education offers as well as to collect feedback on the implemented education programmes, courses, their usefulness and quality. Moreover, it is important to gather data on the performance of the persons who have acquired the qualifications in their respective sector.

Polish colleagues also stress that courses and trainings should reflect the actual needs present on the national and European labour markets. They should be regularly verified to check if the content offered is up to date. This also applies to appropriate, current competences and qualifications of the teaching staff.

Polish team emphasized that currently, too few companies understand their role in the adult education process beyond the employee training programmes. At the same time, there are discrepancies between the competences available on the labour market and the real needs of business companies. Technologies such as Virtual Reality (VR), Augmented Reality (AR) or mixed reality should be deployed. New methods are employed by the business and an atmosphere of elitism is being created, accompanied by entry barriers, despite the fact these are relatively simple to master without the need of considerable budgets.

When designing the reforms in the adult learning education system, a key thing is to invite stakeholders at each step: starting with the consultations concerning the systemic solutions (e.g. the qualification register functionality), up to consultations related to curricula for individual courses, trainings and qualifications.

The positive link between employment and learning is obvious: Learning workers and employees are important for innovation, productivity, competitiveness and entrepreneurship. Workplace learning is one of the key drivers for adults' participation in lifelong learning, and cooperation with all main stakeholders, especially the social partners, is essential.

To the mind of Lithuanian representatives, employers are one of the factors that can stimulate or discourage adult learning. They must realise that adult learning (and not just vocational) helps to promote productivity, competitiveness, creativity and entrepreneurship, which is an important factor in increasing the employability and mobility of workers in the labour market.

To sum up, in moving forward, adult learning and education must be built into a holistic, intersectoral approach. This requires working across sectors, guided by the urgent need for deeper partnerships. We must continue to inform all sectors of the essential importance of education for success across the board.

3. Lessons learnt- three lessons learnt i.e. what has and has not worked within the adult learning sector that should inform future policy.

As Polish colleagues mention, formal education services are already well defined. However, the number of methods and tools supporting informal development is growing. It makes sense to educate the market and recognise informal methods in the policies. Many adult Poles are unaware of the fact that non-formal activities can be included in the qualification frameworks.

Latvian team supports this idea, they stress that greater emphasis should be placed on the popularisation of options for recognising the effects of non-formal

and informal education. Promoting the employers' use of externally certified qualifications, potential benefits, details of learning effects that can be achieved, institutions that offer education, etc.

In the opinion of Lithuanian team, continuous education offer within one professional domain/sector would motivate employees and provide cooperation possibilities for educational institutions (vocational secondary school, college, university).

Moreover, Latvian team emphasized that there is a big demographic group aged 45+ (more than 40% of Latvian employees) who have acquired their higher or vocational education in 1980s-1990s. They have sufficient skills for the work they have been doing for many years with the same employer or in the same industry, however, upon losing that particular position, they are no longer competitive in the labour market due to the lack of the basic skills that correspond to the modern requirements: foreign languages, digital skills, business skills etc.

To sum up, a common challenge for adult education providers across Europe is raising awareness about the value of their field: making policymakers but also citizens more aware of what adult education is and what its benefits are; making the field better known and better supported.

As Latvian team stressed, the latest technology can effectively support adult education. ICT integration ensures the flexibility of adult education and provides more opportunities for learners to manage their learning. In addition, ICT helps significantly reduce the cost of adult education. It is important to design ICT integration strategies that promote the quality and efficiency of adult education.

Estonian partners stress that many governmental services and tools for civic participation are now available online. Digital skills ensure digital inclusion and participation. Additionally, the service industries will also see radical changes, which will also mean a reduction in human contact. The same is true for e-learning, which offers many possibilities but which also reduces the social aspect which is important for many learners.

To sum up, the level of digitalisation in our societies is rapidly increasing. Therefore, there can be no real inclusion without a functional level of digital competence. Learning to use mobile devices and digital tools can also make basic learning processes more flexible, adequate and efficient – provided teachers know how to use them! Adults can actually learn to read and write by using digital tools. Therefore, a focus should be placed on developing methodologies that make allowances for the high dynamics in the area of available technologies, use of mobile applications and social services.

Conclusions

The theoretical analysis of scientific literature allows concluding that adult learning is inter-connected with the process of adult education politization, formalization and institutionalization shaped by the policy of adult education. Adult education, although implemented nationally, can no longer be understood as a policy concern which is delimited by the nation-state. Uncovering the reasons and mechanisms that sustain regional transnationalism in adult education constitutes a pre-requisite to broadening our understanding of what enables European citizens to engage in learning – or precludes them from doing so.

The findings of the empirical study allow drawing such conclusions as

- In moving forward, adult learning and education must be built into a holistic, intersectoral approach. This requires working across sectors, guided by the urgent need for deeper partnerships.
- A common challenge for adult education providers across Europe is raising awareness about the value of their field: making policymakers but also citizens more aware of what adult education is and what its benefits are; making the field better known and better supported.
- The level of digitalisation in our societies is rapidly increasing. Therefore, there can be no real inclusion without a functional level of digital competence. Learning to use mobile devices and digital tools can also make basic learning processes more flexible, adequate and efficient – provided teachers know how to use them! Therefore, a focus should be placed on developing methodologies that make allowances for the high dynamics in the area of available technologies, use of mobile applications and social services.

The present research has limitations. The inter-connections between policy of adult education and adult learning's politization, formalization and institutionalization have been set. Another limitation is the empirical study conducted by involving only the participants of one EPALE conference. Therein, the results of the empirical study cannot be representative for the whole area.

Involvement of respondents from more European countries is proposed. A comparative research of more different European countries on policy of adult education could be of a high value, too. Further research tends to focus on analysis of implementation of inter-sectoral approach in adult education.

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ORGANIZATION OF STUDENT-CENTERED TRAINING IN THE SYSTEM OF ADDITIONAL EDUCATION OF ADULTS

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Abstract. *The article presents one of the modern trends in the development of the education system - the organization of student-centered training. Extrapolation of this type of training into the system of additional education of adults will allow to prepare a specialist with modern thinking, focused on innovation, continuous self-development. The purpose of the research is to explore the possibilities of implementing student-centered training tools into the practice of realization retraining programs for educational specialists. Research methods: a theoretical analysis of the essence of the concept of "student-centered training", analysis of the characteristics of adult education, experimental work on testing methods of student-centered training in the system of additional education of adults. The main results of the research: methods of student-centered training of adults have been adapted to the specifics of organizing retraining programs, conditions for organizing student-centered training in institutions of additional education of adults have been identified, methodical recommendations have been developed. The use of these recommendations will optimize the implementation of retraining programs for education specialists.*
Keywords: *active training methods, educational process, project training, retraining program for education specialists, student-centered training, system of additional education of adults*

Introduction

The modern period of reforming and modernizing of the educational system has necessitated the penetration into the theory and practice of additional education of adults of new conceptual ideas and approaches, one of which is student-centered training. This led to a change in the requirements for the training of specialists who are able to adapt successfully and define themselves in their future professional activity. Radical changes in working conditions, the emergence of new areas of activity contributed to the development of institutions of the system of additional education of adults, including the training of teachers.

In "The Code of the Republic of Belarus on Education" additional education of adults is considered as a type of additional education aimed at the professional development of the adult learner, trainee and the satisfaction of their cognitive needs (Кодекс Республики Беларусь об образовании, 2012).

Retraining, advanced training and internship programs are implemented in the system of additional education of adults. This article will deal with the training of teachers in the system of additional education of adults, which is carried out by retraining programs for managers and specialists with higher education.

The effectuation of teacher training in the system of additional education of adults in line with the ideas of student-centered training allows not only to adapt the educational environment to the individual characteristics, needs and interests of students. But it also lets to ensure freedom of choice and variability of education, to form the desire of self-education and development of skills of independent work, as well as contains many applications related to solving problems of personal development. Extrapolation of student-centered training into the system of additional education of adults will allow to prepare a specialist with modern thinking, focused on innovation and continuous self-development.

*The purpose of the research i*s to explore the possibilities of implementing student-centered training tools into the practice of realization retraining programs for education specialists.

Research methods: a theoretical analysis of the essence of the concept of "student-centered training", analysis of the characteristics of adult education, experimental work on testing methods of student-centered training in the system of additional education of adults.

Literature review

The ideas of student-centered training are not new in the theory and practice of education. Currently, this type of education is one of the priorities for the European Higher Education Area for the next decade.

Among the specific characteristics of student-centered training are:

- emphasis on active rather than passive learning;
- emphasis on critical and analytical study and understanding;
- increasing the responsibility and accountability of students;
- increased students' autonomy;
- interdependence between a teacher and students;
- mutual respect in relations between students and a teacher;
- a reflexive approach to the learning process by both the teacher and students (Аттард, Ди Иорио, Гевен, & Санта, 2017).

The basis of student-centered training is constructivism as a theory, involving the construction and reconstruction of knowledge for effective learning. In this case, the training is more effective when, within the framework of a certain activity, the learner creates a meaningful product. Thus, "student-centered training is both a way of thinking and culture within a particular higher

education institution and an approach to learning, which is generally related to the theory of studying based on constructivism. This training is characterized by innovative teaching methods aimed at promoting learning based on the cooperation of teachers and students, the active role of students in controlling their own learning process and the development of personal skills such as problem solving, critical and reflexive thinking" (Аттард et al., 2017).

In the course of monitoring the Bologna process, V. Baidenko et al. defined the concept of student-centered training in the light of the competency approach as "the fundamental principle of Bologna reforms in higher education, implying a shift in emphasis in the educational process from teaching (as the main role of the teaching staff in the "translation" of knowledge) to study as an active educational activity of the student" (Байденко, Селезнева, Ворожейкина, Карачарова, & Тарасюк, 2009). The organization of student-centered training in practice of institutions of additional education of adults will have its own specifics.

The training of teachers in the system of additional education of adults as a process is a well-structured system of interrelated components: goals, content, methods, means and organizational forms of training, upbringing, results. The effectiveness of this process depends on the involving of adult learners in an active, significant for them learning activities. Through the organization of educational activities, they assign social and professional experience, develop mental functions and abilities and form a system of relations to the world and to themselves. Being carried out in the educational environment of the institution of additional education of adults, the training of teachers acts as a combination of various factors of the educational process and interpersonal relations that the subjects of education establish in the process of their interaction (Невдах, 2015). The structural components of the educational environment are used by its subjects for the development of professional activities, business communication and creativity in the course of polysubject interaction, which ensures the successful professional and personal development of future specialists.

The specifics of the organization of training in the system of additional education of adults are presented in the works of many researchers (Василькова, 2009; Змеёв, 2002; Колесникова, Марон, & Тонконогая, 2003). In the process of training teachers in this system adult learners should be provided with the help in:

- adapting to the conditions of training (group of adult learners, content, ways of working with information);
- making of intersubject interaction situations;
- creating conditions for a positive attitude and understanding of the prospects for professional and personal growth, etc.

Adult learners must be provided with the opportunity for self-actualization through the presentation of their positive experience, for mastering the competencies necessary for the implementation of the upcoming activities, for outlining the prospects for further progress in the professional sphere. In this regard, the adaptation of student-centered training tools for use in the process of implementing educational retraining programs for teachers will be of particular importance.

Methodology

Experimental work on testing methods of student-centered training in the system of additional education of adults was carried out at the Institute of advanced training and retraining of the Maxim Tank Belarusian State Pedagogical University (Minsk, The Republic of Belarus).

The experimental work was conducted with 72 adult learners (teachers, who decided to receive additional qualification), who were retraining in the following specialties: "Integrated education and training in school education", "Integrated training and education in preschool education" and "Speech therapy" from 2016 to 2018. The use of student-centered training tools was carried out in the process of conducting classes in the discipline "Pedagogical systems and technologies". The results confirming the effectiveness of the applied methods of training were obtained in the course of observing the work of adult learners in the classroom, analyzing the products of their activity, questioning, and polling.

Research results

The content of teacher training in the system of additional education of adults is determined by the logic of a particular science and the model of future professional activity. It is projected not as an academic subject, but as an object of educational activity, consistently transformed into an object of professional activity (Вербицкий, 1991). Training of adult learners should be organized using methods that stimulate their cognitive activity, involving each participant in mental and behavioral activity.

In the course of training teachers with adapted tools of student-centered training in the educational process, we can consider the practice of modeling, designing, using active and interactive forms of working with adult learners, conducting thematic discussions, training with "immersion", organized on the basis of new types of special institutions, training and introducing them elements in practical classes, scientific problem groups. Being a participant in the educational process, the adult learner acts as both an object and a subject of

pedagogical activity, which allows him to expand the scope of his actions in solving professional problems.

Special attention should be paid to the combined nature of conducting classes, where methods of lecture presentation and practical tasks are combined at the same time. Since the training of teachers in the system of additional education of adults is carried out in a relatively short period of time, the educational process should be more practically oriented. Increasing the number of practical and laboratory classes, gradual monitoring of the course of training in each class for timely correction of teaching, activization of adult learners' activities by introducing active teaching methods, problem and game situations, individualization of training and mutual learning, business games, rational organization of independent work will allow adult learners to form professional competencies necessary to perform the future teaching activities.

One of the ways to implement student-centered training in the process of training teachers is the use of adapted technology of educational design.

This technology ensures the inclusion of adult learners in project activities, the transfer of knowledge into the sphere of professional activity, development of the consciousness of the future specialist and influences his sense of purpose and life strategy. According to L. Orlova (Орлова, 2002), project activities are one of the most effective ways of organizing education based on the psychology of human relationships and interactions.

In the course of educational design conditions are created and adult learners independently and willingly find missing knowledge in various sources, learn to use acquired knowledge for solving educational and practical tasks related to the upcoming professional activity. These conditions also improve communication skills by working in different groups, develop research skills and system thinking.

The learning process in the context of the technology supposes the creation of a project. The choice of subjects of educational projects in different situations may be different. In some cases, the subject can be formulated by a teacher taking into account the learning situation according to his discipline, professional interests, interests and abilities of adult learners. In other cases, the subjects of projects can be offered by the adult learners, who are guided by their own cognitive, creative and applied interests.

During the classes in the subject "Pedagogical systems and technologies" the themes of the projects were proposed by the teacher and reflected the specifics of the upcoming professional activity of teachers in special education institutions for children with peculiar psychophysical development. The work of adult learners to create a project included preparatory, informational, constructive, generalizing and evaluative-reflexive stages.

At the preparatory stage adult learners concentrated on cognitive and research activity, the actualization of the problem to be solved and the organization of creative teams to work on the project.

Adult learners independently united in groups of 3-4 people. Each participant of the design was to contribute to the preparation of the project. Teamwork on a project becomes attractive only when a positive interdependence of project participants is created and constructive interaction is organized.

The informational stage assumed the planning of work on a project, the search and collection of information, its analysis. For the implementation of educational projects in the classroom adult learners could use both the available knowledge and experience on the problem being solved and the knowledge gained in the process of studying special disciplines. During the implementation of this stage the tasks of developing intellectual skills are solved, for example, to select relevant information from various sources, analyze, systematize and summarize it in accordance with the cognitive task, formulate reasoned conclusions, etc.

The constructive stage assumed the study of the problem, the creative, search activity of the adult learners, which is embodied in any product. Focusing on research requires a well-thought-out structure, selection of appropriate methods, organization of the research procedure and the availability of research skills of adult learners.

In the process of creating projects adult learners had the opportunity to conduct a micro research in a group, summarize and analyze the results, present them in a visual form. To save time, separate fragments of the task were distributed among the group members. In this case, it is very important that each participant contributes into creation of a common project.

The content of the generalization stage was the integration of theoretical and practical data, their correlation with the assigned tasks of the project. The adult learners made a conclusion on the possibilities of applying the obtained results in modern conditions and defined new problems for subsequent projects.

A mandatory component of the technology of educational design is the presentation of projects. The collected materials and the obtained results were presented to the jury at the final stage of the lesson and evaluated according to relevant criteria.

Further, within the framework of the assessment-reflexive stage, the analysis and assessment of the results of work on the project were carried out. This stage included the group reflection of the project authors, self-analysis of the process and the result of their activities, analysis and assessment of the project quality by other adult learners, the teacher.

For the successful implementation of educational design technology we needed:

- the presence of a problem that is significant in a research, creative plan, which requires integrated knowledge, research for its solution;
- practical, theoretical, cognitive significance of the intended results;
- independent (individual, in pairs, in groups) activities of adult learners;
- structuring the substantive part of the project (with indication of step-by-step results);
- use of research methods.

It should be also born in mind that adult learners' opinions on any issue may differ, you should not insist on one version. Everyone has the right to their point of view if he's able to reason it.

The implementation of the technology of educational design significantly changes the role of the teacher in the educational process of the institution of additional education of adults. The main tasks of his activities are to organize the project activities of adult learners, advising and providing support at all stages of project preparation, coordinating the entire process of working on a project, providing feedback, organizing project presentation and reflection.

The use of the technology of educational design in the practice of the institutions of the system of additional education of adults will contribute to the improvement of intellectual, research, communication and organizational skills of adult learners; the formation of socially important professional, cognitive and personal motives of educational activity; formation of their active life position.

The effectiveness of the use of student-centered training tools was carried out in the process of monitoring the cognitive activity of adult learners during the classes and in the course of their questioning and survey. The indicators showing the results of the educational process were:

- learning satisfaction;
- satisfaction with the form of training;
- satisfaction with the quality of teaching;
- level of formation of knowledge and skills (identified in the process of observation, reflection);
- quality of completed assignments;
- the need to study the scientific literature, the experience of colleagues;
- the possibility of extrapolating the gained experience into practice.

After the training classes adult learners were offered a questionnaire, including the following questions: Are you satisfied with the learning process? What is the use of active methods and technologies? What forms of work do you consider to be the most effective in conducting classes? What difficulties did you have during the assignments? How did you compensate for the missing knowledge and skills? and others.

Analysis of the results of experimental work on testing methods of student-centered training in the system of additional education of adults showed that 100% of adult learners were satisfied with the learning process. In the questionnaires it was noted that the form of conducting classes using active methods and technology of educational design allowed them to take a fresh look at practical activities. The exchange of experience with colleagues would improve the organization of work with children with peculiar psychophysical development. 86% of respondents indicated that it was the independent work with the literature on finding the necessary information that contributed to a better understanding of the material, its systematization and generalization. The answers of the adult learners in the classroom were distinguished by the proper use of appropriate terminology and the ability to back up theoretical positions with practical examples.

Due to the fact that adult learners had different levels of formation of mental operations (analysis, synthesis, generalization, abstraction, etc.), some of them experienced difficulties in selecting the necessary information (12%), formulating conclusions (17%). Lack of good communication skills, the fear of speaking in front of the group with the project presentation (23%) allowed the audience to choose the directions of self-improvement.

The use of adapted tools of student-centered training in the educational process also contributed to team building, shaping adult learners' socially significant qualities, mutual support, empathy, awareness of the prospects for professional and personal growth, the possibility of self-expression and self-affirmation among adult learners through the presentation of their positive experience.

The success of the organization of student-centered training in institutions of additional education of adults depends on the following conditions:

- context (presentation of tasks in relation to a specific context (contexts) of professional pedagogical activity, operating with interdisciplinary knowledge, reflecting a wide range of sciences);
- taking into account the needs of subjects of the educational process (value-semantic coordination of the positions and actions of all interested participants of the educational process, taking into account the cognitive interests and needs of different specialists, different groups of adult learners);
- activity of participants in the educational process (voluntary involvement of adult learners in the performance of independent work).

As a result of the experimental work, methodical recommendations were developed, the use of which will allow to optimize the implementation of retraining programs for educational specialists.

In the educational process it is necessary to ensure adult learners to experience their own success in the activity. At the initial stages, it is recommended to offer feasible tasks, creating a situation of success, so that the adult learner becomes more and more confident, does not experience anxiety and internal stress. In the case of constant failures, even if they are caused by objective circumstances, a person may even be disappointed with his abilities to achieve the desired goals, to control the results of his behavior.

For adult learners the example of other people is important. Observing how people act in difficult situations, changes the person's judgment about his own capabilities, helps him to acquire useful skills, creates the basis for discovering the self-fulfilling potential of an individual, reflecting the degree of satisfaction or dissatisfaction with himself expressed in critical evaluations of his own activities.

Social conviction is no less valuable. When people (teachers, colleagues) significant for the adult learner highly appreciate his abilities and assure him that he is able to overcome difficulties, the degree of self-realization increases ensuring qualitative personality changes.

A major role in the process of retraining teachers is played by internal and external motivation. In different periods of a person's life the motivation for education changes, but in general, an adult learner is always capable of developing appropriate individual ways of optimal working with information. Understanding the need to continue (build up) his education is usually connected with the lack of the required level of education in the new situation. Every day of his education opens something new, enriches ideas and notions about reality and creates the basis for new motivations in mastering knowledge and skills necessary for the upcoming activities. For these people additional adult education is becoming one of the ways of self-realization in the profession and life.

Conclusions

Thus, the implementation of student-centered training methods adapted to the specifics of organizing retraining programs allows engaging adult learners in active independent work, helping them to master modern methods of searching, processing and using information, to master some methods of creative activity, to develop the ability to defend their point of view and to exercise reflection. Compliance with the presented conditions for the organization of student-centered training in institutions of additional education of adults, the use of methodical recommendations will optimize the implementation of retraining programs for educational specialists, ensure the variability and integrity of the academic process, apply adequate teaching methods and technologies for the

development of professional competencies and personality-relevant qualities of adult learners.

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TRANSFERRING STUDY PROCESS INTO VIRTUAL ENVIRONMENT: WHY IS IT NEEDED?

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Abstract. *The paper presents a comparative analysis of the opinion regarding the advantages and disadvantages of virtual environment Moodle among lecturers and students in 2015 and in 2018 and correlations with increased use of Virtual Learning Environment (VLE) to improved study outcomes. The study has revealed that virtual learning environments are beneficial for the study process as they create new learning opportunities, increase access to learning material and allow time and space flexibility. The purpose of this study is to examine the use of Moodle in a college type higher education institution in 2018 and compare the results of the survey to those obtained in a similar survey in 2015 in the same college, as well as relating the change in the use of Moodle to the change in the study outcomes. The interviewees were the lecturers and students who answered questions related to the use of Moodle. The implemented learning environment includes 14 feature creation functions and 7 resources. The evaluation results indicate that Moodle is commonly used to deliver course content, develop a course plan, evaluate, create activities, and communicate with course participants. Among many functions offered by Moodle only some of them are considered to be very important and commonly used, such as tasks, reviews, tests and workshops.*
Keywords: e – Learning, Learning Analytics, Moodle, Virtual Learning Environment.

Introduction

E-learning and teaching is gaining momentum in the academy, which inevitably leads to the use of all kinds of information, computer, telecommunication technologies and electronic multimedia for educational purposes. An increasing number of educational institutions use virtual environments to create the best possible conditions for students.

The intensifying trend to use virtual learning environments in the study process is due to the fact that neither lecturers nor students are limited to being in one place, in other words, it is a more convenient way to study regardless of time and place. In addition, virtual learning environments are not hardware-dependent. The only requirement is to have an Internet connection, and the operating system used is completely irrelevant. Virtual learning environments

are installed in many universities and schools. Among many VLE one of the most popular is the *Moodle* environment.

Majority Lithuanian universities and colleges have opted for partially distance teaching methods due to the growing demands of contemporary students, a large number of whom cannot attend classes on daily basis, as they live and work abroad, study at several institutions at the same time, have a job and do not want to drop out of the working community, etc.

Although various virtual learning environments, especially Moodle, have been analyzed extensively, the scholars mainly focused on the use of various VLE functions at a given time, and not a lot of studies looked into the change of VLE use over the period of time at the same institution.

The purpose of this study was twofold. First, the research aimed to find out the students and lecturers' present perceptions about the use of *Moodle* environmental elements, and compare the results of the study with those obtained three years ago in the same study. For this purpose, the methods of questionnaire survey and comparative analysis of the received data were used. Second, the research touched upon the application of Learning Analytics to *Moodle* system data. For practical Learning Analytics, the database stored in the *Moodle* system was used, as well as statistics of students' performance during autumn semester in both 2015 and 2018.

The first quantitative research was carried out in 2015 and 116 questionnaires were filled in. Ninety full-time students (86% of the second year, 14% of the first and third) and twenty six lecturers from one higher education institution took part in the survey. The second survey was conducted in 2018, and this time 173 respondents from the same college completed questionnaires. 144 full-time students (31% of the second year, 48% of the first and 20% of the third year) and 29 lecturers participated in the study.

Questionnaires, which consisted of 15 questions, were submitted to the students and teaching staff of the college. The questions were of both types, closed and open, which allowed for more detailed answers and information that is more reliable. Most questions for lecturers and students were the same, and only a few differed slightly as they were aimed at the specific target group. For example, the question for students "Have you had to write a test or exam in the *Moodle* system?" was formulated in a slightly different way when referring to the lecturers: "Have you ever submitted a test or exam assignment in the *Moodle* system?"

Having compared the results of the two surveys, the paper also presents the information on study results in 2015 and in 2018, as well as compares the data on the frequency and scope of using *Moodle* during both years. The analysis of *Moodle* usage via log data allows to better understand students' learning patterns and even predict their possible learning achievement (Yu & Jo, 2014).

Literature Review

E-learning and teaching is an advanced form of study organization that facilitates independent learning activities and satisfies learners' needs (Bourne, 2005). It has been known for some time that an interactive knowledge assessment using computer technology is also a very successful practice (Hewson, 2012). According to Zoran Milevski and Zoran Zdavev (2013), the goal of the virtual learning environment is to provide effective learning methods, allow users to obtain the necessary learning resources at any time convenient for them, to solve emerging problems, to evaluate work done, and so on.

In many cases, the use of virtual learning environment is utilized as supplementary part of otherwise traditional learning process, when study process, organized in a brick and mortar way, is combined with the use of various electronic multimedia. For example, Bucharest Polytechnic University has just started to use the *Moodle* environment, the use of which is not yet mandatory. However, it is noted that the use of a virtual learning environment contributes to a more effective communication and learning process for students and lecturers (Oproiu, 2014).

Possibility to retrieve information that is received in real time is also among many benefits of Learning Analytics. Since a lot of academic interaction take place online, students inevitably leave a wide footmark of their activities, which can later be analyzed as an important data in order to improve the study process. Thus, the rocketing popularity of virtual learning environments in the study process has triggered the need for more sophisticated methods of evaluating the effectiveness of learning management systems (LMS) that is non-intrusive and requires no instructors' intervention. New analytical methodologies, particularly Learning Analytics, have made fulfilling this requirement possible. Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs (Siemens & Baker, 2012). Possibility to retrieve information that is received in real time is another benefit of Learning Analytics.

Thus, Learning Analytics has been an increasingly important area of research for quite a while. Information is stored in student databases and is later analyzed in order to understand and improve the student's learning process's performance. Its aim is to better understand how students learn and to determine the parameters under which they are learning and to improve their educational outcomes, gain insights into and explain educational phenomena (Romero & Ventura, 2013a). Larusson & White (2014) analyzed the latest theories, findings, strategies, tools and case studies, and focused on such issues as enhancement of student performance, improvement of student understanding of course material,

identification and support of struggling learners, achievement of accuracy in grading and more efficient use of resources at the institutional level.

There is a recent increase in the use of educational software. Accordingly, the amount of data on students' learning in databases is also increasing. This educational information is used to improve understanding of learners and the learning process and to develop methodologies to improve this process. The production of educational data is a growing field of research involving representatives from various fields around the world. A great deal of effort has been made in this area and a number of articles have been published on the subject of the production of educational data (Campagni et al., 2015).

Typically, learning institutions define learning programs by laying their own regulations on how students should participate in the learning process. Given current practice, students have a high degree of freedom of choice, so it is important to help them choose courses appropriately, discover training models and improve programs based on student feedback. This is an important educational challenge that Sunita B. Aher (2014) is studying. In fact, studies have shown that there is a correlation between LMS usage with students' performance (Filippidi et al., 2010; Jo et al., 2014; Macfadyen & Dawson, 2010; Whitmer, 2012).

Results and Discussion

This study describes experience of integrating *Moodle* to support study process at a College that provides higher professional education. The paper assessed students' and lecturers' feedback on the *Moodle* site usage patterns, compared it to the results obtained in a similar study three years ago, and touched upon students' academic performance in the light of the trend to use *Moodle*.

One of the first questions, which lecturers and students, the target groups of this research, were presented, was what type of lectures they would choose given a choice. The diagram (Fig.1) shows that the students' opinion in 2018 is similar to the one in 2015, while lecturers' preference of the combination of virtual and traditional lectures has grown by fifteen percent in three years (54% in 2015, 69% in 2018). No lecturer, however, has opted for virtual lectures and only students would like to study in a virtual environment only.
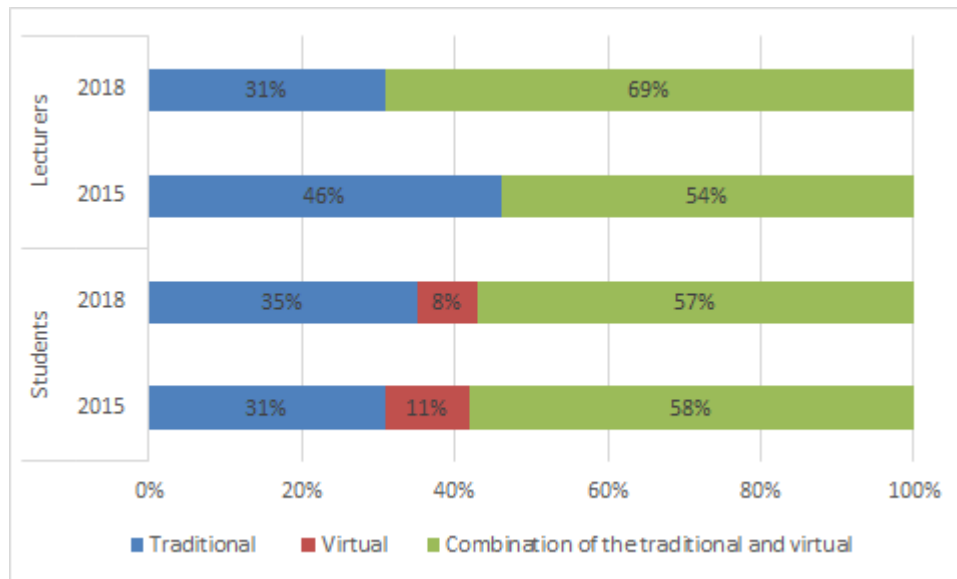
Figure 1 ***Choice of lecture types for VLE***

The question of whether the *Moodle* system is useful in the study process (Fig.2), students answered positively and, compared with 2015, as many as 98% believe it to be beneficial. Meanwhile, a survey of lecturers shows that although there were no and there are no lecturers who believe that a virtual environment brings no benefits to the study process, in 2015 as many as 32% did not have an opinion on the subject. Although the survey in 2018 shows that number has shrunk by 25%, there are still a few of those who admit not using the system.
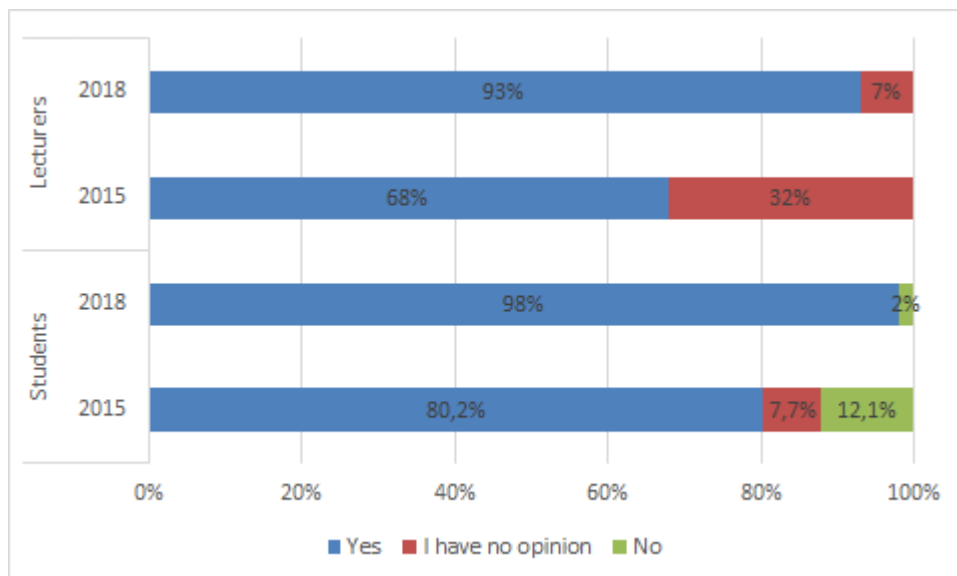
Figure 2 ***Moodle usefulness***

Both target groups positively answered the question whether they were taught how to use the *Moodle* system. However, the question about "friendliness" of *Moodle's* environment received very different reaction from lecturers and students. More than two thirds of the students in both surveys said that they found the system easy to use, while the lecturers' opinion was completely different in terms of the years - in 2015 as many as 76.9% of them felt that it was difficult to use this environment, however, now only 24.1% of them think so.

Moodle offers a wide variety of different tools to facilitate a study process. The most frequently mentioned tool among both students (2015 – 66%, 2018 – 92%) and lecturers (2015 – 75%, 2018 – 93%) appeared to be file sharing, and in both groups the use of the tool has increased by about 25%. Another popular element was the sending of tasks to the *Moodle* system, and the use of this function almost doubled in both groups (36% in 2015 and 69% in 2018 – students; 48% in 2015 and 71% in 2018 - lecturers). Other *Moodle* elements appeared to be rarely used by respondents, they admitted using only the calendar (6% in 2015, 7% in 2018 among students and 17% in 2015, 9% in 2018 among lecturers), private messages (in 2015 - 2%, in 2018 - 8% among students and in 2015 -3%, in 2018 - 5% among lecturers, the forums are enjoyed by neither students nor lecturers. These results imply that that the more interactive communication *Moodle* elements require, the less likely they are used because they are usually replaced by other communication tools (e-mail, facebook, etc.).

Positive students' reaction towards taking a test or an exam in *Moodle* tripled in three years (26% in 2015, 89% in 2018). Only student group received a question if they liked the experience of being assessed online, and vast majority of them (93%) were satisfied with this opportunity. Likewise, a survey of lecturers revealed that similar attitude is shared by lecturers, as the number of those lecturers who did not create any control or exam assessment tasks in the *Moodle* environment has shrunk five times in the last three years, from 84.6% in 2015 to 16% in 2018. Such finding suggests that some lecturers still avoid making evaluative tasks in the online environment. The most common concerns among lecturers appeared to be high cost of time, difficulty in developing tests, because these activities require computer knowledge and skills; difficulty to interpret the answers to open questions.

When asked about the outstanding benefits that *Moodle* provides, the respondents usually name ability to study at a convenient time, at the right pace and in a convenient place as the greatest advantage of *Moodle*, which means that the students are interested in the issue of employment and the possibility to combine studies and work (Kyburiene & Juodeika, 2015). Table 1 presents a list of the benefits that were considered by the students of the college. The respondents also named other advantages of the *Moodle* system: accessibility

and clarity of the information, pilot testing, user friendliness of the environment, the view that interactive evaluation is more objective than traditional, etc.

Table 1 **Advantages of Virtual Learning Environment (student opinion)**

Advantages	2015	2018
Innovative learning method	53%	33%
Ability to study at a convenient time in a convenient place	56%	94%
Opportunity to save time	37%	73%
Information accessibility and clarity	42%	68%
Pilot tests	12%	64%
Interactive assessment is more objective	45%	89%

Lecturers distinguished other advantages of *Moodle's* environment than students. Among the benefits of using *Moodle* in education (Table 2), lecturers highlight the easier accessibility to students attending courses without the need for further search for other means of communication (e.g. email). It is enough to place courses, workshops or literature on the environment, and students can access it. In addition, lecturers appreciate the opportunity to see student data and evaluate them in the environment. Lecturers also name opportunity to add information, clarify it; there is no possibility to forget students or for a student to claim that the lecturer did not provide some information. It is convenient for the lecturer because the study material can be adjusted at any time, supplemented by new information, new sources of information, while it is not possible through traditional printed textbooks. Lecturers, like students, say that one of *Moodle's* environmental benefits is its reliability. When placed into the environment, a student's work will not disappear. In addition, the tutor can also write an assessment and comment, which will only be seen by the student - the author of the work.

Table 2 **Advantages of Virtual Learning Environment (lecturer opinion)**

Advantages	2015	2018
Innovative teaching method	61%	37%
Easy to reach students	43%	49%
Visibility of student data	37%	88%
Possibility to adjust data	51%	79%
Study process monitoring	56%	91%
Convenient assessment	33%	67%
Possibility to change design	21%	43%

In a virtual learning environment, it is much easier for a lecturer to manage the process of independent learning compared to when the traditional teaching takes place and the student activity becomes invisible when leaving the audience. The tutor can track all student actions on *Moodle*, the frequency of the connections, timely provision or activation. In addition, the *Moodle* interface (design) can be modified by adapting it to the specifics of the subject. It activates students, acts as a preventive measure for monotony (Caliskan & Bicen, 2016).

The survey also addressed drawbacks of *Moodle* environment. (Fig.3). The survey revealed that apart from the drawbacks mentioned in the chart, students also miss some lecture material, since not all studying material is available in the *Moodle* environment, studying independently on *Moodle* requires a lot of stamina and self-motivation, students also claim that due to technical limitations and frequent requirement for a password using *Moodle* sometimes isn't very convenient.
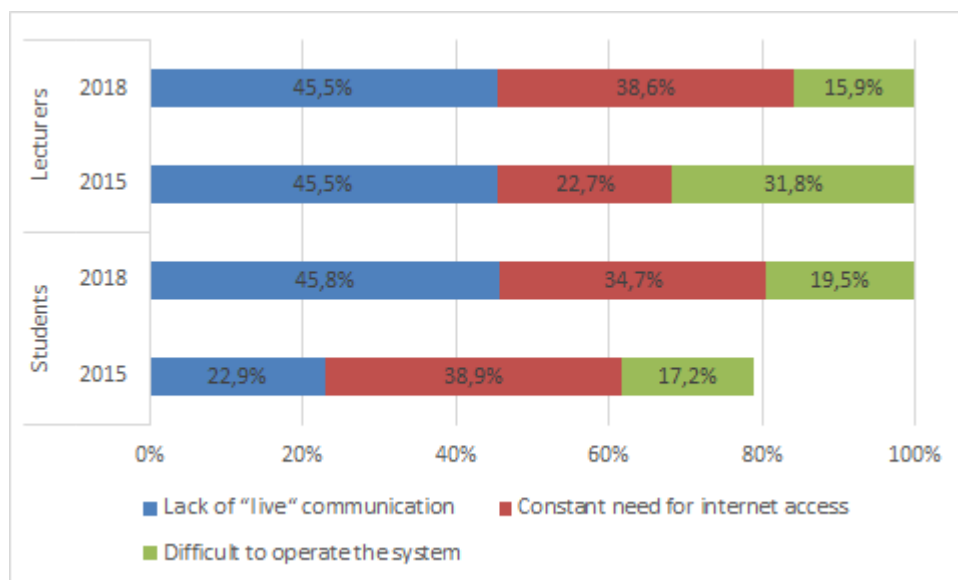
Figure 3 **Drawbacks of Moodle**

Part of the lecturers expressed concerns that students may stop attending the lectures if all the material is placed in the *Moodle* environment, by claiming that they can find all the necessary material on *Moodle*, so there is no need for students to sit in lectures, write, listen, etc.

The opinion of students about the quality of theoretical material provided by lecturers has improved significantly in three years. In 2015, a bit less than half (47.3%) of the students evaluated the information provided on *Moodle* system positively, almost the same number (42.9%) - rated partly positively, and nearly one tenth (9.9%) of respondents were not satisfied with the quality of

material available on *Moodle*. In contrast, positive evaluation of the material increased by thirty percent in 2018 (77.5%), only 16.8% of respondents rated it partially positively, and the number of those dissatisfied shrank almost twice (5.7%). Lecturers, however, were much more critical when asked to evaluate their methodological material. In 2015, none of the respondents evaluated their material as complete, almost half of them admitted that the material is incomplete, almost half (45%) respondents admitted their material was placed chaotically, quarter (25%) of the lecturers failed to include video and/or sound, almost a third (30%) of them thought that the material they provided on *Moodle* was still lacking self-control tasks and pilot tests). The situation in this year's survey is much better: 36% of teaching respondents think that the methodological material is fully and properly prepared, 51% who still admit that it is incomplete and lack of video and sound, 13% answered that there is a lack of self-monitoring and control tasks.

The question if the *Moodle* was useful for the study process received surprisingly similar answers from the students in both surveys. Almost all students responded positively (about 90%) to the question about the usefulness of the methodological material provided by their lecturers in the system. However, among the lecturers the utility of the *Moodle* system was judged much worse. Although the number of respondents who consider *Moodle* to be a beneficial part of the study process increased by almost ten percent (38.5% in 2018 compared to 46.2% in 2018), it still means that *Moodle* is used by less than a half lecturers in their teaching process.

After comparing the results of surveys carried out in 2015 and 2018, the study also looked at the learning results of students. The research did not aim at analyzing the log files or specific groups of students that exported them, neither it focused on the types of actions possible in *Moodle*. Rather, it was important to look at the use of Moodle via quantitative data collected in the autumn semesters of 2015 and of 2018 and relate it to the learning outcomes (Table 3).

Table 3 **Correlation between log-ins and average students' score**

	2015	**2018**
Total login count in autumn semester	14503	44359
Time spent in Moodle in autumn semester	21381	147514
Average score of students	6,8	8,1

The results presented in the Table 3 imply that there is a correlation between *Moodle* use and students' performance. The number of students' logins increased more than three times, and the time they spent in the VLE sky-rocketed seven times. At the same time, the average learning score of students also improved by 1.3 point. Of course, such a change in numbers might be a

result of complex reasons, e.g. the use of the *Moodle* platform may be gaining momentum due to the increasing number of working students who cannot participate in every traditionally organized lecture. However, the use of *Moodle* system as an e-learning tool cannot be discarded, as the results of the students improved simultaneously with the growing applicability of the VLE.

Conclusions

The evidence of this study suggests that the integration of the *Moodle* platform into teaching clearly provided many advantages and benefits. The use of *Moodle's* virtual learning environment is gaining momentum every year. This VLE is user friendly, has many interactive features that could enhance the students' learning experience, and allows more flexibility in teaching, lets students to decide where and when they want to engage in learning. The structure of the courses, learning resources and other important elements can be chosen by the compiler according to their needs. The introduction of *Moodle* has also improved student performance, suggesting that it had a positive impact on student learning outcomes. However, the feedback from the students and lecturers indicates that despite being strongly supportive of *Moodle* usage as an adjunct to the traditional style of teaching, they were largely apprehensive of its potential as a substitute to face-to-face teaching. It means, that the use of VLE is indispensable part of study process, but it shouldn't replace a brick-and mortar classroom.

Transferring study process into virtual environment in the future will permit collection of students data which, in turn, can further be used for analyzing their behavioral and cognition processes, as well as allow the creation of personalized learning scenarios for each identified student group according to their needs and peculiarities of information acquisition.

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FOREST ENGINEERING STUDENTS COMPETENCE DEVELOPMENT IN ADULT EDUCATION

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Abstract. *Forest engineering students need to develop their competence in order to ensure a sustainable working environment in the relevant sector of economy. The aim of the study was to clarify the dynamics of the development of the students' competence in the learning process. The methodological basis of the study included the analyses of the relevant publications in the context of competence and adult education. The authors' personal reflections and work experience at the Forest Faculty of Latvia University of Life Sciences and Technologies were taken into consideration. To assess the development of students' competence in the forest engineering studies a survey was carried out. Within the framework of the study and as the result of improved adult studies, there was a significant improvement of students` competence in the field of forest engineering. The self-assessment of competence at the end of the course was higher than at the beginning of it.*
Keywords: *adult education, competence, forest engineering students.*

Introduction

Forest engineering students need to develop their competence to be able to provide a sustainable working environment in their respective sector of the economy. The research was carried out at the Forest Faculty, within the framework of the Labour protection study programme that has resulted in the development of labour protection specialists' competence model (Brizga, 2018). The model has been approbated in the study programme course of the senior labour protection specialist and it has been stated that this model can be adapted in the study process of other programmes.

In order to clarify the possibilities of using this model in the study course *Utilization of Forest Resources,* a pilot research case study was carried out within this course.

The main questions of the case study were the following:

1. Did the competence increase as a result of improving and acquiring the study course *Utilization of Forest Resources* according to the aforementioned model.

2. What level of knowledge and skills has been achieved as a result of the completion of the study course?

Within the framework of the research, the analysis of relevant publications in the context of competence has been carried out. The personal experience of the researchers while working at the Forest Faculty of Latvia University of Life Sciences and Technologies was used.

The case study was conducted with a part-time students' group in which the characteristics of adult education had to be observed.

Literature review

The Cabinet Regulation No 287 "On the implementation of the adult education governance model plan for 2016-2020" (The Regulation of the Cabinet of Ministers [TROTCOM], 2016) indicates that one of the goals of the Sustainable Development Strategy of Latvia "Latvija 2030" is the development of lifelong learning, including – education of employed adults – constant development and improvement of skills and competence.

Adult education has been defined in several documents, including the (Education Law [EL], 1999), which states that it is a "multifaceted process of educating persons which ensures the development of the individual and his or her ability to compete in the labour market during the course of a lifetime of a person".

Adult education (Cedefop, 2008) is general or vocational education for adults after acquiring initial (former) education and practical training to meet professional and personal needs, which aims to provide general education to adult learners on specific themes of interest.

The education obtained allows the people to take responsibility for themselves and others. It is open for the dialogue and new perspectives to transform one's life and improve competences (Ouane, 2011).

According to the definition given in the (Competence dictionary [CD], (2011), the key competences are those that are necessary for individuals to improve themselves, for developing responsible attitudes, civic activities, social inclusion and employment.

Competence studies show that it can be divided into the following partly overarching types: meta-, basic, social, professional and self-competence (Briede & Pēks, 2011).

Competence is a dynamic characteristic feature of a person that develops at the beginning of Professional education as a competence development towards proficiency (Зимняя, 2005). In the professional development the improvement of one's personality, self analysis of knowledge, skills and qualifications are important as well as self-assessment; the improvement of emotional self-regulation, analysis and development of relationships are equally important.

Basing on the experience in adult research, Tatjana Koķe (2012) points out the principles and approaches for ensuring successful adult learning. This means that adults need to participate in planning, organizing and evaluating their learning process, maximally evaluating their own experience; the content should be topical, problem-centred, and the problem addressed should be related to the adult's professional, social or personal life. Basically, in adult education it is necessary to focus on how theoretical knowledge can be transformed into the necessary life skills.

When studying in the programme "Forest Engineer", students have to acquire knowledge and skills to work with modern design and production technologies, acquire the management and production organization competences of a forestry enterprise; they also have to acquire knowledge of the full cycle of forest management, technologies and forest economy.

The research shows that the teacher motivates and supports the adults in the process of studies and at the same time, the teacher ensures the quality of the classes, thus arousing interest in the learners to attend classes, acquire skills and achieve the goals of an organized learning course (Murray & Mitchell, 2013).

In adult education (Hoare, 2009; Pfaffenberger, 2013) self-development and self-efficacy play an important role in intellectual development.

During the study process, discussions with both lecturers and fellow students on the acquired experience are important. Competence assessment and self-assessment contribute to the acquisition of self-assessment skills (Ross, 2006; Ross & Bruce, 2007).

Theoretical findings (Rubene, 2012, 184) prove that in a critical education process an adult is aware of a lack of his/her competences and develops the necessary key competences.

Creativity in the learning process pertains to innovations in a particular field and refers to flexibility, openness to the new, the ability to find new solutions, new methods, and the ability to face challenges in problem solving by surpassing the traditional methods. When analysing meta-creativity, one should be able to improve his/her energy, creativity and mental well-being (Cropley, 2001), because "a creative personality must have knowledge and competence in

a field, and it is important to know the strategy for solving a problem, one should be motivated and interested in the problem to be solved" (Garleja, 2006, 56).

Creativity is important in education as a performance (McLellan & Nicholl, 2011) to promote innovations in everyday life.

The main focus in the study process was on self-directed rather than teacher-guided learning, because, according to the research, - self-directed learning is an active student's participation in curriculum planning, acquisition of knowledge and skills and assessment of one's own learning outcome (Katane & Katans, 2014).

The survey was conducted in two stages: It was carried out in February and May 2018, and 11 part-time students were involved in it. The task of the study was to find out was to clarify the dynamics of the development of the students' competence in the learning process. The summary of the obtained data is presented in Table 1. The students performed self-assessment of their competence. Self-assessment (Толочек, 2005) manifests itself as a regulating mechanism of a personality's behaviour, assessment of one's own performance, and assessment of self-concept.

Methodology

In the study process the Labour Protection Specialist Competence Model (Brizga, 2018) was used. The publication states that the model was approbated in the study programme of the senior labour protection specialist and it can be adapted to other study programmes. In the adapted model, two competence components have been used instead of four components. The two components are knowledge and skills. The traditional education model, when the information transfer to the student took place almost without the student's participation, has been replaced by the new one, when the teacher defines the problem, creates an idea, gives the student the tools for acquiring the learning skills with tasks that require the use of previous experience and competence. When addressing problem situations, students develop critical thinking. Working in small groups where participants have different skills and abilities, and when they learn from each other, exchange ideas and relevant information, helps develop collaborative competences.

In the process of cooperative learning, students use their experience, their intellectual and emotional potential and learn from each other learning in groups, thus, there is a close cooperation among the participants. Cooperative learning is the process during which each member of the group and the whole group are oriented towards achieving the stated goal.

During the first class, the student was introduced to the use of the selected model and the learning method that promote cooperation during the learning process, as well as a survey was carried out regarding the self-assessment of students' competence.

Since they were part-time last year students, their initial competence was acquired through their previous study courses and work.

After the lectures, the students were divided into groups and received an independent work assignment. The elaborated independent work was presented and shared with the students and the lecturer. The presentations were supplemented with a video material that the students had taken while doing practical work in the forest. Additionally, a survey was carried out in which 46 full-time students participated. The aim of the survey was to clarify the competence development in this study course. After the survey results were summarised, it was concluded that it was necessary to improve the study course. One of the suggestions was that the course should be taught during the 1st year of the study programme or its content should be improved, so that it would not overlap with other study courses. That would be a condition for the improvement of competence within the framework of the study programme. The duration of the course was 4 months – during the session when students met each other and in students' workplaces during the inter-sessional period. After the completion of the course, the students performed a repeated self-assessment of competence (knowledge and skills).

Research results

Self-assessment results of competence level (knowledge and skills) at the beginning of the course and after the completion of the course are summarised in Table 1.

Table 1 **Competence development in the study course Utilization of Forest Resources**

Respondent codes	Self-assessment of competence level *5- point scale*							
	Knowledge				Skills			
	Points		Number		Points		Number	
	Beginning of course	End of course	=	>	Beginning of course	End of course	=	>
1	2	4	-	2	3	4	-	1
2	4	5	-	1	4	5	-	1
3	4	5	-	1	4	5	-	1
4	4	4	1	-	4	4	1	-
5	4	5	-	1	4	5	-	1
6	4	5	-	1	4	4	1	-
7	4	4	1	-	4	4	1	-

8	4	5	-	1	4	5	-	1
9	4	5	-	1	4	5	-	1
10	4	4	1	-	4	5	-	1
11	3	4	-	1	4	4	1	-
Total	41	50	3	9	43	50	4	7
Distribution of data								
Level	2	1	-			-	-	
	3	1	-			1	-	
	4	9	5			10	5	
	5	-	6			-	6	
Descriptive statistics								
Mode	4	5			4	5		
Median	4	5			4	5		
Range	4	5			4	5		
Mean	3.73	4.55			3.9	4.55		

Descriptions (Table 1):
> at the end of the session the assessment is higher than at the end of it.
= the assessment has not changed.

During the study process, two respondents pointed out that it would be more purposeful to include the course in the first year study programme, thus it could be a basis for the further improvement of knowledge and skills, which could be strengthened during the practice period in the forest.

Nine respondents acknowledged that the competence development model meets their requirements, giving 5 points, and two respondents gave 4 points.

During the course the individual self-assessment of the competence (knowledge and skills) did not change for seven respondents (3+4=7), it increased for 16 respondents (9+7=16). Statistically significant (p=0.06 < p=0.10) individual self-assessment changes were observed.

Conclusions and recommendations

As the result of the pilot case study, it was found that:

1. At the end of the course students' competence increased, statistically significant (p = 0.06) changes were observed in individual self-assessment due to the collaboration process between the teacher and students;

2. Upon the completion of the study course the knowledge and skills of all respondents were evaluated with a mark 4 or 5 (on a 5-point scale);

3. Basing on the experience gained from the case study, it is recommended to carry out research involving a larger number of respondents to improve the model used in statistically significant results from the research and to recommend it for the further use in the study course *Utilization of Forest Resources;*

4. In order to improve competence, it is necessary to take into consideration the suggestions made by both full-time and part-time students.

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AN EXPRESSION OF DIFFERENT GENERATIONS IN AN ORGANIZATION: A SYSTEMATIC LITERATURE REVIEW

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Abstract. *The concept of generation is examined in many sciences such as sociology, philosophy, pedagogy, anthropology, biology, history, management, etc. Generation as a construct is intricate, and researchers from various fields have tried to define this extraordinary phenomenon. The aging population representatives of different generations live longer, so the differences between generations are becoming increasingly noticeable. This article examines the concept of generation, analyses the main theories of generations and presents a theoretical approach to a generational expression in an organization. The aim of the research is to reveal a theoretical approach to the expression of different generations in an organization, i.e. to analyse studies related to the expression of different generations in an organization and to identify the main research fields related to the subject. The primary method used in the article is a systematic literature review (SLR). The systematic literature review (SLR) disclosed that although the topic of expression of different generations in an organization is relevant among the human resources management (HRM) specialists-practitioners, nevertheless, there is a lack of high-level publications in Europe containing empirical research on this subject, i.e. there is a lack of a systematic scientific approach to this topic, and therefore, this area is under-researched.*
Keywords: generation, generational differences, Theory of Generations.

Introduction

Generation as a construct is not tangible, and therefore, this extraordinary phenomenon has been researched in a variety of fields (Joshi, Dencker, & Franz, 2011; Srinivasan, 2012). Generations and their differences are increasingly mentioned in management, especially in the field of human resources management (HRM), emphasising the concept and expression of generation through generational differences (Twenge, Campbell, Hoffman, & Lance, 2010; Gonçalves, 2015) or conflicts regarding generational differences (Urick, Hollensbe, Masterson, & Lyons, 2016) in a workplace, and at the same time, in an organization. The topic of expression of different generations in an organization is relevant, because media is dominated by the articles about stereotypes of generations (Kitch, 2003; Stein, 2013) and articles oriented to specialists-practitioners in human resources management (Martin & Kallmeyer,

2018; Zhou, Tan, Xiao, & Ge, 2018; Graystone, 2019). According to Parry and Urwin (2011), there is not much evidence of real generational differences or the expression of different generations in the context of an organization, whilst the academic empirical evidence for generational differences at work is, at best, mixed and contradictory. Therefore, it is important to carry out a systematic literature review (SLR) of research articles related to the expression of different generations in an organization.

The aim of the article is to reveal a theoretical approach to the expression of different generations in an organization, i.e. to analyse research articles related to the expression of different generations in an organization, and to identify the main scientific research fields related to the subject. The article aims at defining the concept of generation; the identification of the main theories of generations that analyse and define the concept of generations; the analysis of research articles on the exploration of the expression of different generations in an organization. The article consists of a subject-specific scientific literature analysis, the methodological part, a systematic literature review (SLR), and final conclusions regarding high-level publications on the expression of different generations in an organization.

The Concept of Generation

Most researchers agree that the modern construct of generation has emerged in the area of sociology (Rudolph, Rauvola, & Zacher, 2017) as a separate field of science, and only then it has spread to other areas of science, such as management. Studies of different generations occupy a prominent place in social sciences (Giancola, 2006). For several decades, scholars have been trying to observe the expression of different generations through their unique characteristics. A Multilingual Compendium (2017) identifies several major categories of generation-related themes and discourses: genealogical generations related to kinship, ancestors and family roles; pedagogical generations, related to educational relationships and roles; social, cultural and historical generations, related to wars, economic and political unrest as well as collective identities arising from them; cultural trends, styles and works that identify trends; the regulation of social security of a welfare state; generations diagnosing the period, encompassing the statements about the current status of specific population groups, emphasising ideal-typical adolescent generations (Kurt et al., 2017). According to Höpflinger (2010), it is possible to distinguish three main concepts of generations: genealogical, pedagogical and historical-social. The definition of generation is most accurately used to define the genealogical kinship (Ryder, 1965; Pilcher, 1994; Joshi et al., 2011), meanwhile in social

sciences generation is understood as a group of people, born and living, now or earlier, in the same historical period.

Mannheim (1952) defines generation as a group of individuals, born in the same historical and socio-cultural context, and shaped by common formative experience, which results in unifying commonalities. The Dictionary of Contemporary Lithuanian (2012) defines generation "as people of similar age living in the same period of time". According to Rayani (2015), generation is composed of people of similar age, living in similar locations, experiencing similar social, historical and life events (Becton, Walker, & Jones-Farmer, 2014). Generation can be identified as a group that shares birth years, age and significant life events at critical developmental stages (Kupperschmidt, 2000; Cennamo & Gardner, 2008). Kupperschmidt (2000) assumes that generation in management is usually described as a certain identifiable group that shares birth years, location, and significant life events at critical developmental stages of the epoch.

Since the beginning of the 20th century scholars have been seeking explanations for the mechanisms responsible for bringing about large-scale social changes (Kertzer, 1983) that influence the expression of generations in an organization. According to Mannheim (1952), Ryder (1965), each generation has its unique experience solving the problems faced by the society. Since each generation is temporary and historically embedded within a given socio-economic context, it was assumed that childhood experiences uniquely shape the so-called "shared consciousness" of each generation (Mannheim, 1952). According to Rudolph, Rauvola and Zacher (2017), the formation and codification of such a shared consciousness from cohort-to-cohort gives rise to unique distinguishable features that are characteristic of each new generation and thus help observe the expression of different generations in an organization. These shared experiences (e.g. industrialisation, fundamental changes, cataclysmic events, tragedies, etc.) differentiate one generation from another (Mannheim, 1952; Jurkiewicz & Brown, 1998; Kupperschmidt, 2000) and have a profound effect on the generational attitudes, values, beliefs and expectations (Inglehart & Norris, 2003), and at the same time, on the expression of different generations in a workplace and in an organization in general. Rogler (2002) claims that a collective identity of a generation is shaped under several fundamental conditions: first, significant events, such as disasters, wars or revolutions that threaten the existing social order and provide basis for the emergence of new generations; second, these events have a much greater impact on the future generations than on the already existing generations of that period, as individuals tend to shape their attitudes and values in adolescence, while the values of older generations have long been established (McCrae et al., 2002); third, this common set of values and goals is supported by peers and, most often

on attaining full age, this set does not change (Kupperschmidt, 2000; Macky, Gardner & Forsyth, 2008; Becton, Walker, & Jones-Farmer, 2014).

Thus, according to Bourdieu (1993), generation is a culturally conditioned phenomenon, i.e. different generations have particular interests, beliefs and inclinations, and within the generation there is a struggle in time for cultural and economic resources. Mead (1970) claims that there is a conflict of generations in the world, as the young generation rebels against the old generation that controls social control mechanisms, and therefore, according to Buckingham and Willett (2006), it is important to evaluate the role of new technologies, media and consumption habits when determining the boundaries of generations and analysing the expression of different generations in an organization. According to Labanauskas (2008), the boundaries of generations "crystallise" in the course of reverse socialisation, when children "force" their parents to adapt to new and changing socio-technological conditions. Hence, the "order of generations" is not passively imposed on an individual, but is a dynamic process that an individual gets involved into, thus creating conditions for a different expression of generations in an organization too.

The Analysis of Theories of Generations: a Theoretical Approach

Research and theories of generations have developed in social sciences from a few different perspectives. Today, in scientific literature, based on these perspectives, several main theories of generations that analyse and seek to define the concept of generations can be distinguished:

Karl Mannheim's Theory of Generations. The theory based on social forces perspective has originated from Karl Mannheim, the founder of this theory, and his essay "The Problem of Generations", where the author emphasises that particular events or a context, experienced by a generation in the years of its formation, become a potential basis for the unity of the "inborn way of experiencing life and the world" (1952, p. 283). Mannheim (1952) identified that individuals born within the same historical and socio-cultural context, share the same events and context in the most important years of their formation (Pilcher, 1994). Thus, a certain period of history, in which a certain generation are born, limits its members to certain opportunities and experiences and forms their "collective memories" (Schuman & Scott, 1989), which are the basis for the attitudes, thoughts and behaviours in the future (Joshi et al., 2011). Looking from this perspective, a generation is a mechanism, by means of which an individual understands his / her life in a historical context and interprets the behaviour of others (Foster, 2013). Although, these perspectives provide insights into intergenerational phenomena, relatively few organizational studies have been done to examine generation as an interpersonal phenomenon (Urick et al.,

2016). New generational awareness rises when certain historical, social or economic transitions emerge that allow the occurrence of new skills and new social organization models, and make changes to the values and lifestyle of the representatives of generations (Eyerman & Turner, 1998; Laufer & Bengtson, 1974). This theory of generations is defined as an idea of generations grouped by age, emphasising that social, economic and historical events that have taken place in childhood and adolescence have a decisive influence on the formation of generations; explaining how a period in which a person was born affected an individual's perception of the whole world; although unable to predict the actions of individuals of a generation but helping to analyse their behaviour (Schuman & Scott, 1989; Holbrook & Schindler, 1994; Eyerman & Turner, 1998; Edmunds & Turner, 2002, 2005; Gilleard, 2004); allowing the observation of an individual's progression throughout their life (i.e. maturation) and throughout history (i.e. the period of birth) when assessing the synthesis of the consequences of a biological aging process and the socio-historical context (Pilcher, 1994; Gilleard, 2004). According to Lyons and Kuron (2014), based on this theory, a generational identity is formed when its members become of full age (17 to 25 years old), and collective memories of early life events crystallise into a similar attitude and behaviour (Schuman & Scott, 1989; Joshi et al., 2011). Although history, psychology, political sciences, sociology and management provide valuable critical insights from their perspectives, Mannheim's theory of generations provides the most understandable and effective explanation of changes of mass perception.

William Strauss and Neil Howe's Generational Theory. The Generational Cohort Theory was popularised by Howe and Strauss (1991) in their book "Generations: The History of America's Future, 1584 to 2069". This theory is among the most frequently applied generational theories in social sciences, based on Ryder's (1965) works (Pilcher, 1994), seeking to understand the attitudes and values of individuals from different generations (Davis, Pawlowski, & Houston, 2006), as well as their attitude to higher education (Haynie, Martin, White, Norwood, & Walker, 2006), behaviour when searching for information (Weiler, 2005), learning styles and attitudes (Oblinger, 2003), etc. Based on this approach, a generation is a social force facilitating the transfer of new ideas and the social change (Gilleard, 2004). Generations are objectively represented as demographic cohorts, i.e. they are noticeable groups of people that experience particular events in the same period, have specific boundaries, which correspond to particular years of birth, are similar enough so that to be of significance and to have noticeable features which are relatively fixed and can be measured (Ryder, 1965). The identity of generation is characterised by the fact that over a certain period of time those who were born in the same period as if become identical (Foster, 2013; Parry & Urwin, 2011). Thus, a lot of scholars

focus on specific connections of the cohort's older (i.e. mature) representatives of generation and the consequences of a historical period (Laufer & Bengtson, 1974; Lyons & Kuron, 2014). In order to define generations and their boundaries, the cohort theory followers pay less attention to the historical events and more to the cultural elements, e.g. the impact of music or other popular culture on a generation, thus expanding the concept of generation and emphasising unique social habits. When defining generations, common habits express the idea that members of each generation have a shared collective cultural field (of emotions, attitudes, preferences and dispositions) and a set of embodied practices (of sport and leisure activities) (Bourdieu, 1993; Eyerman & Turner, 1998). Holbrook and Schindler (1994) assume that nostalgia and popular culture have a greater impact on cultural differences, because people mostly tend to socialise through music, movie starts and fashion, and in the 21st century, also through IT and other technologies (McMullin, Duerden, Comeau, & Jovic, 2007), which draw a distinctive feature between a new and preceding generations.

In the theory of generations, Howe and Strauss (1991) characterise historical generations by means of cyclical changes, emphasising the dynamics of behaviour that repeats itself every four generations (a generation changes every 20 years) (Galland, 2009; Sajjadi et al., 2012) and the influence of an earlier generation on new generations. Thus, the generation that emerges after the fourth generation is much more similar to the first one rather than the last generation in terms of the system of values and the worldview. According to DeChane (2014), the main drawback of Strauss and Howe's generational theory is the problem of identification of the initial event that leads to the unpredictable responses of the generation's representatives affecting a new generation. The main difference between the two above-mentioned theories of generations is that one theory emphasises that past generations have a major influence on the generations that follow them, meanwhile another theory emphasises the significance of the most important event of the period for the formation of generation. According to Galland (2009) and DeChane (2014), the supporters of both theories unanimously agree that the formation of a generation is determined by a variety of external and internal factors.

Aart Bontekoning's Generation Theory. Relying on the basic information provided by Karl Mannheim (1952), Jeffrey Pfeffer (1983), Howe and Strauss (1991) and Henk Becker (1992), Bontekoning (2011, 2012) established a new theory of generations that explored and linked the main perspectives of generations' development in social sciences. He relied on the assumptions made by historians, sociologists and philosophers over the last two decades as well as on the assumption of the organizational culture theory that generations can be treated as subcultures that have an evolutionary function: a generation is not

only a united group, born in a certain period, but also a common attitude, a response emerging from spontaneous impulses with an attempt to regenerate; a common collective mental, emotional and physical development based on the evolutionary role of this generation. Bontekoning's (2011, 2012) theory of generations provides the idea that a generation is comprised of people born in a certain period of time and it is formed by individuals, who feel a connection with their peers: 1) representatives of one generation share their life history, circumstances and the impact of historical events, in other words, the spirit of the time that influences their upbringing and education, thus creating a common basis for a collective development of a new generation; 2) the most important source is their common response to the spirit of time, based on vital sensitivity, the ability to feel a collective expression; 3) a separate generation creates a common entelechy for the development of collective mental, emotional and physical attitudes and skills, with the overall aim to create the evolution of social systems, e.g. of societies, families, clubs and organizations.

Most of scientific research related to generational differences in a workplace suggest that the differences of social generations, i.e. the expression of different generations in an organization, should be obvious in the field of work; however, Joshi and his colleagues (Dencker, Joshi, & Martocchio, 2008; Joshi et al., 2011) proposed a coherent theoretical explanation of generations in an organizational context. Their theory focuses on generational identity, i.e. the perception of an individual and adherence to a particular generation. Dencker et al. (2008) found that the generational identity starts shaping in a workplace, based on collective memories of common events occurring during the later years of formation of each generation (Schuman & Scott, 1989). The strength of each generation's identity may vary depending on age, sex, race, education, and it is not strictly related to the birth of its members. Also, scholars have found that a generally used identity of a generation raises typical work-related expectations, expressed by psychological contracts (Rousseau, 1995; Onnis, 2019), the violation of which results in negative emotional reactions, dissatisfaction, lack of commitment, and an intention to quit a job (Poisat, Mey, & Sharp, 2018). Lyons and Kuron (2014) assume that although Aart Bontekoning's generation theory did not receive much attention in scientific literature, it offers important directions for future research.

Methodology

To prepare this article, a systematic literature review (SLR) was used, as this methodology allows for collecting the most relevant scientific facts on the subject in question from a large number of scientific publications found in the international press (Pittway, 2008; McInerney, 2016). To perform SLR, the

following established procedure was used: 1) a review process protocol was prepared; 2) a primary literature search was carried out; 3) the sources found were critically assessed, and the publications of less significance were removed; 4) the texts of the remaining sources were collected; 5) the necessary information from the collected texts was extracted; 6) the collected information was generalised; 7) a review was made (Miliauskaitė & Čaplinskas, 2013).

The following databases of scientific publications were selected for a systematic literature review: the Web of Science and Scopus. Special strategies were developed to perform the search, applicable to any database. The following keywords and their combinations were applied for the search: "generation", "generational", "generational differences", "multigeneration", "multigenerational workforce", "Theory of Generations". The main criteria for article selection were applied: 1) the articles were published in 2010-2018; 2) the aim of the research is to study how the expression of different generations in an organization is analysed in research articles, seeking to identify the main research areas related to the subject of generations; 3) the systematic review includes only the research classified as a high-level of evidence group (documents on the Web of Science and Scopus databases).

Once the primary search results have been displayed, i.e. 680246 documents on the Web of Science database and 1241889 documents on Scopus database, 79 publications were selected for thorough reviewing (including 35 on the Web of Science database and 44 on the Scopus database). Applying the above described criteria for the inclusion of articles, 10 articles with the highest citation index within the analysed period, displayed on the Web of Science and Scopus databases, have been selected for a systematic review and analysis.

Research results

The search of primary literature sources was carried out according to 7 criteria: 6 keywords and their combinations, and the distribution of these combinations in research articles in the field of management. Once the search by the keyword "generation" of 2010-2018 was performed, the Web of Science database displayed 680246 documents, including 8793 Highly Cited in Field; the main Web of Science Categories covered Engineering Electrical Electronic (100396 documents), Energy Fuels (54395) and Physics Applied (49364). The Scopus database displayed 798066 document results (Table 1); however, it included such main subject areas as Engineering (244617 documents), Computer Science (144685), Physics and Astronomy (126781), Medicine (111289) and Biochemistry, Genetics and Molecular Biology (108637), i.e. other than the field of Social Sciences.

Table 1 **Distribution of publications by the subject of generations on the Web of Science and Scopus databases by criteria**

No. of the criterion	Name of the criterion	No. of publications of 2010-2018 that meet the criteria	
		Web of Science	Scopus
1	"Generation" *(in the title, abstract, key word)*	680246	1241889
2	"Generational" *(in the title, abstract, key word)*	6371	8050
3	"Generational differences" *(in the title, abstract, key word)*	791	909
4	"Multigeneration" *(in the title, abstract, key word)*	382	323
5	"Multigenerational workforce" *(in the title, abstract, key word)*	35	44
6	"Theory of Generations" *(in the title, abstract, key word)*	9	64
7	Documents published in Management matches	3893	5551

Source: based on the data of the research conducted on 20/12/2018 on the Web of Science and Scopus databases.

Once the search by the keyword "generational" of 2010-2018 was performed, the Web of Science database displayed 6371 documents, including 28 Highly Cited in Field; the main Web of Science Categories covered Sociology (403 documents), Management (362), Public Environmental Occupational Health (295), Education Educational Research (282) and Business (252). The Scopus database displayed 8050 document results, including the main subject areas of Social Sciences (3686 documents), Arts and Humanities (1479) and Medicine (1385). The number of publications by the subject "generational", displayed on the Web of Science database, increased from 487 scientific articles in 2010 to 941 scientific articles in 2018; and on the Scopus database, increased from 685 documents in 2010 to 1137 documents in 2018. Most of the publications of 2010-2018 by the subject of "generational" on the Web of Science database by the author, included Twenge (23 documents), Kendler (12) and Campbell (11); on the Scopus database – Twenge (27 documents), Tanskanen (11), and 10 scientific articles each, Biggs, Kendler, Lyons and Peguero. Most of the publications of 2010-2018 by the subject of "generational" on the Scopus database by the country, included the United States (2846 documents) and the United Kingdom (1033).

Once the search by the keyword "generation differences" of 2010-2018 was performed, the Web of Science database displayed 791 documents, including 4 Highly Cited in Field; the main Web of Science Categories covered Management (165 documents), Business (77) and Psychology Applied (75). The

Scopus database displayed 909 document results, including the main subject areas of Social Sciences (437 documents), Business, Management and Accounting (203), Medicine (170) and Psychology (152). The rise in interest in the subject of "generation differences" is demonstrated by the increase in the number of articles on the Web of Science database from 55 scientific articles in 2010 to 134 articles in 2018. The Scopus database displayed from 65 documents in 2010 to 157 documents in 2018. Most of the publications of 2010-2018 by the subject in question on the Web of Science database by the author, included Twenge (15 documents) and 7 documents each, Campbell and Cruickshanks. Most of the publications by the subject of "generation differences", displayed on the Scopus database by the author, also included Twenge (16 documents), 6 documents each, Campbell, Lyons and Schweitzer, and 5 documents each, Campbell, Lee and Parry. Most of the publications of 2010-2018 by the subject of "generational differences" on the Scopus database by the country, included, first, the United States (426 documents), second, the United Kingdom (81), and third, Canada (67).

Once the search by the keyword "multigeneration" in 2010-2018 was performed, the Web of Science database displayed 382 documents, including 7 Highly Cited in Field; the main Web of Science Categories covered Energy Fuels (115 documents), Thermodynamics (55) and Environmental Sciences (48). The Scopus database displayed 323 document results, including the main subject areas of Medicine (98 documents), Energy and Environmental Science (72 documents each) and Biochemistry, Genetics and Molecular Biology (50). The number of publications by the subject of "multigeneration" on the Web of Science database, increased from 20 scientific articles in 2010 to 58 scientific articles in 2018. An increase was also observed on the Scopus database: from 20 documents in 2010 to 54 documents in 2018. Most of the publications by this subject in the target period were published by Dincer (Web of Science – 51 documents, Scopus – 50), J. Sundquist and K. Sundquist, each having published 31 documents on the Web of Science database and 30 documents on the Scopus database. Most of the publications of the period in question by the subject of "multigeneration" on the Scopus database by the country, include the United States (124 documents), Canada (74) and Sweden (50).

Once the search by the keyword "multigenerational workforce" of 2010-2018 was performed, the Web of Science database displayed 35 document results; the main Web of Science Categories covered Management (15 documents), Nursing (9) and Business (7). The Scopus database displayed 44 document results, including the main subject areas of Business, Management and Accounting (23 documents), Social Sciences (12), and Economics, Econometrics and Finance (5). The number of publications by the subject in question on the Web of Science database, increased from 2 documents in 2010

to 8 documents in 2018; and on the Scopus database – from 4 documents in 2010 to 6 documents in 2018. Most of the publications of 2010-2018 by the subject of "multigenerational workforce" on the Web of Science database by the author, included Bressan, Chakradhar, Kleinhans ka, Kvist and Stevanin (2 documents each); and on the Scopus database – Jackson, Rani and Stevanin (2 documents each). The largest distribution of 2010-2018 by the subject of "multigenerational workforce" on the Scopus database by the country, includes 20 articles from the United States, 4 from India, and 3 from each, Australia and Malaysia.

Once the search by the keyword "Theory of Generations" of 2010-2018 was performed, the Web of Science database displayed 9 documents, including the following Web of Science Categories: Education Educational Research (3 documents) and Sociology (2). The Scopus database displayed 64 document results, including the main subject areas of Arts and Humanities (19 documents), Social Sciences (15), Physics and Astronomy (14) and Engineering (13). The number of scientific publications by the subject in question on the Web of Science database, increased from 1 document in 2010 to 3 documents in 2018; and on the Scopus database, reduced from 10 documents in 2010 to 7 documents in 2018. Most of the publications of 2010-2018 by the subject of "Theory of Generations" on the Web of Science database by the author, include Bannykh (2 documents); on the Scopus database – 4 articles published by Frolov and 3 articles published by each, Belyi, Kazak and Kurilkina. Most of the publications of 2010-2018 by the subject of "Theory of Generations" on the Scopus database by the country, included the Russian Federation (10 documents), China (8), the United States (7) and the United Kingdom (6).

In the following stage of the research, in order to reduce the primary search results, restrictions have been introduced on the Web of Science database by the Web of Science Categories – Management; and by the document types – article and proceeding paper; and on the Scopus database, by the subject area – Business, Management and Accounting; and by the document type – article and conference paper. The displayed documents that met the criteria were sorted out by citation (Cited by (highest)), and 10 mostly cited articles have been read performing their content analysis (Table 2).

Table 2 **Distribution of the most frequently cited publications by the subject of generations
on the Web of Science and Scopus databases and the main areas of research**

No.	Author(s)	Title of a publication and journal	No. of citation		Main areas of research
			Web of Science	Scopus	
1	Twenge, J.M., Campbell, S.M., Hoffman, B.J., Lance, C.E.	*Generational differences in work values: Leisure and extrinsic values increasing, social and intrinsic values decreasing.* Journal of Management, 2010, 36(5), 1117-1142.	322	347	Research on generational differences (Baby Boomers, Generation X, Generation Y) in work values of a nationally representative sample of U.S. findings; practical implications for the recruitment and management of the emerging workforce.
2	Bolton, R.N., Parasuraman, A., Hoefnagels, A., Migchels, N., Kabadayi, S., Gruber, T., Loureiro, Y.K., Solnet, D.	*Understanding Generation Y and their use of social media: A review and research agenda.* Journal of Service Management, 2013, 24(3), 245-267.	226	272	Research on Generation Y's use of social media and assessment of the implications for individuals, firms and society; a conceptual framework for considering the antecedents and consequences of Generation Y's social media usage; identification of unanswered questions about Generation Y's use of social media and practical insights for managers.
3	Twenge, J.M.	*A review of the empirical evidence on generational differences in work attitudes.* Journal of Business and Psychology, 2010, 25(2), 201-210.	206	225	Research on the evidence for generational differences in work values from time-lag studies (which can separate generation from age / career stage) and cross-sectional studies (which cannot); summary of available studies examining generational differences in work values.
4	Parry, E., Urwin, P.	*Generational Differences in Work Values: A Review of Theory and Evidence.* International Journal of Management Reviews, 2011, 13(1), 79-96.	188	201	A critical review of the theoretical basis and empirical evidence for the popular practitioner idea that there are generational differences in work values.
5	Ng, E.S.W., Schweitzer, L., Lyons, S.T.	*New generation, great expectations: A field study of the*	161	191	Research on the career expectations and priorities of members of the Millennial generation;

		Millennial generation. Journal of Business and Psychology, 2010, 25(2), 281-292.			exploration of differences among this cohort related to demographic factors and academic performance; a large-sample study that provides benchmark results for the Millennial generation, which can be compared to the results from other generational cohorts, and to the Millennial cohorts in the future as they progress through their life-cycle; a study on demographic heterogeneity within the Millennial cohort.
6	Myers, K.K., Sadaghiani, K.	*Millennials in the workplace: A communication perspective on millennials' organizational relationships and performance.* Journal of Business and Psychology, 2010, 25(2), 225-238.	124	152	A thorough theoretical analysis on the Millennials in the workplace, revealing a communication perspective on Millennials' organizational relationships and performance.
7	Zellweger, T.M., Nason, R.S., Nordqvist, M.	*From Longevity of Firms to Transgenerational Entrepreneurship of Families: Introducing Family Entrepreneurial Orientation.* Family Business Review, 2012, 25(2), 136-155.	115	142	Research on transgenerational entrepreneurship of families; empirical exploration of the construct of family entrepreneurial orientation, which may serve as an antecedent to transgenerational value creation by families.
8	Deal J.J., Altman D.G., Rogelberg S.G.	*Millennials at work: What we know and what we need to do (if anything).* Journal of Business and Psychology, 2010, 25(2), 191-199.	130	138	A theoretical analysis of one generation (Millennials) and their generational differences at work; discussion on the importance of new directions of research on generational differrences to help both practitioners and the research community better understand the realities of generational similarities and differences, and rely less on urban myths or stereotypes.

9	Cruz, C., Nordqvist, M.	*Entrepreneurial orientation in family firms: A generational perspective.* Small Business Economics, 2012, 38(1), 33-49.	104	143	Research on a generational perspective to investigate entrepreneurial orientation (EO) in family firms, finding that perceptions of the competitive environment and EO correlate differently in family firms, depending on the generation in charge, and that it is generally stronger in second-generation family firms.
10	Lyons, S., Kuron, L.	*Generational differences in the workplace: A review of the evidence and directions for future research.* Journal of Organizational Behavior, 2014, 35(SUPPL.1), S139-S157.	85	113	A critical review of the research evidence concerning generational differences in a variety of work-related variables, including personality, work values, work attitudes, leadership, teamwork, work-life balance and career patterns; assessment of its strengths and limitations, and provision of directions for future research and theory.

Source: based on the data of the research conducted on 5/1/2019 on the Web of Science and Scopus databases.

The review of the content of the articles shows that the expression of different generations in an organization is mostly analysed through the generational differences in a workplace, i.e. personality, work values, work attitudes, leadership, teamwork, work-life balance and career patterns; in addition, the topic of expression of generational differences is relevant in the context of a relationship between generations and entrepreneurship of families. The most quoted articles mostly perform a thorough critical theoretical analysis of documents or, less frequently, use quantitative research. The future research directions provided in all the articles show the importance of the expression of different generations in an organization and the need for such research in the future.

Conclusions

Generation as a concept is used widely and in a variety of fields of science, such as Engineering Electrical Electronic, Energy Fuels, Physics, Computer Science and Medicine. This was demonstrated by a large number of high-level scientific articles on the Web of Science and Scopus databases. As regards the subject of generation in the field of Management, it should be emphasised that

this subject is of an increasing interest among scholars – this is evidenced by a systematically increasing number of publications.

Scholars agree that since social, economic and political conditions have changed, a new generation is emerging. In the 21ˢᵗ century, these changes are becoming more intense (e.g. globalisation, IT development, nanotechnology, social media, etc.) than before and lead to an increasing intergenerational gap, i.e. major generational differences or a different expression of generations in an organization. The systematic literature review (SLR) showed that articles with the highest citation index aimed at the analysis of generational differences in a workplace, with a special emphasis on one generation, the most recent generation in a workplace, i.e. the Generation Y or the Millennials, which is currently strengthening its positions in a workplace and features major differences in an organization from the earlier generations.

The topic of an expression of different generations in an organization is relevant not only to the human resources management (HRM) specialists-practitioners, but also scholars, especially in the USA, as most of the articles on the subject of generations are found in this country. In Europe, there is a lack of high-level publications on this topic, i.e. there is no systematic scientific approach to this topic related to the theories of generations and empirical research. To sum up, it can be assumed that an expression of different generations in an organization is an insufficiently explored field of research. This is emphasised by the majority of the authors of the articles with a high citation index who provide trends and directions for future research.

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PERSONALITY FACTORS AS BASIC ELEMENTS OF THE ESTONIAN YOUTH WORKERS´PROFESSIONAL GROWTH

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Abstract. *The article dealt with one aspect of the professional growth basic elements. The issue of the Estonian Youth Centers youth workers´ professionality has been relevant for many years, as employees often exchange. Expectations for youth work as a promotion of non-formal education are high. There is no research that explained the issues related to the youth workers professional growth, including personal factors. The theoretical framework of the research created Ruohotie, Tamm, Clarke and Hollingsworth concepts of professional growth. The purpose of this research was brought to the light youth work specialists´ opinions about the personal factors of the professional growth. For qualitative data collection semi-structed interviews were conducted with 35 Estonian youth work specialists in 2016-2018. The results showed that in eight key-topics important opinions were received. Most attention should be given further to the youth workers´ internal motivation, treatment and professional identity. Mostly were explained the high expectations to the youth work generally. Interviews revealed a different commitment to everyday work, that could have resulted from their different education and professional training or attitudes towards education. The needs for further clarification are: occupational and organizational elements of youth workers´ professional growth.*
Keywords: *Estonia, personality factors, professional growth, youth work, youth worker.*

Introduction

The multifaceted nature of youth work (YW) and the often-changing context of the youth worker´s everyday work causes increasing expectations and demands on their professionality. Youth worker supports the personal development and learning of young people outside the school, family and work, and creates the conditions necessary to achieve it. It is important to design non-formal learning (NFL) activities, as well as to support young people´s NFL, and to interpret this experience and achievement with young people (Noorsootöötaja Kutsestandard, 2018). Therefore, the youth worker's responsibility is high and coping with work tasks is expected. High staff exchanges, occupational mobility creates uncertainty for the quality of youth work and raises the question of how effectively the non-formal education is expected to support the formal education in Estonia (Conradsen, 2017; Veigel, 2017). There are 280 youth centers in

Estonia (Pirk, 2018). In the light of demands and expectations of European and Estonian YW, youth workers must deal and be considered as educational staff. Very often the youth worker´s work is associated with solving youth social problems and work with NEET-youth (youth which are neither in employment nor in education or training; eg Tugila program in Estonia). During 2005-2018 various studies showed the high mobility of Estonia youth workers in youth centers and shortage of personnel with special education. Professional youth workers will need long-term employment in the sector to develop and hone their skills (Tamman, 2018; Conradsen, 2017; Veigel, 2015). Thus, the youth workers' professional growth as a professional perspective is important research subject and youth workers´ opinions about personal factors are essential.

The research problem: due to the frequent changes in staffing, it was necessary to study the characterization of the youth workers´ personal factors as the basic elements of the professional growth. The aim of this article was brought to the light youth work specialists´ opinions about the personal factors of the professional growth. The research questions were: (1) which characterized the youth worker motivation? (2) What is work coherence and job dedication in youth work specialists´ opinions? (3) What characterized the professional identity of youth workers? Answers were achieved by a qualitative approach. Semi-structed interviews with 35 Estonian youth work specialists from 14 counties were conducted in 2016-2018.

Theoretical background

Youth workers' professional growth as a professional perspective is important research subject and important to understand its´ basic elements. Estonian Lifelong Learning Strategy 2014-2020 (2013) explained that it is necessary to increase the number of people with professional qualifications. Youth worker quality can be assessed on the basic of the professional standards of the youth worker. The competencies had been described in the occupational standards.

Researchers from different countries have been paying attention to professionalism and it is important to note that the youth worker is a semi-professional (relatively new profession, lack of recognition in society and lack of evidence-based). Noordegraaf (2007) defining a new form of professionalism as a hybrid professional. They are "open" professionals, experts: practitioners who do not have a strong institutional background and who have acquired professional knowledge on a non-formal and informal basis through lifelong learning but are trying to establish their own professions.

Astroth, Garza & Taylor (2004) raised the issue of high mobility among youth workers in the United States and explained the problems. They noted that

most of the employees started to work with great energy, enthusiasm, but they were characterized by a lack of awareness of the development of young people, which could also lead to faster job abandonment. At the same time, there were explained the professional skills and their development, the professionalism and its´ value, the self-efficacy of youth workers. In Estonia, it is important to note these too, and to support professional growth. Tamman (2018) argued to address more customized work-oriented work, which is a prerequisite for employees' desire to relate their work with their own skills and interests. In this way, the worker can raise his own job satisfaction and hedge his retirement intentions.

Professional growth is a natural part of human life, because it supports the coping with work tasks. Ruohotie (2005) said, that this is an ongoing learning process for working life knowledge and skills necessary to obtain that come using the official competent to handle changing requirements. Professional growth basic elements are follows:

- personality factors: motivation, expectations, professional realistic approach (knowledge of strengths and weaknesses), the need for achievement, willingness to manage the situation, dedication to work, coherence with work, strong sense of professional identity. Experienced success and the desired benefits make up the personal professional growth potential. Important is the profile of life, the family - and home roles, health and professional support;
- occupational factors;
- organizational factors (Ruohotie, 2005; Tamm, 2008).

Clarke and Hollingsworth (2002) argued that the components of the Interconnected Model of teacher´s professional growth are: personal domain, the domain of practice, the domain of consequence and the external domain. Personal factors were dealt in their model as more important domains.

The job satisfaction relates to work attitudes. Herzberg's Two-Factor Theory (1989) pointed, that job satisfaction depends on the success of the job. It is affected by motivational and hygiene factors. Motivation involves the nature of the work, achievement needs, development opportunities, trust and accountability. Hygiene factors are: wages, conditions, - quality of management, personal life. Motivation refers to internal motivations, causes, and forces that influence its activity (Vadi, 1995).

A professional identity develops through professional practice and, when interpreted, becomes aware of what has shaped their understanding of practice and their professional identity (Kelchtermans, 1993). Professional understanding of experience is the starting point for supporting professional development. Identity as a narrative self-interpretation that develops in the dialogue between different positions, which, through various social processes, are affirmed in a

social environment and values, when the motives are influenced by the content and behavior of the identity and the creation of the meanings, the over-situation objectives (Hermans, 2012; Tennat, McMullen, & Kaczynski, 2010). Motivated employees who are sufficiently related to the work and commitment to this, obviously, is also interested in the challenge of this occupation. In supporting circumstances, the development of his professional identity is probably considerably larger than it has become clear from researches. Among workers who experience moments of not-knowing what to do, many often describe their thoughts and reactions to the phenomenon in occupational and existential terms. In many cases, the vocational crises following experiences of not-knowing contribute to burnout and youth workers' decisions to leave the field (Veigel, 2018). Transition from academic education to professional world poses a great challenge for any young person individual; Anspal (2018) argued that teachers with a better-educated teacher identity have been found to be more professional-proof and ready for work. Therefore, training should support the development of a professional identity, that is, finding a balance between oneself and a person as a professional.

An increase in the management function requires a different approach to the professionalization of the youth worker's office. At the same time, the competences needed for management are sometimes contrasted with special knowledges and skills (Noordegraaf, 2007). The personality model describes the importance of spirituality and personality traits in professionalism; emphasis on customer focus and knowledge, but knowledge is an important addition to the way of thinking, spirituality, dedication and passion. What matters is not only, what the professional "knows" about, but also what he "thinks" (Van Ruler, 2005).

Youth work is entwined the idea of non-formal learning - guided learning process, which is characterized by thought-out and conscious youth activities, including fixed and formulated learning outcomes (Dunne, Ulicna, Murphy, & Golubeva, 2014). The principle of youth work is to support young people's development, freedom of expression and active participation, enforceability and inclusiveness (Declaration of the 2nd European Youth Work Convention, 2015). One of the goals of the Youth Development Plan for 2014-2020 is to work more effectively in the youth field, one of its outputs being to increase the educational impact of such youth work and support youth work quality in developing young people's key competences. This means the need to understand the learning process in the context of youth work, to support learning and to create a favorable environment for the development of young people (Veigel & Reedik, 2017). The current Youth Development Plan 2014 - 2020 (2013) presented the concept of youth as a resource. Therefore, taking into the account of all above, the youth worker can do a great deal and differently, through activities, methods,

cooperation, networks, projects to direct the youth field, including their daily work. The fun and educational aspect of activities are important (Merton, 2007). Youth workers are educators, trainers and therefore capable of designing educational goals in their daily work. The question remains at the level of the person - who is he/she? What are his/her knowledges, skills, interest, desire? What is coherence with work and commitment?

Methodology of research

This research applies a qualitative research strategy, based on a phenomenological approach. For qualitative data collection semi-structured interviews were conducted with a total of 35 Estonian youth workers and experts (youth centres/YC/directors, youth field coordinators); 5 men and 30 women from 14 counties, mostly worked in cities and who has worked in the speciality for at least 2-3 years. Most experts had worked as a youth worker. During 2015-2017 in Estonia various youth workers´ studies and courses participates were mostly women (86 %). Pilot interview was conducted with youth worker and the other with YC director, who had over four years work experience. After this the questions were developed and clarified. Interviews were conducted individually in 2016-2017 (30), and for confirm the focus of the basic elements extra in 2018 (5). They lasted usually from 1 to 2h, were recorded on tape. The interviews were carried out in a quiet place at the university or at work place. This was considered important in order to maintain objectivity and to create an atmosphere in which interviewees would not were afraid to share their experiences and to express viewpoints that might be critical of their study experiences. The interview takes place in a social context. Both the interviewer and the interviewee brought to an interview with their past, age, position, expectations and beliefs (Wengraf, 2001). A common understanding will be created during the interview. The data-driven thematic analysis process included six phases. First, all recorded interviews were transcribed, read and initial ideas noted. Next, initial codes were generated regarding the phenomenon. In the third phase, the different codes were sorted into potential sub-themes and key-topics. Subsequently, the content of the created sub-themes and main themes were checked. In the fifth phase, all sub-themes (36) and key-topics (8) (Table 1) were refined and named. In the last phase, the final analysis was written. In the focus of the research were personal elements as youth workers´ professional growth basics.

The anonymity of the sample was ensured. Protecting participants and respecting their right to make decisions regarding their participation were the core ethical principles guiding the treatment of the participants in the research. Before research, the participants were informed of the purpose of the research

and how the information they would give would be used (e.g. through anonymous quotes). Participation was voluntary and participants were informed of their right to withdraw at any time without consequences. No sensitive questions were asked.

Results and discussion

This section explains how interviewees perceived their opinions about youth workers´ personal elements in the context of professional growth.

Motivation. It turned out rather internally short-term motivation and mostly project-based work has increased. It was clear that, youth workers´ assessment of managers´ support for solving their tasks independently was high (Tamman, 2018) and external motivation important. Internal motivation was a causal (a pleasing activities). Sometimes there was even an attitude that education is not important for cope with daily work. Lifelong learning principles, including learning in networks, were not often understood and awareness.

Tabel 1 **Main key-topics and sub-themes that constitute the pattern of meanings the youth workers attributed to the personal factors**

Key topics	Sub-themes
Motivation	Rather internally short-term motivation
	Supported by the outside (colleagues), rather external motivation Youth satisfaction (feedback) motivates most
	Internal motivation is a causal (a pleasing activities)
	Residence close to the workplace
	Suitable occupation
Expectations	Youth work has high expectations (activities with NEET-youth, educational goals, work-training, internationalization, etc.) Valuing more the youth work
	Desire to be more autonomous
	Routine free work
	Teaching key competences in non-formal learning
	Experts' expectations related to greter professionality
Realistic professional approach	Different special trainings leading by youth worker Mostly project-based work rather has increased
	Flexibility is appropriate for the elderly workers
	Well-established volunteers
	Networking, its´possibilities varies locally, but supports y.workers
	2-4 years experienced worker had theoretical knowledge in practical work and often innovative views

Work dedication and work coherence	Youth workers are rather more dedicated periodically The decreasing contact work will changed the nature of the work
	Altruism may sometimes occur
	Pleasant tasks and possibility to choise options were revealed
	Health could be as the factor in the future work choices
	Youth workers like the work with young people
	Less experienced youth workers argued that, rather does not operate in the area after the 3-5years
Professional identity	Experts have a strong professional identity supported by professional development
	In many youth workers are rather questionable professional identity, as they also deal with other specialties, Partialy youth workers have level in other occupation
Achievement needs	Could be higher among youth workers
	For experts, especially noticeable and valued
Situation control, leading	Rather noticeable among youth workers periodically Difficulties are caused by the youth behavior
	Powed in the case of youth work experts
Health	Work conditions are very different
	Often deteriorating mental health
	Burnout, or risk for it

„I do not agree, that to be youth worker, you must learn. You must to be very motivated to do this work". Revealed that, on several cases youth worker worked alone.*" When I came to work, I was completely alone for 6 months, I worked alone for a long time".* Such situations were rather demotivated and didn´t support professional development. Youth satisfaction (feedback) and youth development motivated workers mostly. *"I am motivated, complicated, interesting, feedback from young people if you see that a young person who is at risk of prison, but you see that he has gone to work".* According to Noordegraaf (2007), the description of "open" professionals was as follows. Knowledge is an important addition to the way of thinking, spirituality, dedication and passion (Van Ruler, 2005). Interviewees with professional education had more success and were more professional in the context of expectations for youth work.

Expectations. Experts´ expectations were related to greater professionality and teaching key competences in non-formal learning. *".. To get up from the table upstairs, go to the open space, go somewhere in the field, play ..all the action is still with the young people".* Revealed desire to be more autonomous. Youth work valuation differs from regions. Routine free work was often expected in youth work, but the opposite was true in the cases unexpectedly. *"Many employees were on the computers and as if they were doing projects..".*

Professional youth workers will need long-term employment in the sector to develop and hone their skills (Conradsen, 2017; Veigel, 2015).

Realistic professional approach. The work of a youth worker can be seen in integration with different disciplines: natural sciences, sports, psychology, art, languages, culture, music, IT ect. It turned out that mostly hobby activities, counseling and project-based work were increased. 2-4 years experienced worker had (better) theoretical knowledge in practical work and often innovative views. *"With regard to goals, quality of work. At the moment, I'm not happy with the work of a youth worker sitting at the table and waiting while young people go talk with him".* Technology should be used more for smart youth work.

Work dedication and work coherence. Youth work is value-based. *"It's not easy, because every person is not fit for work here. He must have ethics, values in place, an understanding of how to deal with young people. Also, often a teacher does not fit into this job because he can´ not understand simply because he is like a school for him".* A dedicated youth worker created a suitable environment for young people. *"The attitude towards the building is quite different.. That's their home and a safe place to come here, if you feel..".* Employee professionalism supported work coherence. A skilled worker will better cope with the job and is more professional. *"Some young people are coming ... those who come back here if their life is very difficult or if they can´ not handle it themselves".* Altruism may sometimes occurred and overwork, for example, in camps, during events, but it was accepted by the employee.

Professional identity. Many interviewees work else in different professions, so there was no clear professional identity. Youth worker identity involves both the individual and the social nature: it develops through social interactions in social contexts. Youth worker´s short-term motivation and studies did not provide enough support for the development of a professional identity. *"My studies changed to become more demanding of myself and my work. I'm looking at something from another angle and more demanding than ever".* Partialy youth workers had level in other occupation. A professional identity develops through professional practice (Kelchtermans, 1993). It turned out that experts had a strong professional identity supported by professional development. Most of them worked before as youth workers.

Achievement needs. It turned out that aspect could be higher among youth workers. *"I'm not a specialist in any special field, but that (YW) the organizational work and I like to feel that I should be able to organize, to do it, to do the negotiations".* Developing reflection skills should be supported and taught and maybe students should be given more responsibility for reflection, so they can develop more confidence in their own judgments. Ruohotie (2005)

explained experienced success and the desired benefits make up the personal professional growth potential.

Situation control, leading. Management knowledge, skills and attitudes also ideally required the acquisition of academic education. *„I can´not be a cultural organizer, to produce consumers in society.. I'm the person who supports and stands next to youth and we work together, I can help you do everything, then I can help you analyze what was well, what's wrong, what can be improved..".* It was important to apply the skills and knowledge of the employees and, if possible, to link them with their interests and the meaningfulness of the work (Tamman, 2018).

Health. Flexible working hours were often good for intervieewes, but it depends from workers´ family, health. Workrooms in the basement were not pleasant generally. *„Evening work-hours do not allow for a normal family life..and you would like to leave".* In addition to work-stress influenced on their own mental health. *"I began to think that this terror began to assume the brains, because it was doing the opposite of what I recommended, and then it happened that I thought, however, that I would not leave my job after 1 boy".* It turned out that age was considered an important factor in the context of professional growth. *"With age change my health and I will change my profession..go to social work".*

Conclusion

From research emerged, that more attention should be given further to support better youth workers´ professional development, to maintain their internal and long-term motivation, and treatment. Individual work is one way to increase work-life balance and stay in the workplace customization, but it must be supported by the professional mentor. Employee professionalism supported work coherence. High expectations to the youth work requires workers to work professionally, coping with everyday work and be more focused on success and achievements. The preparation of youth workers is very different and the setting goals of non-formal learning, including educational, is rather random. Many youth workers can be treated as representatives of hybrid professionals, which confirmed that vocational training a youth worker level 4 is necessary (incl. work-based learning), which is not available in Estonia. Different commitment to everyday work could have resulted from their education and professional training. There were rather few interviewees, who had youth workers professional identity. Less experienced youth workers rather will do not operate in the area after the 3-5 years. There is a need for a sustainable program/curriculum for motivated beginners and trainings for advanced youth workers. Interdisciplinarity, internationalization, entrepreneurship and other

important topics can only be properly addressed by motivated, professional and committed youth workers. Experts understood the content of the field, but it is hard to train and mentoring many new colleagues constantly.

The growing tendency to work while studying must take more the focus on reflective activities, which help to combine the professional and personal aspects of becoming a youth worker: developing youth worker identity.

Health and wellbeing are important factors that affect many youth workers do decide for benefit of the profession. Mental health concerns associated with the behavior of young people and tension for right decisions, responsibility. Prevention of altruism could be under the spotlight.

The study limitation was qualitative methodology, which does not allow for extensive generalizations, but it was necessary to obtain the information that other methods would have been difficult. This topic should be explored in the other aspects of professional growth basic factors.

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GADĪJUMU PĒTĪJUMS PAR PIEAUGUŠO PROBLĒMU RISINĀŠANAS PRASMJU UZLABOŠANU

Case Study on the Improvement of Adult Problem-Solving Skills

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Abstract. *A number of research studies have been done on knowledge, skills and competences in relation to sustainable development. The concept of competences is seen as an essential landmark for orienting teaching and learning for sustainable development of society. One of the most common competencies mentioned in the surveyed literature and most often required by employers is problem solving. To develop an adult needs oriented education program to improve problem-solving skills, the aim of this study is to identify skills and competencies which are necessary for adults to manage their professional life and to overcome challenges of modern world as well as to improve their personal resilience. This study includes two parts. In the first phase of the study, a survey of adult education providers was compiled in four countries: Latvia, Sweden, Italy and Bulgaria. Summarizing the opinions, the main groups of adult problems were identified: family problems, work and career related problems, and so-called general problems (including problems related to decision making), as well as identified problem solving methods. This study summarizes also adult learners survey results in Latvia on problem-solving skills and the needs and opportunities for developing this competence are analysed in details.*
Keywords: adult education, competencies, problem-solving skills, problem-solving strategies, survey.

Ievads
Introduction

Zinātniskajā literatūrā atrodami vairāki pētījumi par zināšanām, prasmēm un kompetencēm saistībā ar ilgtspējīgu attīstību, skatot kompetences kā ilgtspējīgas attīstības pamatelementus. Kompetences jēdziens tiek uzskatīts par būtisku orientieri, lai orientētu mācīšanu un mācīšanos sabiedrības ilgtspējīgai attīstībai. Arī Eiropas Komisijas (EK) dokumentos skatīts kompetences jautājums nosakot dažādas pamatprasmes, katra no kurām veicina veiksmīgu dzīvi sabiedrībā (EK, 20006, 2018). Pamatprasmes ietver tādas prasmes kā

kritiska domāšana, problēmu risināšana, komandas darbs, saziņas un sarunu prasmes, analītiskās prasmes, jaunrade un starpkultūru prasmes (EK, 2018).

Viena no visbiežāk literatūrā apskatītajām iepriekš minētajām kompetencēm ir problēmu risināšana. 2016.gadā notikušajā Pasaules ekonomikas forumā šī prasme tika identificēta kā viena no desmit prasmēm, kas nepieciešama nodarbinātībai nākotnei (World Economic Forum, 2016). Arī pētījums, kas tika veikts darba devēju vidū Amerikas Savienotajās Valstīs, problēmu risināšanas prasmes un kritiskā domāšana ir vienas no svarīgajām prasmēm, kas nepieciešamas jauniešiem, kuri ienāk darba tirgū (The Conference Board, 2006).

Jāatzīmē, ka kritiskā domāšana ir ļoti tuvu problēmu risināšanas prasmēm, bet vairāk vērsta uz "informācijas identificēšanu un interpretāciju, informācijas analīzi, kā arī pierādījumu un argumentu novērtēšanu" (Firdaus, Kailani, Bakar, & Bakry, 2015). Savukārt, problēmu risināšana ietver mērķtiecīgu domāšanu un rīcību situācijās, kurās nav pieejama rutīnas risinājuma procedūra. Parasti problēmas risinātājam ir zināmi mērķi, taču nezina, kā problēmu atrisināt. Problēmu risināšanas process ietver problēmas situācijas izpratni un tās pakāpenisku transformāciju, balstoties uz plānošanu un izvērtēšanu (Finegold & Notabartolo, 2016). Zinātniskajā literatūrā tiek uzsvērta arī problēmu risināšanas prasmes nozīmība gan ekonomikā kopumā, gan darba vietās, kas prasa elastību un inovāciju.

Cilvēki katru dienu saskaras ar problēmām, kas jārisina. Strauji mainīgā pasaule un dažādi apstākļi var radīt dažādas problēmas ne tikai darbā, bet arī personiskajā dzīvē, piemēram, nelaimes gadījumi, slimības, bezdarbs utt. Neatkarīgi no tā, vai jautājums ir liels vai mazs, visi cilvēki izvirza mērķus sev, saskaras ar izaicinājumiem un cenšas tos pārvarēt. Taču dažreiz cilvēki nevar atrast efektīvus un apmierinošus risinājumus. Pakāpeniski pastāvīga problēma nomāc cilvēkus. Viņi jūtas zaudēti jaunos apstākļos un kļūst nomākti. Tas rada jaunas problēmas - dažreiz bezdarbu, atkarību u.t.t.

Izglītība ir galvenais līdzeklis, lai sniegtu zināšanas, uzlabotu cilvēku spējas un pilnveidotu prasmes. 21.gadsimtā īpaša uzmanība tiek veltīta tādu apmācības programmu izveidei vai pedagoģiskajai praksei, kas nodrošina problēmu risināšanas prasmes, kritiskās un radošās domāšanas attīstību. Tāpēc Erasmus+ Stratēģiskās partnerības projekta Nr. 2017-1-LV-1-KA204-035487 "Pieaugušo problēmu risināšanas prasmju attīstīšanas stratēģijas personas veiktspējas sekmēšanai" mērķis ir sekmēt atbilstošu neformālās izglītības atbalstu pieaugušajiem, lai veicinātu tādu prasmju apgūšanu, kas nepieciešamas, lai dzīvotu un strādātu mainīgā pasaulē, galveno uzmanību pievēršot problēmu risināšanas prasmēm, kā arī sagatavot pedagogus nepieciešamā atbalsta sniegšanai.

Projektā sagaidāmais rezultāts ir izstrādāta unikāla, sistemātiska, pārdomāta un viegli pielāgojama pieaugušo izglītības mācību programma, lai veicinātu problēmu risināšanas prasmes indivīdiem, ar mērķi uzlabot personu veiktspēju, palīdzot attīstīt prasmes un kompetences, kas ir nepieciešamas pieaugušajiem, vadot un plānojot savu dzīvi, izglītību un karjeru.

Šā iemesla dēļ šī pētījuma mērķis ir noteikt prasmes un kompetences, kas nepieciešamas pieaugušajiem, lai pārvaldītu viņu profesionālo dzīvi un pārvarētu mūsdienu pasaules izaicinājumus, kā arī uzlabotu viņu personīgo izturību.

Pētījuma metodika
Research methodology

Pētījums ietver divas daļas. Pirmajā pētījuma posmā apkopota pieaugušo izglītības pakalpojumu sniedzēju aptauja četrās valstīs: Latvijā, Zviedrijā, Itālijā un Bulgārijā. Apkopojot viedokļus, noteiktas galvenās pieaugušo problēmu grupas: problēmas ģimenē, problēmas saistībā ar darbu un karjeru, un, tā sauktās, vispārējās problēmas (ietverot arī problēmas, saistībā ar lēmumu pieņemšanu), kā arī identificētas apzināto problēmu risināšanas metodes.

Balstoties uz šī pētījuma pirmā posma rezultātiem, izveidota aptaujas anketa pieaugušajiem par problēmām un kā viņi tās risina, kas pieejama vietnē: http://www.iipc.lv/surv/index.php/survey/index/sid/693528/newtest/Y/lang/lv

Aptaujā kopumā piedalījās 166 respondenti, taču, kā šī pētījuma bāze, izmantotas tikai 92 anketas, kas tika pilnībā aizpildītas. Pētījuma izlases raksturojums atspoguļots 1.tabulā.

*1.tabula. **Pētījuma izlases raksturojums***
*Table 1 **Characteristics of the sample***

Dzimums	siev iete		vīrietis			
	90.2%			9.8%		
Vecums	*<18*	*18-25*	*26-30*	31-40	41-50	*51-60*	61<
	-	3.3%	2.2%	22.8%	26.1%	31.5%	14.1%
Dzīves vieta	lauki	mazpilsēta		vidēja pilsēta		liela pilsēta	
	25%	37%		14.1%		23.9%	
Nodarbinātība	vadītājs	darba devējs	darba ņēmējs	pašnodar-binātais	bezdarb-nieks	students	mājsaim-niece
	21.7%	7.6%	58.7%	5.4%	-	2.2%	4.3%
Izglītība	pamata	vidējā	profesi-onālā	augstākā	Maģistrs	PhD	
	-	6.5%	7.6%	35.9%	44.6%	5.4%	

n=92

Pētījuma rezultāti un diskusija
Research results and discussion

Pētījuma rezultāti rāda, ka Latvijā pieaugušajiem vislielākā problēma ir laika trūkums (71.1%). Vairāk nekā viena trešdaļa aptaujāto respondentu ļoti bieži saskaras arī ar finansiālām problēmām (37%). Savukārt, vairāk nekā 80% no aptaujātajiem apgalvo, ka viņus vispār neskar atkarības problēmas vai arī izolētības problēmas, kontaktu nepietiekamības dēļ (1.att.).
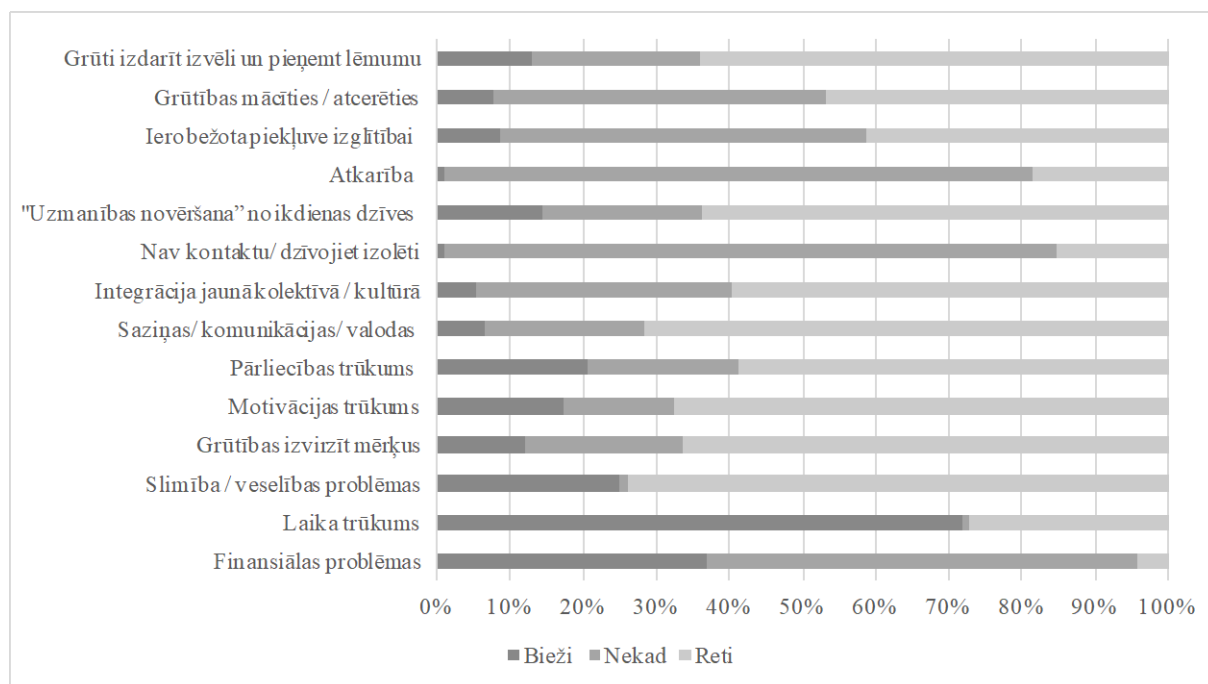
1.attēls. **Vispārējas problēmas, ar ko saskaras pieaugušie**
Figure 1 **General problems faced by adults**

Vairāk nekā puse aptaujāto pieaugušo apgalvo, ka viņi savā ikdienas dzīve saskaras gan ar nelīdzsvarotu pienākumu sadali ģimenes locekļu starpā (51.1%), gan ar finansiālām grūtībām (51.1%). Vairāk nekā pusei no respondentu (54.3%) problēmas rada arī sarežģītas ģimenes attiecības (2.att.).
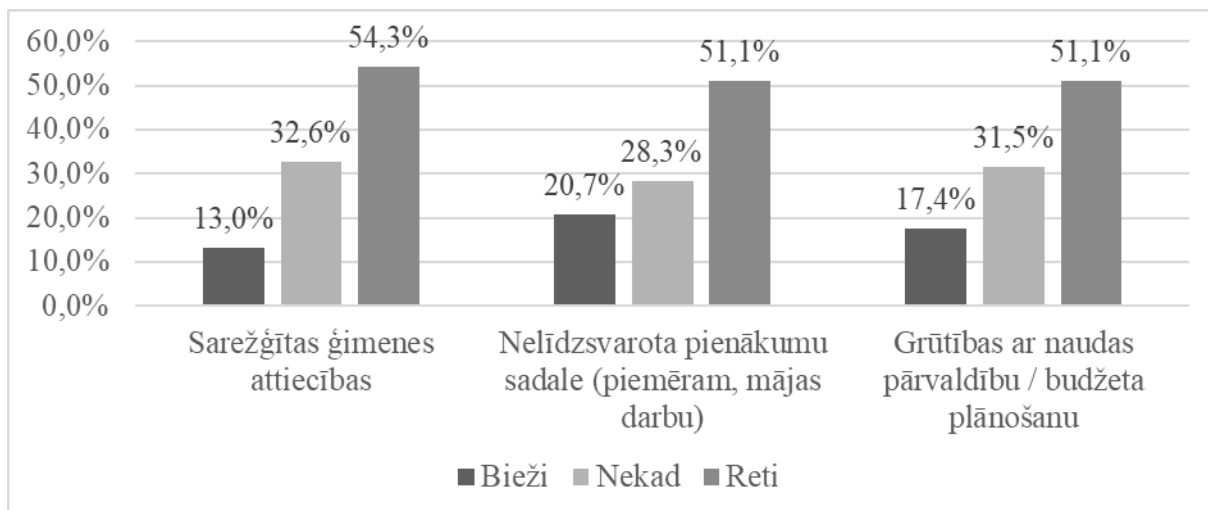
2.attēls. **Problēmas ģimenē**
Figure 2 **Family problems**

Vislielākā problēma Latvijā pieaugušiem, saistībā ar darbu un karjeru, ir nepietiekams vai neatbilstošs atalgojums (39.1%). Liela problēma ir arī līdzsvars starp darba un personīgo dzīvi (19.6%). Pozitīvi ir tas, ka 69.6% aptaujāto bezdarbs nekad nav bijusi problēma. Kā apgalvo 65.2% aptaujāto, arī iebiedēšana darbā ir reti sastopama. 56.5% respondentu reti nespēj atpazīt savas prasmes un stiprās puses, bet 52.2% nepietiekama kvalifikācija nekad nav bijusi problēma (3.att.).
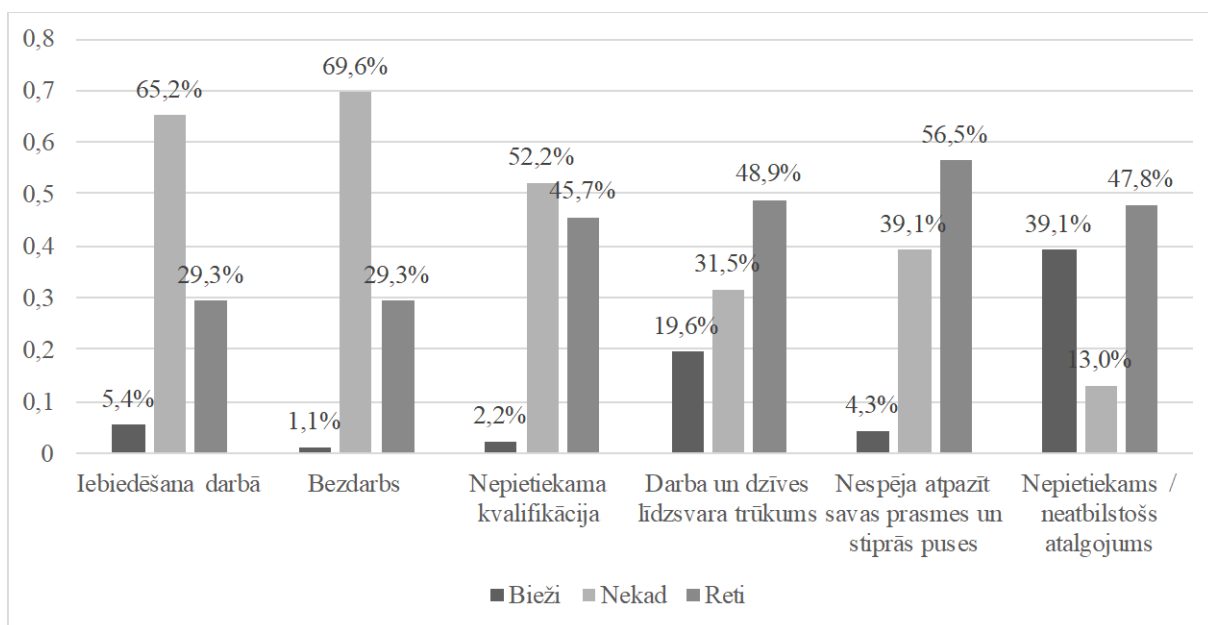
3.attēls. **Problēmas saistībā ar darbu un karjeru**
Figure 3 **Work and career related problems**

Laika trūkumu visvairāk izjūt pieaugušie vecumā no 31 līdz 50 gadiem (56%). Savukārt, respondenti, kas vecāki par 50 gadiem, apgalvo, ka viņi ar laika trūkumu nekad nesaskaras. Pētījums arī apliecina faktu, jo augstāks izglītības līmenis, jo retāk sastopas ar laika trūkumu, kas apliecina laika menedžmenta prasmes, lai gan respondenti tieši ar augstāko izglītību ļoti bieži saskaras ar finansiālām problēmām. Jāatzīmē, ka arī pieaugušajiem ar augstāko izglītību ir problēmas izvirzīt mērķus, un, lai gan reti, tomēr ir saziņas/ komunikācijas/ valodas problēmas.

Laukos cilvēkiem vislielākā problēma ir laika trūkums, bet kontaktu trūkums vai dzīvošana izolēti viņus neskar. Slimība vai veselības problēmas ir trešā nozīmīgākā problēma, ar ko saskaras visas respondentu grupas.

Izrādās, ka ierobežota piekļuve izglītībai (finansiāli iemesli, satiksme līdz skolai, nav pieejami piemēroti kursi…) biežāk ir vērojama tieši lielās Latvijas pilsētās, nekā mazpilsētās.

Ar darbu saistītās problēmas visbiežāk vērojamas vecumposmā no 31.līdz 50 gadiem, kad iedzīvotāji ir arī ekonomiski visaktīvākie. Šajā grupā ir arī vislielākais darba un dzīves līdzsvara trūkums 72.2% respondentu.

Ar iebiedēšanu darbā saskaras tikai pieaugušie ar augstāko izglītību. Kopumā 80% darba ņēmēju apgalvo, ka darbā viņi cieš no iebiedēšanas.

Nepietiekamu kvalifikāciju pašreizējam vai turpmākam darbam kā problēmu, ar ko saskaras, ļoti bieži norāda gan pašnodarbinātas personas, gan uzņēmuma / departamenta vadītāji. 59.6% gadījumu darba ņēmēji nespēj atpazīt savas prasmes un stiprās puses. Ar atalgojumu nav apmierināti gan darba ņēmēji (64%), gan uzņēmuma / departamenta vadītāji (41.2%).

Pētījumā tika iegūti arī citi rezultāti, kas var būt noderīgi, plānojot pieaugušo izglītības programmas noteiktai mērķauditorijai.

Kā tiek risinātas problēmas? Mūsdienu tehnoloģiju laikmetā, radušos problēmu gadījumā, atbildes visbiežāk tiek meklētas internetā (73.9%), taču 57.6% aptaujāto norāda, ka viņi apmeklē kursus vai seminārus (4.att.), lai pilnveidotu profesionālo kompetenci un citas prasmes, saistībā ar problēmām, ar kurām viņi sastopas gan darbā, gan personīgajā dzīvē (piemēram, valodu, komunikāciju prasmes; sevis apzināšana, personīgo plānu izveidošana, u.c.).

Jāatzīmē, ka dažāda veida specializētas konsultācijas (piemēram, psihologa, karjeras vai ģimenes u.c.) nav populāras, jo tikai 10.9% apgalvo, ka tādas izmanto (4.att.).
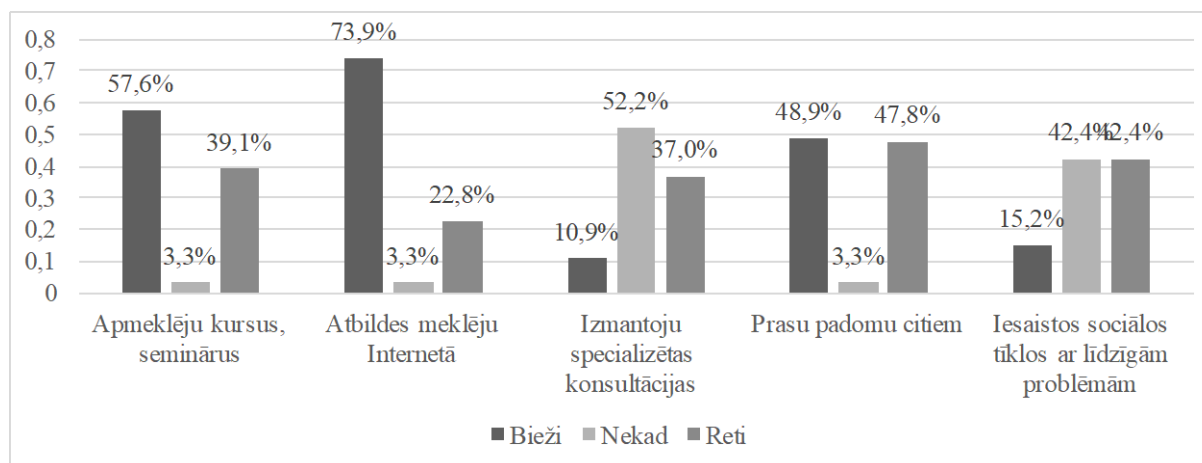
*4.attēls. **Atbildes uz jautājumu: "Kā jūs risiniet savas problēmas?"***
Figure 4 Answers to the question: "How do you deal with your problems?"

Apkopojot, Latvijā, Zviedrijā, Itālijā un Bulgārijā veiktās pieaugušo izglītības pakalpojumu sniedzēju aptaujas rezultātus, redzams, ka vissvarīgākās ir starppersonu prasmes (piemēram, komunikāciju - spēja uzklausīt, aktīvā klausīšanās, spēja atspoguļot sociālo lomu, utt.), laika menedžments un tādas indivīda prasmes, kā pašdisciplīna, motivācija, prasme izvirzīt mērķus u.c. Pētījumā otrajā posmā iegūtie rezultāti apliecina, ka Latvijā pieaugušajiem nepieciešams arī uzlabot savu finanšu pratību, jo vairāk nekā 40% pieaugušo ikdienā saskaras ar finanšu problēmām un grūtības ar naudas pārvaldību un budžeta plānošanu rada problēmas ģimenē. Gan darbā, gan ikdienas dzīvē nozīmīga ir arī informācijas pratība (meklēšana, izvērtēšana, izmantošana u.c.). Tās ir galvenās pieaugušo veiktspēju sekmējošas prasmes, kurām veltāma galvenā uzmanība pieaugušo izglītības programmu izveidē.

Secinājumi
Conclusions

No pētījuma empīriskajā daļā iegūtajiem rezultātiem izriet sekojoši secinājumi:
1. Latvijā pieaugušajiem vislielākā problēma ir laika trūkums, kā arī ar finansiālas problēmās, vismazākās - atkarība vai izolētība.
2. Vairāk nekā puse aptaujāto ģimenē saskaras ar visām anketā minētajām problēmām.
3. Saistībā ar darbu un karjeru, Latvijā pieaugušiem vislielākā problēma ir nepietiekams vai neatbilstošs atalgojums, arī darba un personīgās dzīves līdzsvars.

4. Atbilžu meklēšana internetā ir visbiežāk minētais problēmu risināšanas veids. Lai pilnveidotu profesionālo kompetenci un citas prasmes, saistībā ar problēmām darbā vai personīgajā dzīvē, vairāk kā puse aptaujāto pieaugušo Latvijā apmeklē kursus vai seminārus.

5. Pieaugušie vecumā no 31 līdz 50 gadiem visvairāk cieš no laika trūkuma. Savukārt respondenti, kas vecāki par 50 gadiem, laika trūkumu neizjūt vispār. Rezultāti rāda, jo augstāks izglītības līmenis, jo retāk sastopas ar laika trūkumu.

6. Slimība vai veselības problēmas ir trešā nozīmīgākā problēma, ar ko saskaras visas respondentu grupas.

7. Pieaugušo izglītības programmu izveidē akcentējamas sekojošas indivīda veiktspēju sekmējošas prasmes: starppersonu prasmes, laika menedžments, pašdisciplīna, motivācija, prasme izvirzīt mērķus, arī finanšu pratība u.c.

Summary

The results obtained in the empirical part of the research show that the biggest problem for adults in Latvia is the lack of time (71.1%), and also financial problems (37%), the rarest problems - addiction or isolation ("never" answered more than 80%). More than half of the respondents in the family face all the problems mentioned in the questionnaire: difficult family relations (54.9%), problems to balance responsibilities *(e.g. housework)* (51.1%) and difficulties with money management/ budget planning (51.1%).

In terms of work and careers, the biggest problem for adults in Latvia is insufficient or inadequate remuneration ("very often" answered 39.1%) and also work-life balance (19.6%).

In the modern technology era, in the case of problems, answers are most often searched on the Internet (73.9%), but 57.6% of respondents indicate that they attend courses or seminars to improve their professional competence and other skills related to problems they encounter both at work and in their personal lives (e.g. language, communication skills; self-identification, personal plans, etc.). Different types of specialized advices *(psychologist, family or career counselling, etc.)* are not popular in Latvia, as only 10.9% are visiting them. Only 15.2% of the respondents are involved in social networks, to share experiences and see what others do with similar problems.

Adults aged between 31 and 50 suffer most from the lack of time (56%). In turn, respondents over 50 years of age say they never face lack of time. Illness or health problems are the third most important problem facing all groups of respondents. The biggest problem in rural areas is the lack of time, but lack of contact or living in isolation does not affect them.

The results of a survey of adult education providers in Latvia, Sweden, Italy and Bulgaria show the topic of adult education curriculum that promote adult resilience: interpersonal skills (e.g., communication - ability to listen, active listening,

ability to reflect on social role, etc.), time management and intrapersonal skills such as self-discipline, motivation, ability to set goals, etc. The results of the second phase of the study show that adults in Latvia also need to improve their financial literacy, as more than 40% of adults face financial problems on a daily life as well as difficulties in managing money and budgeting cause problems in the family.

Pateicība
Acknowledgements

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GALVENĀS MĀCĪBU TĒMAS UN TO NOTEIKŠANAS PRINCIPI DARBA VIETĀS LATVIJĀ

Identifying the Training Needs and the Key Training Topics in the Enterprises of Latvia

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Abstract. *The role of a workplace in the provision of lifelong learning processes is increasingly emphasised in the academic discourse. Since the early 21st century, a new term – "workplace pedagogy" (Billet, 2000) – has appeared, which signifies the increasingly important role of the workplace in the process of adult learning. The goal of this article is to discuss the key principles in determining the training needs and the key training topics in the enterprises of Latvia. The author of the article has carried out a qualitative study using a partially structured interview method. Four heads of human resource departments have been interviewed in four enterprises of Latvia with varied capital and with total number of employees reaching more than 6000. The outcomes of the study reveal three key tendencies in determining the training needs. First, the principle of urgency, namely, technical training, in order to ensure that corporate activities are pursued in accordance with law. Second, the principle of professional development for staff. This block contains various training options aimed at the development of the different skills and competences. Third, the training dictated by the development of information technologies. However, it must be noted that it is more characteristic to the enterprises specialised in information and communication technologies and thus could be integrated in the group mentioned in the second group. All the interviewees confirmed that training in the companies they represent is financially supported, although specific amount of expenditure was not mentioned. Still, it is possible to conclude that the planning and implementation of staff training form an integral part of corporate strategies. At the same time, it is possible to draw a conclusion that several crucial skills such as complex problem solving, cross-cultural competency, new media literacy, which have been mentioned as essential in the sources used for this research, have been neglected as staff training options.*
Keywords: *adult education; adult learning; life-long learning; skills for jobs; workplace learning; workplace pedagogy.*

Introduction

The World Economic Forum (WEF) report entitled *The Future of Jobs Report* (2018a) confirms that the speed of change in the labour market has been increasing since 2016, when the World Economic Forum published its initial study on *The Future of Jobs: Employment, Skills and Workforce Strategy for the*

Fourth Industrial Revolution. Furthermore, the gap between skills and competences demanded in the labour market and the capacity of the formal education system to provide opportunities to acquire these skills and competences is growing. For this reason, more and more enterprises are becoming "learning places", not only by offering, providing and financing, but by integrating training of different types, forms and content into entrepreneurial processes. According to Van Dam and Guidone (2018), in future enterprises are likely to be able to keep the best employees only by developing a "learning culture" that offers employees continuous development opportunities. On the other hand, the growing trend of freelancers in the West, which in 2020 is estimated to reach 50% of the workforce by a number of authors and organisations (Kaufman, 2014), the author of the article herein is nevertheless inclined to think that every adult will be more responsible for developing his/her own skills and expertise and for creating and strengthening his/her own personal "brand" in an increasingly demanding and changing labour market. This is demonstrated by a study published by the WEF in 2018, in which 84% of enterprises admit that they would choose a strategy to recruit new employees to replace the existing ones and only 72% would teach the existing ones to address the issue of skills shortage.

Both the 21st century skills mentioned in the sources analysed in this article and the skills required in the labour market (e.g. persuasion, negotiation skills) fall within the so-called "social competences" category, which cannot be learned in school to the extent required by the labour market. There are also digital skills that cannot be acquired to the extent needed within the framework of the formal education system, for objective reasons such as the rapid development of technologies and artificial intelligence. Therefore, workplaces play an increasingly important role in both informal and formal education system (for example, work-based learning). Otherwise, the enterprise will simply lose its competitiveness and place in the market.

The objectives of this research are:

1) whether there are any mechanisms for identifying the training needs in the ever-changing business circumstances, and if there are – what kind of mechanisms;
2) what are the key training topics in the workplaces in Latvia.

A qualitative study has been carried out to achieve this aim. The method of semi-structured face-to-face interviews has been used to collect the primary data, and the method of thematic analysis has been applied to the data analysis. HR managers from four large enterprises (each of more than 1000 employees in Latvia) with both foreign and local capital have been interviewed.

Literature review

Comparatively recently, in the late 20th century, training in the enterprise was largely focused on increasing the employees' skills. "The purpose of management training and development is to increase competence by doing a specific job" (Kubr & Prokopenko, 1989, 9). However, the study *The Future of Jobs Report* (WEF, 2018a), as well as previous studies, have shown that in the 21st century training in the workplace should change in terms of the content, too. Trilling and Fadel (2009) divide the skills needed in the 21st century into three categories: learning and innovation skills, digital literacy skills and career and life skills (Trilling & Fadel, 2009), of which: the latter includes skills such as flexibility and adaptability, initiative and self-direction, social and cross-cultural interaction, productivity and accountability, leadership and responsibility. Social intelligence and cross-cultural competency are also mentioned by Davies, Fidler and Gorbis (2011) in their study *Future Work Skills 2020*. Reports by the WEF in 2016 and 2018 mention emotional intelligence as a necessary skill of the 21st century. From the above, it can be concluded that the understanding of the competency of a modern and competitive employee goes far beyond the definition provided by Kubr and Prokopenko in 1989, namely, to increase the competence to do the work in question. Or, it can be said that the pursuit of a particular job in the 21st century is not merely about professional competency and its increase.

Since 1999, Eurostat has been collecting data on vocational training (*Continuing Vocational Training Survey* (CVTS) up to 2005, *Vocational Education and Training Statistics* by 2005, *Vocational Education and Training Statistics* currently) in the European Union (EU), including statistics on the continuing vocational training in enterprises (*Continuing Vocational Training in Enterprises*). According to the most recent data by Eurostat, most of the vocational training programmes in enterprises are provided outside the formal education system, which is to be classified as non-formal education or training (Eurostat, 2018).

Eurostat data show that the number of enterprises providing further vocational training and development opportunities to their staff has increased by 6.8% in 28 EU countries in 2015 compared to 2010 and by 12.8% compared to 2005. In Latvia, there were 99.9% of such enterprises providing further vocational training and development among those surveyed in 2015. Compared to 2005, this indicator has increased more than twice in Latvia. This increase may be explained by the opportunities and investments offered by the European Structural Funds in the field of adult education, which has continued since 2001 and is available under the *Human Resources and Employment* operational programme in a variety of sub-activities, including promotion of the

competitiveness of economic operators (esfondi.lv). High professional development rates were also found in Norway – 99.1% of enterprises offered further training courses to their employees in 2015, while for example in Greece, this percentage was 21.7%.

Eurostat (2018) distinguishes the training of employees not only by content but also by form. In other words, continuing vocational training means that courses are led separately from the active workplace and the training takes place in a specially designated place (training centre, classroom). The content of the training is adapted to a specific group and internal and external continuing vocational training and development courses are provided. Another method, or other forms of training, are usually related to active work and workplace, but may also include participation in conferences, fairs and the like.

Having analysed the scholarly literature and sources in the context of teaching content and thematic blocks, it can be concluded that there is still no common understanding of the so-called "soft skills". In Latvian language these essential 21st century skills do not even have a generally accepted translation. In the context of the new training content to be developed in the field of general and vocational education, in the projects funded by the European Structural Funds entitled *The Approach of Competences in the Learning Content* and *Improving the Sectoral Qualification System for the Development and Quality Assurance of Vocational Training* the term "transversal skills" is used (the term "transversal skills" is also used in the European Commission and UNESCO documents). "Transversal skills" are understood as self-knowledge and self-awareness, thinking and creativity, cooperation and participation and digital literacy (Izglītība mūsdienīgai lietpratībai…, 2017).

In the final report of the WEF entitled *The Future of Jobs Report* (2018a), skills such as creativity, critical thinking, originality and initiative, persuasion and negotiation skills are named as "human skills". In Latvian, the soft skills are sometimes translated as "social skills", sometimes as "simple" or even "individual skills". On the other hand, the OECD reports *The Future of Education and Skills. Education 2030* (2018) talks about "transformative competences", understanding the growing need to be innovative, responsible and self-aware.

Methodology

The aim of this article is to find out whether and what kind of mechanisms enterprises use in the rapidly changing business circumstances to determine their training needs, as well as whether enterprises in Latvia have common training topics. To specify the research question, the qualitative research method was chosen. The data were obtained through a semi-structured interview. The

method of thematic analysis was used for data processing and analysis. Taking into account the author's fifteen-year experience in identifying adult learning needs and organising the respective training, a small sample of study was developed selecting experts as respondents in the field of study. The author interviewed the HR managers from four large enterprises (over 1000 employees) with both foreign and local capital. The interviews were conducted at respondents' workplaces, and a dictaphone was used for recording. After the transcript of the interviews was carried out, it was possible to conclude a number of common trends in determining the training needs of employees in all four enterprises.

The following questions in terms of determining the training needs were asked to the respondents – the HR representatives, whose daily work is closely linked with the subject of this study:

1. Does your company support staff training?
2. Is training supported for all employees, or only for individual job groups/positions?
3. How are the staff training needs identified?
4. What have been the key training areas/topics in the last three years?

In the context of Latvia, large enterprises (in terms of the number of employees) in the private sector were targeted for the study. As the author of the article has observed in the framework of her professional activities, large private sector companies are trendsetters in the context of the staff training culture. Taking into account the sample of the study, the results cannot be extended either to the public sector, or to small enterprises (with a number of employees up to 50) and medium enterprises (with a number of employees up to 250) in Latvia.

Research outcomes

The first question of the interview – whether the company in question supports the staff training – was answered in the affirmative by all four representatives; however, the approaches were different when answering the question whether training is supported for all employees, or only for individual job groups/positions. In half of the enterprises surveyed – that is, two – the respondents confirmed that training was offered to all employees, while the other two confirmed that different measures were taken. Namely, one of the respondents replied that the training is supported "primarily for managers of different levels", whereas the other respondent replied: "The training needs are identified at the level of the departments. First of all, the employee's needs, second, the manager's vision, are taken into account." This approach is related to the principle of determining the training needs in a given enterprise. An

employee and his or her direct manager are involved in identifying the training needs.

If the manager and employee's understanding of the required training during the annual appraisal coincides, the training shall be included in the budget plan for the following year in the order of priority. Similarly, the training needs are identified in two other enterprises surveyed, where in one case the enterprise defines the criteria and sums them up in the *Excel* table. The department managers are delegated to fill out the table once a year. In the second case, in the company where training is offered mainly to managers at different levels, the next year's training needs are identified in discussions with a representative of the HR department. It should be noted that the respondent of this enterprise pointed out that a large proportion of employees were sceptical about these discussions, since under limited budgetary conditions not all training could have been carried out over several years.

One of the enterprises surveyed has developed an accurately organised procedure of the training needs identification. In particular, every new employee receives a road map, which highlights the skills needed for the particular job, which, in turn, are divided into "compulsory" and "optional" in accordance to several levels. In cooperation with the training centre established in the enterprise, the employee is responsible for acquiring the skills needed for his or her job within 12 months, while the enterprise provides the staff with the necessary resources of time (training during working hours) and money (training paid by the enterprise). Such a principle of "road map" echoes with the previously mentioned increasing numbers of freelance employees. Detailed guidance on the set of knowledge, skills and competences needed for the particular project would give the employee an opportunity to assess their eligibility for the job in a more accurate manner, and forecast the amount of investment needed to obtain the knowledge that was missing if it were to be paid for by himself or herself (which in the case of freelance employment is likely to be the case). Perhaps, such a system may be a step towards the reskilling revolution, which is discussed in the report of the WEF on *Towards a Reskilling Revolution* (2018b).

The interviews highlighted three major trends in determining the training needs. First, the principle of urgency, that is, technical training to ensure the lawful operation of an enterprise. Secondly, the principle of professional development. This block includes a variety of types and forms of the so-called cross-functional skills (as mentioned above, also termed in Latvian as "social" or "transversal") and development training. Thirdly, the lessons dictated by the development of information technologies. They are more characteristic to the enterprises in the information and communication technology sector and could also be included in the second group mentioned herein. The three-block

breakdown was characterised by all respondents, but there were differences in one of them.

All respondents unanimously referred to the training related to the direct functions of the enterprise as the largest block, defining it in a variety of ways, such as technical, mandatory or regulatory (stipulated by law). The second block included the training described as business related. One of the respondents defined this training as corporate strategic training (or related). In the third block, two of the respondents mentioned the soft skills training using this English term, while in the company where the training needs are marked on the "road map", the third block was described as a "professional development" block by the respondent.

It should be noted that two of the respondents surveyed used English terms to describe the training. This could indicate that the terms for identifying specific types of training and content have not been established in Latvian language. On the other hand, the respondents represent enterprises in which the daily working language is English, and thus it is understandable that the respondents used the same terms as in the working documents and day-to-day communication. Nevertheless, in the enterprise, where the term "soft skills" was used, these skills were described as communication, presentation, leadership, negotiation and coaching skills. It resonates with the characterization mentioned by the respondent, when defining professional development skills, including also foreign language training.

By extending the question about the third-block training, the respondents were questioned in terms of the key training topics/fields in the last three years. It was asked whether there have been any changes compared to an earlier period. Two of the respondents named communication and presentation skills. Furthermore, leadership skills, time management and stress management skills, artificial intelligence, and self-awareness were also mentioned. It can be concluded from the replies that the 21st century skills mentioned in the scholarly sources used in this article – such as analytical and critical thinking, complex problem solving, emotional intelligence, system analysis and evaluation (OECD, 2018), are not yet included in the training agenda of enterprises in Latvia.

From the replies provided by one of the respondents, it can be concluded that the recent changes have affected the form of the training, and not so much the content. Enterprises are looking for ways to opt out of the traditional learning form – sitting in the classroom and listening to the lecturer. It is partly replaced by reading professional literature and online courses. One of the respondents noted: "(...) the recruitment and motivation policy is changing on a global scale. There are talented and educated employees, and progressive enterprises fight for them." This statement echoes with the argument expressed previously, namely, that people will increasingly be responsible for improving

their knowledge, skills and competences, so that not only will they would have an opportunity to have a well-paid job, but also they would be able to stay in the current workplace. Training is changing in terms of the form; more engagement is required from the employees themselves. Not only they participate in training as listeners, but they also become trainers for their colleagues. This is the direction taken by the three of the surveyed enterprises, thus it is necessary to talk about the development of "workplace pedagogy" in Latvia and to study this phenomenon in the future.

Conclusions

As the gap between the skills and competences demanded in the labour market and the ability of the formal education system to ensure the possibility to acquire them is widening, increasingly more enterprises are becoming "learning places". In addition, the understanding of the competence of a modern and competitive employee goes far beyond the definition, which means "to increase competence for doing certain jobs" (Kubr & Prokopenko, 1989). Eurostat data show that compared to 2005, the number of enterprises providing further vocational training and development to their employees has increased more then twice in Latvia and in 2015 reached 99.9% of the surveyed enterprises. The aim of the study was to find out whether there are any mechanisms for identifying the training needs in the ever-changing business circumstances and what are the key training topics in the workplaces in Latvia, how much they include the 21st century skills such as analytical and critical thinking, complex problem solving, emotional intelligence, system analysis and evaluation, etc. (WEF, 2018a). It could be concluded from the interviews that all the surveyed enterprises share three trends in determining the training needs of employees. All respondents provided a breakdown of three blocks, but there were differences in terms of the content in the third block listed below:

1) the principle of urgency, that is, technical training to ensure the lawful activity of an enterprise;
2) the principle of professional development of employees, that is, different types of cross-functional skills (also referred to as social, transversal or soft skills in other sources);
3) training dictated by information technologies; though it is more characteristic to the IT enterprises and could also be included in the second block mentioned here.

Communication and presentation skills dominate the key training topics in two of the enterprises surveyed. Leadership skills, time management and stress management skills, artificial intelligence and self-awareness were also mentioned among others.

From the provided answers it was possible to draw a conclusion that the 21st century skills mentioned in the scholarly literature in this article, such as analytical and critical thinking, problem solving, system analysis and evaluation, have not yet been included on the agenda of the training plans of the enterprises surveyed.

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LEGISLATIVE PROVISIONS FOR ADULT EDUCATION IN LITHUANIA

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Abstract. *The article reviews the changes in legal acts and their role in the development of adult education in Lithuania. Developing learning opportunities and bringing educational services closer to each individual is a political action based on a fundamental provision of respect for the individual, his / her ability to create one's own life and that of his / her loved ones and the duty to help to do it as best as possible. Education, as an institution, has an increasingly complex role to play in justifying and creating a common educational content on which to build the social life of society in order to enable a person to develop general skills, lifelong learning skills, and helping him to adapt to a constantly changing environment. The laws and resolutions discussed reflect the advanced attitude of adult education in Lithuania as an important part of the lifelong learning system in society and provide wider opportunities for its development. Summarizing the normative documents regulating adult learning, it can be stated that at the level of strategic objectives they are relevant and purposeful, but not sufficient in some cases.*
Keywords: *adult education, legal documents, strategies.*

Introduction

In Lithuania, as in the most of the world, there is a growing awareness that learning is one of the most important and necessary means of helping people to become the conscious managers of their own functions, the participants in state development, the regional citizens who can effectively contribute to the sustainable change, economic and social progress. Developing learning opportunities and bringing educational services closer to each individual is a political action based on a fundamental provision of respect for the individual, his / her ability to create one's own life and that of his / her loved ones and the duty to help to do it as best as possible. The signs of modern rapid change reveal the importance of the ability of a person, organization and society to adapt to constant change. Changes are based on economy, technology, communication, but they may not be related to morale or the values that education seeks to transfer. Thus, education has a dual purpose: to help an individual to adapt to the external changes dictated by globalization and to pass on the inner values of society that are related to the identity of the nation and the person. Education, as an institution, has an increasingly complex role to play in justifying and creating

a common educational content on which to build the social life of society in order to enable a person to develop general skills, lifelong learning skills, and helping him to adapt to a constantly changing environment. However, the development of the education system requires the development of a legal framework that assists and promotes the development of adult education in Lithuania.

The aim of the article is to analyze the changes in legal acts and their role in the development of adult education in Lithuania.

Evolution of adult education legislation

In 1990, after Lithuania regained its independence, the political and economic system of society changed, and the process of integration into the community of democratic states began, this situation created new requirements for adult education. The building of an advanced adult education system based on legal documents has become a task of public interest, as the exploitation of adult education potential is the main success story in solving topical problems of today's Lithuania.

The legal basis for adult education in Lithuania consists of the Constitution of the Republic of Lithuania, laws, resolutions of the Government of the Republic of Lithuania (secondary legislation), normative acts of its authorized institutions (ministries, etc.) and other legal documents.

The main document defining the rights and duties of the state and its citizens, the document defining the state structure is the Constitution of the Republic of Lithuania (1992), which was approved in 1992 and Article 41 of the Constitution states that learning in state and municipal general education, vocational and higher schools is free, but also compulsory for individuals of until 16 years of age.. Higher education is also available to everyone according to the abilities of each person. The right to any kind of participation in education (the right to disseminate information) is declared, it only requires that it does not harm health and morality.

The first Lithuanian Education System Development Strategy Paper "Lithuanian Education Concept" (1992) noted that adult education is a large part of the permanent education system that augments the physical and spiritual power of the personality. The document emphasizes that the adult education system is characterized by complexity and diversity of structures - educational institutions, voluntary organizations, educational and cultural institutions, commercial institutions and mutual assistance groups. Media and modern information technologies also play an important role in this system. Thus, as a system, adult education encompasses all structures in which formal and non-formal adult education takes place, as a process, adult education is any activity

that leads adults to acquire knowledge, skills and abilities, as well as their attitudes and behavior. This concept also provided for the training of adult education specialists, not limited to teachers (called pedagogues), but complementing them with libraries, museums and club workers. It should also be noted that, at the very beginning of the state's restoration, the concept focused not only on the training of adults directly involved in the labor market but also on social exclusion groups (people with disabilities, migrants, sentenced persons) and other vulnerable groups.

The Law on Education of the Republic of Lithuania, adopted in 1991, noted that the purpose of education is to create the conditions for a person to acquire the foundations of civil and political culture embodying democratic traditions, to develop the skills and experience necessary for a person as a competent Lithuanian citizen, member of a European and global community, a multicultural society member.

As the structure of the Lithuanian economy changed dramatically at that time, much attention was paid to vocational training. In 1997, the Law on Vocational Education and Training of the Republic of Lithuania defines vocational training as training aimed at providing individuals with a profession or with necessary retraining. In addition to providing the profession and general cultural education for individuals, the objective of the vocational training system was to create conditions for the improvement of professional qualifications and retraining so that the person could respond to the constantly changing needs of the labor market. The Law on Special Education of the Republic of Lithuania (1998), established the principles of the organization of one part of the special education system - adult education, and Article 3 defines non-formal education of adults with special needs as a cultural and rehabilitative education for persons with special needs, encouraging an individual to develop, and creating conditions for more effective social adaptation.

The Law on Non-formal Adult Education of the Republic of Lithuania (1998), adopted in 1998, is particularly important for the development and accessibility of adult education in Lithuania. It is important to note that Lithuania was the first of the Baltic States to adopt a law regulating non-formal adult education. The law legitimized the term of non-formal adult education, defining it and laying the foundations for its structure, operation and management. The following tasks of non-formal adult education were formulated in the law:

- to help the person to meet the needs of self-education, to develop his / her creative interests;
- to develop the person's creative powers and abilities;
- to help a person become an active citizen of a democratic society;

- to create conditions for acquiring theoretical knowledge and practical skills necessary for professional activities, as well as conditions for the improvement of qualification.

The Law identifies the main forms of non-formal adult education, identifies key factors and actors for successful non-formal adult education. The non-formal adult education council (expert body) defines the main perspectives of non-formal education development and coordinates the activities of non-formal adult education institutions. The law places great emphasis on education participants and their rights. Participants have to get all information about adult education programs, forms, offer to institutions, and use of state support. Obligations of promoters in non-formal adult education are set to ensure high quality implementation of non-formal adult education programs for participants.

To sum up, a young state, along with a lot of attention to economic change, has also focused on adult education and its legal regulation as an important factor in Lithuania's development.

The Role of Legal Documents
in Developing Lifelong Learning in Lithuania

Global changes in the world at the beginning of the 20th century (abundance of information, new information communication technologies) created preconditions for further improvement of the country's economy and upgraded people's standard of living. This changing society has been called a knowledge, information, learning society. According to Jarvis (1996), society is a complex, constantly changing social system. Educational institutions are under pressure by this change, especially by the growth of technology and economic institutions, but at the same time, educational institutions also affect other institutions. Individuals are also affected by these forces when they try to find their place in society. According to Fullan (1998), people are not passive receivers of social impact, they themselves make changes in their environment, become active agents, and contribute to the process of societal change. Fullan (1998) notes that the rapid change of the modern world is one of the main features of postmodern society. Reich (1992) links postmodernism and education by stating that the most important values of each are the citizens` intelligence and skills. In his view, the most important thing for each country is to increase the potential that its citizens can contribute to the world economy by sharing their experience and skills and improving their application on the global market. All these changes are reflected in the adopted legal documents for adult education.

In March 2000, the European Council in Lisbon noted that Europe has undoubtedly entered the Age of Knowledge, in which learning and education

become a necessity and that it has an impact on economic, cultural and social life. The Memorandum of Lifelong Learning published in the same year noted that the availability, motivation and skills of the most up-to-date information and knowledge become a factor in increasing European competence, people's employability and greater opportunities more than ever (Zemaitaityte, 2007). Lifelong Learning Memorandum Discussions in Lithuania have led to the drafting of an amendment to the Law on Education in the Republic of Lithuania. The new version of the Law on Education of the Republic of Lithuania, approved in 2003, defined the purpose of adult education - to create conditions for a person to study for life, to meet the needs of cognition, to improve the acquired qualification, and to acquire additional qualifications.

This is confirmed by the most important strategic documents of education development - the Provisions of the National Education Strategy 2003-2012 (2003) and the Implementation Program and the Strategy for Ensuring Lifelong Learning (2004) and the Action Plan for its Implementation. The National Education Strategy 2003-2012, approved in 2003, highlights the mission of education: to help a person to acquire a professional qualification that corresponds to the state of the art in terms of technology, culture and personal skills, and to create conditions for lifelong learning to meet the needs of cognition, to develop new competencies and qualifications required by the individual. professional career and meaningfulness of life. In order to ensure the efficiency and coherence of education development, the aim is to transfer a large part of responsibility to municipalities and districts not only for general education but also for vocational training, special education and continuous adult learning. The document noted the need to create a flexible and open educational structure combining forms of general education, studies, formal, non-formal and informal learning into a common educational space. The following general strategic objectives for the development of education were raised in the National Education Strategy Implementation Program for 2003-2012:

− to develop an effective and coherent education system based on responsible management, targeted funding and rational use of resources;
− to develop a continuous, lifelong learning, accessible and socially fair education system;
− to ensure the quality of education, in line with the needs of both the individual living in an open civil society and a market economy, and the needs of the present world society.

The 2004 Strategy for Ensuring Lifelong Learning has highlighted the importance and importance of key competences in developing adult learning. It

was emphasized that the acquisition of key competences facilitates the integration into the labor market and the professional qualification of adults and did not acquire it. In this way, adult learning is based on cooperation, the development of individuality, personal qualities and social abilities. Although the development of key competences is more a priority for vocational training and continuing vocational training, this education is emphasized throughout the education system, without distinguishing between general training schools, universities and other institutions.

Recently, adult education is increasingly focusing on the recognition and validation of non-formal and informal adult education, especially when discussing individual competences and professional flexibility and mobility. The world of production and the social community hope that the changed internal education supply system will bring about new and rapid changes, i. e. that educational institutions meet the new needs for competence development. Educational institutions are expected to meet the needs of both individuals and organizations, and will ensure an individual learning process. According to Bjornavald (2000), the ongoing fundamental transformation of non-formal education and vocational training is linked to the growing importance of continuing education. Creating a permanent learning system requires a strong link between different forms of learning, different learning spheres and different life periods. Bjornavald (2000) notes that the identification, assessment and recognition of non-formal education are undoubtedly perceived as indispensable tools for new ways of learning and for accelerating public progress. In the knowledge economy, the development of human resources is becoming a decisive factor in maintaining competitiveness (Schultz, 1998), so diplomas, certificates and other qualifications prove to keep their value for employers and individuals in the enterprise and the labor market. Employment competition is growing, and employers need more and more skilled workers. Recognition and assessment of non-formal knowledge and skills encourages a person to increase his / her competence, strengthen his / her career position and suitability in the labor market, and increase the potential of human resource management. Recognition and assessment of competences are highlighted in the context of the validity and relevance of the three key learning environments:

- − appropriateness of learning that took place in formal education and other learning environments;
- − appropriateness of learning that has been linked to the labor market;
- − suitability of learning in the context of voluntary activities and social services (Lauzackas et al., 2005).

Responding to the European Commission's Communication "Adult learning: It is never too late to learn", in 2008 a new Strategy for Ensuring

Lifelong Learning was adopted, which also responds to the strategic priorities set out in the Draft Long-term Strategy for Lithuania's Economic Development up to 2020. The development of economic policy focuses on the growth of quality employment and investment in human capital, the development of physical, financial and social infrastructure and science, technology and innovation, and ensuring macroeconomic stability of the country. The Lifelong Learning Strategy (2008) emphasizes that a competitive economy, the development of a knowledge-based society and the prevention of social exclusion lead to the need not only to gain the skills required for the labor market, but also to improve qualifications, self- improve or retrain. Employee qualifications are becoming an increasingly important criterion for labor supply. It should be noted that for the first time in the Strategy, another important area of adult education has been highlighted - informal non-vocational adult education, which is important not only for employment or economic well-being, but also for social cohesion, active citizenship, and personal well-being of individuals. The Strategy recognizes the need to develop adult education programs in the country's higher education institutions, to introduce a system of recognition of non-formal and informal learning. The vision of a lifelong learning strategy is a peaceful, stable and prosperous society providing quality learning opportunities in the context of education, community, work and family for all members of society, based on national cultural heritage and universally recognized social and personal values to enhance their contribution to the economic, social and cultural fabric of the nation. life and the individual's personal life potential, improving the quality of life. Thus, it can be said that at the political level in Lithuania, more and more attention is paid to adult education. The fact that the Lifelong Learning Strategy and the Action Plan for its implementation (2008) no longer define adult learning as a mere vocational training shows that the importance of non-formal and informal adult learning and their place in the modern concept of lifelong learning is better understood at the state level.

The changing era and new documents of European Commission have led to a review of the Law on Non-formal Adult Education adopted in 1998 and, in the light of current issues, the adoption in 2014 of a new Law on Non-formal Adult Education and Continuing Education. The law aims to provide legal guarantees for a person to exercise their innate right to lifelong development of their personality, to guarantee the opportunity to acquire knowledge and skills, to discover new meanings of life, to promote not only professional skills but also to develop meaningful leisure time, to be an active member of a democratic society. The law states that the organization of non-formal adult education and continuing education includes: planning and implementing non-formal adult education and continuing education; information and consultation of

participants; quality assurance in learning; monitoring and evaluation of implementation and recognition of competences acquired by non-formal and informal learners.

Lithuania's 2030 Progress Strategy approved in 2012, emphasizes that Lithuania seeks to become a learning society: modern and dynamic, ready for the challenges of the future and capable of acting in a constantly changing world. The strategy notes that one of the most important factors determining the development processes of society is a well-developed and successful lifelong learning system, which effectively applies the possibilities of information communication technologies, ensuring acquisition and improvement of the knowledge and abilities necessary for a dynamic society.

Implementing the above-mentioned Law on Non-formal Adult Education and Continuing Learning (2014) and responding to the fourth objective of the National Education Strategy for 2013-2022 (2003), "to guarantee the effectiveness of the education system, to create a framework of incentives and a level playing field for lifelong learning based on effective support for self-identification and for choosing the way to the world of activities. In 2016, the Program for the Development of Non-formal Adult Education and Continuing Education for 2016–2023 (2016), the strategic goal of which is to create and develop a system of adult education and continuing education that is supportive and accessible, and socially fair education, in line with the individual and society needs working in the open civil society. The strategy mentions lifelong learning as one of the key factors in ensuring that Lithuanian society is prepared for global change and enabling smart society.

In 2017, the action plan for lifelong learning for 2017-2020 was adopted to ensure the effectiveness of the education system, to create a system of incentives and a level playing field for lifelong learning based on effective support for self-identification and the path to global action, the creation of effective conditions and incentives for lifelong learning; increasing social inclusion.

The Law on Non-formal Adult Education and Continuing Education of the Republic of Lithuania, adopted in 2014, was aimed at "strengthening co-ordination of adult education at national and municipal level, appointing adult education coordinators in municipalities, consolidating the adult educator-andragogue profession", but experience of implementation of the law has revealed the need to revise the subject of this law and relationship with relevant Lithuanian education documents and international (UNESCO, EU, OECD) policy guidelines and recommendations. The purpose of the draft law for consideration is to create legal preconditions for the systematic development of non-formal adult education as part of lifelong learning. The goal of adult education is to contribute to an inclusive development of the society: to provide opportunities for adults to participate in education activities on a continuous

basis in order to acquire competences relevant to successful professional career, meaningful self-expression, active participation in community life, representing social, cultural, economic and environmental interests. The project notes that adult education is a public good based on the following principles: equal opportunities; contextuality, dynamism and partnership. In the opinion of the project developers, the new wording of the law will ensure more differentiated by fields of activity (improvement of qualification, development of general competences, personal development) and more flexible coordination of adult education. Activities will be targeted to meet the needs of adult education at the municipal level, the planned adult education target programs being developed by the relevant ministries would be targeted at public education and engagement in the implementation of sustainable development objectives.

The European Commission's report on the European Commission's Adult Education Policy (2015) and its in-depth analysis of effectiveness says that, alongside rising employment and wages, adult education has a social impact: participation in educational activities reduces social exclusion, increases life satisfaction, including physical and mental health and self-esteem, strengthens social responsibility, tolerance, encourages participation in politics and community projects. This is fully in line with the needs of society development in Lithuania.

Conclusion

The laws and resolutions discussed reflect the advanced provision of adult education in Lithuania. Existing laws formally provide essential preconditions for the implementation of the principle of lifelong learning in the policy of the European Union, but the lack of sufficient and concrete state support and good practice hinders the development of modern adult education and lifelong learning in Lithuania. Although three forms of learning - formal, non-formal and informal - have already been legalized in the most recent documents, full legal preconditions for the systematic development of adult education as part of lifelong learning are needed. A broader legal framework will undoubtedly contribute to the creation of an inclusive society by ensuring that all adults have regular opportunities to participate in education through the acquisition of competences and self-expression. Empowered lifelong learning as an integral part of public life will integrate learning into the everyday activities of adults.

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INFORMĀCIJAS TEHNOLOĢIJU IZMANTOŠANA IZGLĪTĪBĀ

Information Technologies in Education

DESIGNING & PILOTING ONLINE TESTS AS PART OF A TEACHER COMPETENCE ASSESSMENT

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Abstract. *Approaches for competence assessment are becoming increasingly important to plan school development goals, especially during complex educational changes. This paper outlines authors' experience and recommendations from the designing and piloting of teacher online tests as part of a wider competence management process. A developed theoretical model of a universal teacher competence profile is presented. Tests represent four thematic parts related to teacher performance in classroom to facilitate: student cognitive activation, student self-regulation, student collaboration, and leveraging digital. Test questions were developed based on a framework of teacher performance assessment that consists of a structured set of performance level descriptors to help determine teacher level of competence (0-4) according to criteria developed. Online tests were completed by 197 teachers. Test results were analysed to determine their validity. Proposed online tests can be used for interpreting assessment results of teacher knowledge and beliefs necessary for teaching 21st century skills and plan teacher professional development for goal attainment in schools.*
Keywords: teacher competence assessment, test, 21st century skills.

Introduction

Latvia is implementing a compulsory education curriculum reform (Namsone, 2018), and changing the approach in learning process for students to acquire 21st century skills, which is a widespread educational change (Care, Griffin, & Wilson, 2017). High autonomy of Latvian schools (OECD, 2016), as it is in other countries (Mourshed, Chijioke, & Barber, 2010), imply that not all processes in school level can be controlled from above. This emphasise the most

important resource schools as contemporary organizations have – human resources, that is, teachers and their professional competence. Introducing 21st century skills education implies adjustments to how teacher classroom instruction and professional development (PD) should happen.

Currently in Latvia, legitimate Cabinet Regulation prescribes three quality levels in accordance with the list of criteria for assessing performance of teachers mainly on a scale "yes/no" which is done by the school leader (The Republic of Latvia Cabinet Regulation No. 501, 2017). The follow-up of teacher work quality is not based on objective research findings and does not comply with the best practices of other countries. The process of PD is not directly linked with the professional performance of teachers. One of the OECD recommendations for the education system of Latvia state: "Develop a coherent assessment and evaluation framework for informing policy and educational practise" (OECD, 2016).

This paper suggests how evidence-based practices (Mourshed, Chijioke, & Barber, 2010) and structured in-service teacher performance measures through competence assessment may help teachers and school leaders determine competencies available and make development plans for acquiring necessary competencies for achieving new goals that 21st century education brings. In further chapters, the developed construct of teacher competence profile for 21st century teaching and learning will be outlined, first piloting of an online test for assessing parts of teacher competence will be described. First insights of this experience will be presented, further research implications will be discussed.

Background

Our proposed teacher competence consists of the integrated set of knowledge, skills and beliefs that manifest in a specific work situation (Kunter et al., 2013). Teacher competence assessment may be done through using different sources of evidence and different types of assessment approaches (lesson observation, reflective interviews etc.). Each approach focuses on assessing different parts of competence, for example, tests aim to assess teachers' knowledge and decision-making processes (Roelofs & Sanders, 2007; Goodman, Arbona, & Dominguez de Rameriz, 2008). Our proposed tests assess teachers' knowledge and beliefs in an integrated way by including question elements asking teachers' choice of their most typical classroom behaviour. Therefore, the tests reflect only one part of teacher competence, and does not include the skill component (see figure 1). Teacher tests aiming to directly assess pedagogical knowledge are still lacking (Voss, Kunter, & Baumert, 2011).
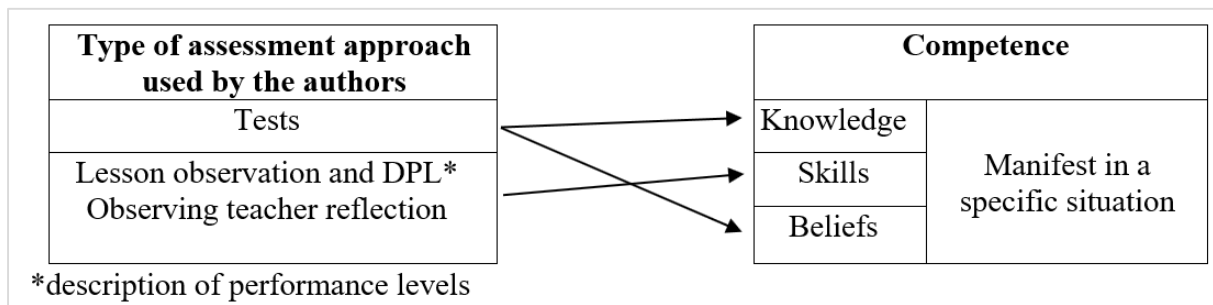
Type of assessment approach used by the authors	Competence	
Tests	Knowledge	
Lesson observation and DPL* Observing teacher reflection	Skills	Manifest in a specific situation
	Beliefs	

*description of performance levels

Figure 1 **Types of competence assessment in relation to competence structure based on authors' current experience** *(Bērtule et al., 2019)*

Competence assessment is part of a wider management and development process in organizations. It may help employees see their performance as linked to achievement of the organization's goals (Campion et al., 2011). Goal setting and goal cascading is part of performance management process, it describes what results an organization is expecting from the employee (Zandbergs et al., 2018). Previous research shows a missing link between goal setting and competence assessment in schools and other organizations in Latvia (Butkēviča et al., 2018).

Objective approaches such as employee competence and performance tests have been used in private sector organizations. It helps to integrate and align human resource systems to enhance and accelerate skill development of employees (Campion et al., 2011). Private sector organizations use computerized tests as an internationally recognized approach by human resource experts and managers for assessment of competences. Tests show that automated tools may be used for objective assessment of competence without overloading of human resource management specialists (Judrups, Zandbergs, & Kazakovs, 2015).

Development and validation of various methods for teacher competence assessment that would correspond to the goal cascading process, competence-based human resource management in formal education providers - schools is a work in progress. For us, competence assessment consists of defining a competence framework, teacher competence profile for assuring objective guidelines of what the competence groups consist of and how they are linked to goals, and through gathering data for assessment in lesson observations (manual) and online tests (automated, information technology (IT) based). These parts of the process would give clear information about decision making in schools. This research describes the development and piloting of teacher in-service tests which is a novel practice in Latvia. In some countries, teachers are subject to testing to assess their general and specialized competencies but it is for granting an entry into the profession. Rarely the results of these tests are used for in-service teacher development (OECD, 2013).

Taking into account the new prioritized changes in Latvian education system, and according to our research project stage, we developed a theoretical framework of four teacher competence groups for teaching 21st century skills. Teaching of 21st century skills is planned to be implemented and started in the education system with the school year 2020-2021. This determines the topicality of the research for schools to set new goals in relation to these changes.

A previously developed category-criteria framework (see table 1) created by the authors (Bērtule et al., 2019) is proposed to be used both for teacher performance assessment (through assessing skills) and for competence profile development, and lastly, for creating tests for assessing knowledge and beliefs. The tests are proposed to be as an alternative and minimize the subjectivity and inaccuracy of an external assessor's activities in assessing teacher knowledge and beliefs - two components of teacher competence.

Questions of the tests were developed based on a framework of teacher performance assessment that consists of a structured set of performance level descriptors to help determine teacher level of performance (score expressed on a scale of 0-4) according to selected criteria for teaching performance to develop 21st century skills (Bērtule et al., 2018). The category-criteria framework consists of eight categories and 13 criteria, each having a qualitative description identifying the performance level (expert, proficient, developing, beginner and not observed). Performance level descriptors where validated based on 145 lesson observations, done by six experts from Interdisciplinary Center for Educational Innovation at the University of Latvia (ICEI UL).

Table 1 **Selected category-criteria framework for teaching performance to develop 21st century skills** *(Bērtule et al., 2019)*

Categories		II 1 Planning	II 2 Teaching	II 3 Classroom environment
IA 1	Student self-regulation	1.1. Learning goals	1.2. Metacognitive skills	
IA 2	Student cognitive activation	2.1. Learning tasks for cognitive depth	2.2.Classroom discourse	
IA 3	Student collaboration	3.1.Learning tasks for collaboration	3.2. Student collaboration	
IA 4	Leveraging digital	4.1. ICT tools	4.2. Meaningful ICT usage	
IB 5 IB 6	Teacher techniques, basic skills	5.1. Lesson design	5.2. Teaching techniques	5.3. Differentiation, personalization, support
		6.1. Curriculum	6.2. Feedback to students	

Previous experience of Baltic Computer Academy (BCA internal working documents such as universal competence profile, tests and competence rubric of instructors conducting PD in various organizations) was analysed and discussed in order to create teacher competence profiles and to conduct competence testing in organizations (Butkēviča et al., 2018). If a school sets a goal for students to develop one of the 21st century skills, then it would be valuable to determine if teachers will be able to reach this goal and if not, then what are the teacher PD needs to do it.

Research questions:
1) What is the theoretical construct (model) for tests to assess knowledge and beliefs necessary for teaching 21st century skills accordingly to potential school goals?
2) How to design the tests that would assess teacher knowledge and beliefs for teaching 21st century skills?
3) What does the test validation process show and what are further improvements needed?

Methodology

The theoretical construct (model) for the tests to assess knowledge and beliefs necessary for teaching of 21st century skills accordingly to potential school goals was created by six experts from ICEI UL. Experts, accordingly, to previously developed category-criteria framework (see table 1) for teaching performance to develop 21st century skills (Bērtule et al., 2019) analysed relevant literature, reviewed development goals formulated by the schools involved in the study and obtained data from the validation process of the mentioned category-criteria framework. Expert discussions were organized to review the theoretical construct (model) involving experts from ICEI UL and the BCA.

Development of tests continued with defining the goal of the tests, defining potential users of the tests, then identifying criteria by which teachers will be assessed according to the structured set of performance level descriptors. A universal and concrete competence profile is presented which the tests are aiming to assess. When developing the test, a data base created from lesson observation was used. The database consists of expert-observers' commentary and citations based on the performance level. Performance levels are structured by criteria, defined in levels (0-4).

All together for developing the four tests, 15 experts were involved, and a workshop was organized. Experts formed four groups according to the competence themes of each test. Each group received those parts from previously mentioned database with criteria referring to the specific test: expert-observers' commentary and citations illustrating teachers' classroom activities according to

performance level. The expert groups created sets of questions referring to each test by using described classroom activity examples (cases) for formulating the multiple choice answers. For each test, a question database was created. It included each question, multiple choice answers and additional data on the question. Test questions and each answer was assigned weights, defined tests' initial size and structure of the question base. By using this database, six experts developed a preliminary version for each test.

The validation of the test took place in a sample of schools that were selected for research purposes. Three groups of teachers were involved, altogether 197 teachers completed the test. Validation of the test took place in the period between 23.04.2018 till 7.05.2018. Distribution of teachers completing each test is as follows: student self-regulation (N=197), leveraging digital (N=49), student cognitive activation (N=85), student collaboration (N=47).

For an additional detailed analysis of data obtained in the validation process SPSS (Statistical Package for the Social Sciences) was used. Descriptive statistics, scale reliability statistics and item reliability statistics (item-total correlation, inter-item correlations, a reliability coefficient McDonald's omega, Guttman's lambda-2 Reliability tests) and where possible, factor analysis was done.

Results and Discussion

The theoretical construct (model) for performance assessment of teaching 21st century skills is designed as a part of the competence management process (see figure 2). It looks at the elements of identified competence assessment parts according to selected school goals. According to selected categories and previously defined competence structure a teacher universal profile is created, that is suitable for selected categories. Teacher profile is developed according to categories, shown in table 1 - Group IA - 21st century skills selected, IB - teacher techniques, classroom management. II - domains of teaching practice - planning (1), teaching (2) and classroom environment (3).
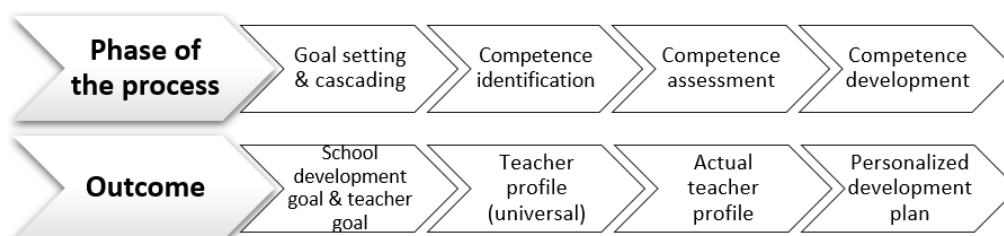

*Figure 2 **Phases of the competence management process and their outcomes**
(ICEI UL archive, 2019)*

The preferred performance is aligned with the real performance, obtaining the actual teachers' profile. Actual teacher profile is obtained when the expert-observer determines the performance level according to the developed framework for performance assessment (Bērtule et al., 2019) by lesson observation. Table 2 shows that tests are usable for assessing two elements of competence profile–knowledge and beliefs (see table 2).

Table 2 **Example of match between test questions and category** *(ICEI UL archive, 2019)*

Category	Criteria	Criteria for performance assessment in lesson observation *	Test questions
Student cognitive activation (IA2)	Learning tasks for cognitive depth	2.1.	D_Z_1 D_Z_3 D_Z_4
	Classroom discourse	2.2.	D_Z_2 D_R_1 D_R_2 D_R_3

* see table 1

Development process of the tests include the following stages: I developing questions; II selecting questions and developing tests; III appropriating the tests for online use (such as for MOODLE environment).

In phase I based on the theoretical construct, design of test elements was done. Questions were developed by using previously mentioned category-criteria framework for teaching performance to develop 21st century skills, level descriptors and by selecting specific classroom situations obtained from database of cases gathered in lesson observations (see table 3).

Test question types are: situational analysis tasks, multiple choice questions, matching assignments etc. Question answers are of different type: multiple or single choice; matching judgements or situation descriptions to teachers' characteristic behaviour; yes/no answers; and with different points (from 3 to 7). In phase II questions are ordered into four separate tests, with 29 questions. These tests are initial versions of the tests, that each correspond to chosen category of the developed teacher profile. In phase III test questions are developed in a format accordingly to MOODLE environment.

Data analysis show that the tests offered easily analysable classroom situations. For example, discrimination index in the test "Student self-regulation" is not larger than 0,3 (see figure 4), 50% from the questions in this test the discrimination index is below 0,1 meaning that these questions are invalid. 28% from the questions the discrimination index is between 0,1 and 0,2 meaning that these questions are usable after improvements. This means that the initial version

of the test does not sufficiently discriminate test takers. The difficulty index of questions in all the tests is mostly above 0,5.

Table 3 **Question for assessing knowledge of category "Student cognitive activation"**
(ICEI UL archive, 2019)

| Code	Question type	Question	Assessment	Max. points
D_Z_1	Yes/No	**We want to achieve that students learn to accomplish productive tasks. Please select which statements do you agree or disagree!** **A -** By accomplishing a typical assignment, student learns to use knowledge and skills in new situations, different context. **B** - There should be more assignments in lessons that demand knowledge use in new situations, in other subjects or real life context. **C** – Creating a transfer from known situations to new doesn't require teaching, it develops in long term exercise. **D –** developing use of HOCS can be accomplished through assignment that takes at least half of the lesson and not by using various different, short, unrelated assignments.	1 point for: A – disagree B – agree C – disagree D - agree	4
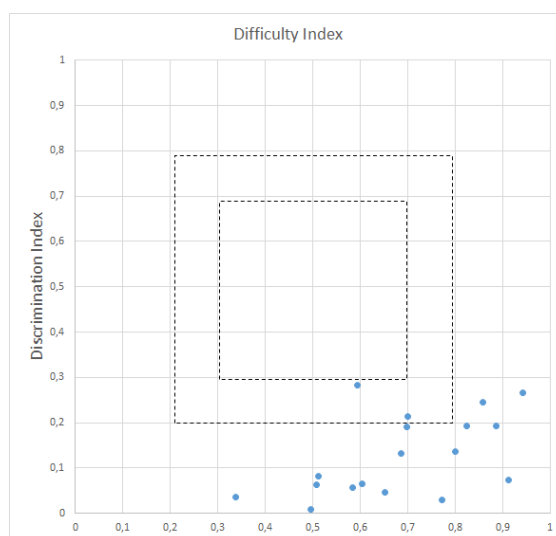
Figure 4 **The relationship between difficulty index and discrimination index of questions of the test "Student self-regulation"** *(ICEI UL archive, 2019)*

For each test question, a violin plot diagram was created (see figure 5 for an example). It shows the frequency of distribution of the data evaluating separately not only each test question but also each test question's choice of answer from the multiple-choice list. This gives detailed information, that will allow for evaluating and further developing each test question and each choice of answer. This is important because there are some valid test questions, but which require adjustments to the offered multiple choice list of answers.

Developed tests will be usable in practice for assessing the selected parts of teacher competence profile, namely, knowledge and beliefs. By improving the tests, it is possible to extend the theoretical construct, adding to the current tests new test questions for personal skills, for example, evaluating reflection skills, thus complementing the inventory of assessment tools.
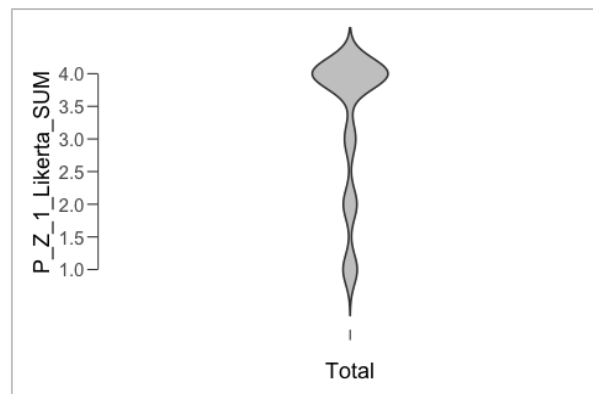
*Figure 5 **A Violin plot diagram for test question P_Z_1** (ICEI UL archive, 2019)*

Using the tests in combination with description of performance levels (DPL), a teacher competence development plan can be drafted prospectively. To conduct research to determine the predictive validity of these tests – do the scores match with results from other sources such as lesson observation and do test scores corelate with student achievement. Previous experience of teacher testing show that there is little empirical evidence about the predictive validity of teachers' performance on the tests as an indicator of classroom effectiveness (Goldhaber & Hansen, 2010).

As in other countries, there is still a need for better teacher tests that would be linked to important teaching knowledge and learning outcomes and validated by independent studies with transparent findings. They would be important accountability mechanisms for states and for programs (Campion et al., 2011).

In further research, it is planned to compare respondents' obtained data from lesson observations with test results. During piloting of next version of the tests, it is necessary to identify reasons that give additional constrains on using the test

and how to increase validity of the test. Further research is also needed to adjust the tests for teacher self-assessment.

When making improvements to the tests, a balance should be found between diversity and the need to attain that the values of question answers differ with the same interval; and that in each test question it is possible to demonstrate knowledge appropriate to criteria in all five levels accordingly to DPL. This would improve the tests' mutual coherence, the number of test questions in tests, the compatibility with parts of the competence profile etc. Invalid test questions have to be sorted out, the test should be complemented with more complex classroom situations. Real life classroom situations gathered from lesson observations were used in the tests. Because in majority of the situations (Bērtule et al., 2019) were on levels 1-2 according to the framework, the data from the tests show that simple classroom situations are being analysed, often in the same performance level.

Conclusions

Four initial test versions for assessing teacher knowledge and beliefs as part of a wider competence construct are developed and first validation in practice is completed. Teacher competence assessment is viewed as a part of competence management process in the context where schools set goals taking into account the planned curriculum reform in the country. The theoretical basis of development of the tests is built on the chooses category-criteria framework by developing teacher competence profiles for teaching 21st century skills. This confirms the developed tests topicality and practical applicability. For the Latvian education context, the tests for in-service teachers can be regarded as innovative. Development of tests' next versions has begun by improving the tests and preparing them for further validation by taking a greater sample of test takers.

Acknowledgments

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THE POSSIBILITIES OF CLUSTERING LEARNING METHODS IN STUDENT EDUCATION

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Abstract. *Many educational courses operate with models that were previously available only in mathematics or other learning disciplines. As a possible solution, there could be the use of package IBM SPSS Statistics and Modeler in realization of different algorithms for IT studies. Series of research were carried out in order to demonstrate the suitability of the IBM SPSS for the purpose of visualization of various simulation models of some data mining disciplines – particularly cluster analysis. Students are very interested in modern data mining methods, such as artificial neural networks, fuzzy logic and clustering. Clustering methods are often undeservedly forgotten, although the implementation of their algorithms is relatively simple and can be implemented even for students. In the research part of the study the modelling capabilities in data mining studies, clustering algorithms and real examples are demonstrated.*
Keywords: *clustering, data analysis, modelling, simulation, SPSS, SPSS Modeler, learning.*

Introduction

Methods of data analysis and automatic processing are treated as knowledge discovery. That is why the notion of similarity is becoming more and more important in the context of intelligent data processing systems. It is frequently required to ascertain how the data are interrelated, how various data differ or agree with each other, and what the measure of their comparison is. Clustering methodology can be widely used in modeling, evaluation of different economic, financial and educational processes.

Nowadays there is a large amount of data in various fields of science, business, economics, etc. and there is a need to analyse them for better management of a particular industry. The goal of cluster analysis as one of the basic tasks of intellectual data analysis is to search for independent groups (clusters) and their characteristics in analytical data. Solving this problem allows for better understanding of data, since clustering can be practically used in any application area where data analysis is required.

The cluster analysis is based on the hypothesis of compactness. It is assumed that the elements of the training set in the feature room are compact. The main task is to formally describe these formations. All clustering algorithms have common parameters, the choice of which also characterizes clustering efficiency.

The most important parameters characterizing clustering are: metrics (the distance of cluster elements to the cluster center), the number of clusters k.

The aim of the article is to show SPSS Modeler suitability for the purpose of visualizing simulation models of various data analysis disciplines. To reach the aim, the following research tasks have been set: identification of SPSS Modeler possibilities for clustering algorithms; demonstrate visualization models on the basis of examples; showing the possibilities of clustering algorithms operation for training purposes. Common research methods are used in this research: descriptive research method, statistical method and mathematical modelling.

Application of clustering methods in data analysis

The issue of "How to organize observable data in reviewed structures?" is a topical issue in various research areas. There is an opinion that unlike many other statistical procedures, in most cases, cluster analysis methods are used when there are no hypotheses regarding to classes, but data collection is still in progress. Cluster analysis methods allow to split exploratory objects into groups of "similar" objects called clusters (Kaufman & Rousseau, 2005; Aggarwal & Reddy, 2013; Wierzchon & Klopotek, 2018). The essence of clustering is depicted in Figure 1, where the two-dimensional space objects are conditionally divided into 5 clusters.
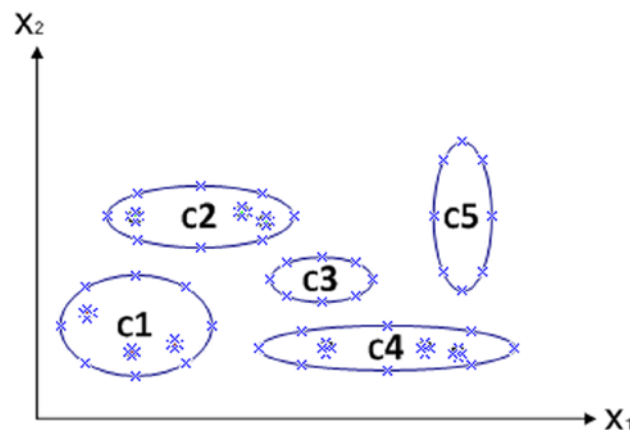

*Figure 1 **An example of a two-dimensional object space division into clusters***

Clustering differs from the classification by the fact that there is no need to separate a changeable group for analysis in the clustering process. From this point of view, clustering is treated as "non-teacher training" and is used in the initial phase of the research (Xu & Wunch, 2009).

The cluster analysis is characterized by two features that distinguish it from other methods:

1) the result depends on the nature of the objects or their attributes, i.e. they can be uniquely determined objects or objects with a fuzzy description;

2) the result depends on the possible relationship between the cluster and the objects in the clusters, i.e., the possibility of belonging the object to several clusters and the determination of the ownership of the object (strong or fuzzy belonging) must be taken into account.

Taking into account the important role of clustering in data analysis, the concept of object belonging was generalized to the function of classes that determines the class objects belonging to a particular class.

Two types of classes characterizing functions are distinguished:

1) discrete function that accepts one of the two possible values - belongs to / does not belong to the class (classical clusterization)

2) a function that accepts values from the interval [0,1]. The closer the values of the function to 1, the "more" the object belongs to a particular class (fuzzy clustering).

Clustering algorithms are mainly intended for the processing of multidimensional data samples, when the data is given in the form of the table "object-property". They allow you to group objects in defined groups, in which objects are related to each other according to a particular rule. It does not matter how the following groups are called - taxons, clusters, classes, the main thing that they accurately represent the properties of these objects. After clustering, other intelligent data analysis methods use data for further analysis in order to find out the nature of the acquired regularities and the possibilities for future use (Han et al., 2001).

Clustering is commonly used in the data processing as a first step of analysis. It identifies similar data groups that can later be used to explore the interrelationships of data (Gan et al., 2007; Han et al., 2001). The cluster analysis process formally consists of the following steps:

- collection of data necessary for analysis;
- determination of cluster characterizing sizes and boundaries;
- grouping data in clusters;
- class hierarchy determination and analysis of results.

The K-Means clustering algorithm (Everitt, 1993.) is traditionally used in data analysis. This minimizes the quality index, which is defined as entire points belonging to the cluster area, the distance to the cluster center (metric) (Agrawal et al., 1993). The metric in this context is the distance between the points included in the cluster (Li et al., 2004). Typically, in clustering algorithms the input data vector is compared to others or to predefined cluster center. The distance metric

also determines belonging to one or another cluster, thus determining the regularities in the multidimensional data samples, by attributing the input data to this or another class or cluster (Vitanyi, 2005).

Euclidean distance is the most widely used distance in clustering. This is the distance between the two-point coordinates in the multidimensional space corresponding to the length of the connecting segment, calculated from the formula (Agrawal et al., 1993):

$$D_{XY} = \sqrt{\sum_{k=1}^{m}(x_{ik} - x_{jk})^2} \qquad (1)$$

Traditionally, in clustering algorithms the Euclidean distance is used, but choosing another metric is also a matter of discussion in some cases. It depends on the task being solved, the amount and complexity of the data.

In this research the similarity of objects is defined by the Euclidean distance: the smaller distance between two objects is, the more similar they are. The algorithm works in this way. At the beginning, the m centres c_j are set to some initial data points. If the training data is not ordered in a proper way, the first m training data is usually chosen as the initial set of function centres. Otherwise, m data points would be selected randomly. At step 2, each of the training patterns is assigned to the closest centre. At step 3, the centres are adjusted by taking the arithmetic average in each cluster group. Steps 2 and 3 will be repeated until each training pattern stays in its group, i.e., no reassignment of any pattern to a different group or previous group (see Table 1).

*Table 1 **K-Means clustering procedure***

Step 1. Initialize the function centres
    Set the initial function centres to the first m training data or to the m randomly
    chosen training data.

Step 2. Group all patterns with the closet function centre
    For each pattern xi, assign x$_i$ to group j*, where $\left\| x_i - c_{j*} \right\| = \min_j \left\| x_i - c_j \right\|$

Step 3. Compute the sample mean for the function centre
    For each group c_j, $c_j = \dfrac{1}{m_j} \sum_{x_i \in group\ j} x_i$

    where m_j is the number of patterns in group j.

Step 4. Repeat by going to step 2, until no change in cluster assignments

The operation of the algorithm results in the establishment of final cluster centers w_j, provided that the sum of square distances between all the points belonging to group j and the cluster center must be minimal.

An essential question in K-Means algorithm implementation is the determination of the number of clusters and initial centers. The simplest tasks assume that the number of clusters is known apriori and it is proposed to take the first m points of the training set for the initial values of the m cluster centers.

As an advantage of K-Means algorithm can be considered its popularity, high efficiency and simplicity of the procedure. But if the layout of the objects is heterogeneous, the algorithm may not produce good results. Then you need to change the parameters (number of clusters) and try again to repeat the algorithm's operations. The disadvantage is that the algorithm is not universal.

An example of the use of a clustering method for training purposes

To demonstrate the operation of a clustering algorithm, assume that we have 14 input vectors, which are split into two clusters. Using the K-Means clustering algorithm, it is necessary to determine the points and cluster centres belonging to each cluster (see Table 2).

Each input vector (or point) has two components: $x1$ un $x2$. The distribution of points in the 2-D plane is shown in Figure 2.

*Table 2 **Experimental data points***

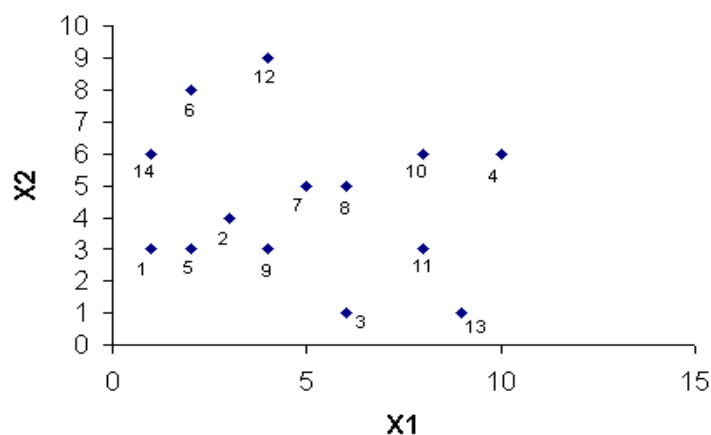|	1	2	3	4	5	6	7	8	9	10	11	12	13	14
X1	1	3	6	10	2	2	5	6	4	8	8	4	9	1
X2	3	4	1	6	3	8	5	5	3	6	3	9	1	6

*Figure 2 **Initial data distribution***

In order to start using the clustering algorithm, it is necessary to determine the number of clusters and their initial centers. In this exercise we assume that input points are divided into two classes, so we will use two clusters.
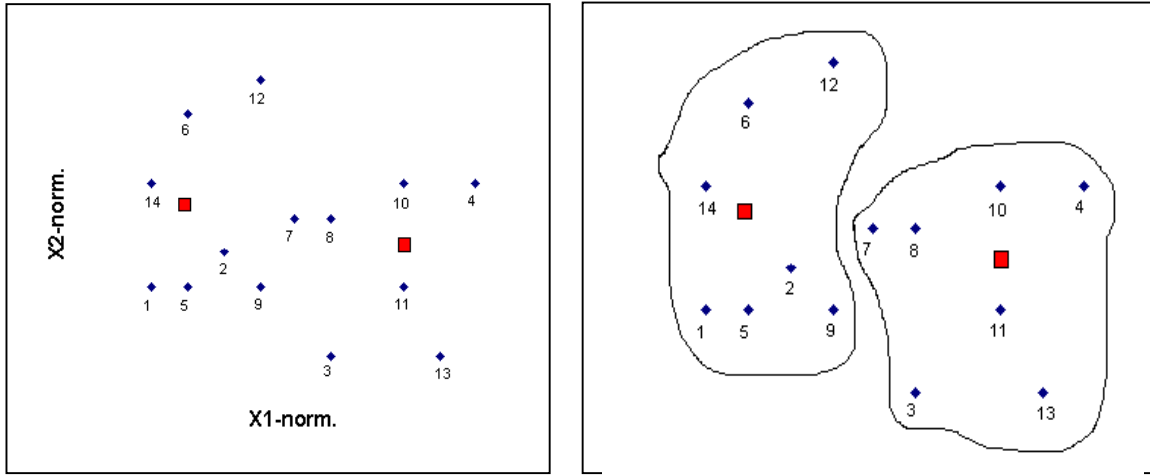

*Figure 3 **a) The distribution of points with an arbitrarily selected center;
b) Separation of clusters after 1st iteration***

Figure 3a) below shows the distribution of points and the coordinate axes harvested for the sake of visibility. We approximately set the initial cluster centers with the arbitrarily selected coordinates. In the drawing, they are shown as squares. We start using the K-Means algorithm. Figure 3b) lists the points belonging to clusters after the first iteration:

Again, we calculate the average values for each cluster i.e. figure out new cluster centers. Since they are different from our arbitrarily selected initial cluster center, then we continue to apply clustering algorithm. The results are shown in Fig.4.
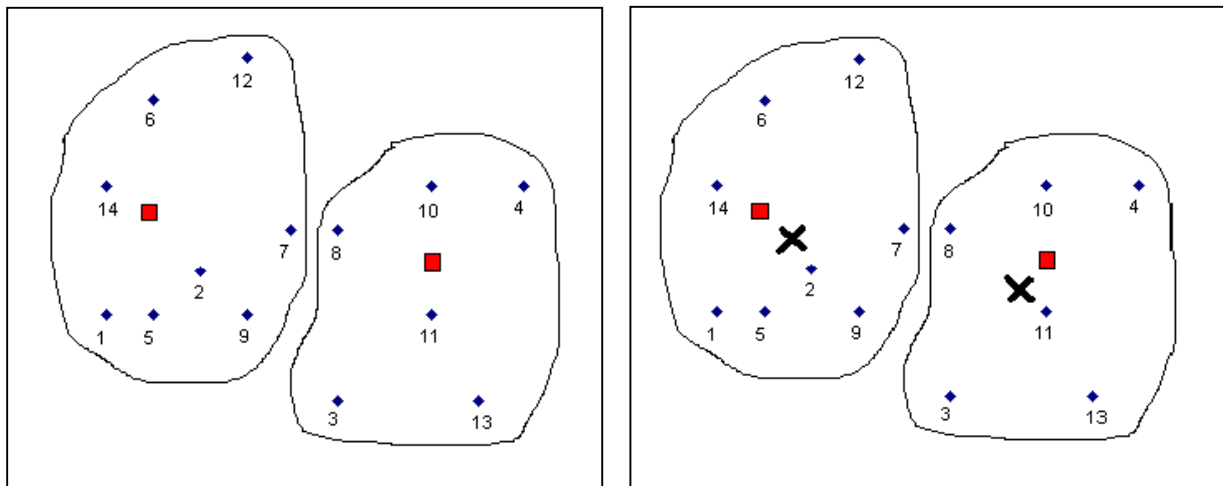

*Figure 4 **a) Separation of clusters after 2nd iteration. b) Separation of clusters after 3rd iteration***

As can be seen, after the 2nd iteration, the 7th data point has changed its class affiliation. Since the new cluster centers are different from the cluster centers obtained in the first iterations, then we continue to apply clustering algorithm.

In the third iteration the points have not changed their belonging to the clusters, i.e. cluster centers calculated in the second iteration remain unchanged. Consequently, it can be concluded that the use of the clustering algorithm in this case has set up cluster centers and the corresponding points from the trainee set are clustered. In Figure 4b, the new cluster centers are marked out with a cross.

Thus, with the help of clustering algorithm it was calculated that 8 data points: 1, 2, 5, 6, 7, 9, 12, 14 relate to cluster 1 and 6 data points: 3, 4, 8, 10, 11, 13 relate to cluster 2. Data is clustered.

Solution with SPSS and SPSS Modeler

The IBM SPSS software platform offers advanced statistical analysis, a vast library of machine-learning algorithms, text analysis, open-source extensibility, integration with big data and seamless deployment into applications. Its ease of use; flexibility and scalability make IBM SPSS accessible to users with all skill levels and outfits projects of all sizes and complexity to help you and your organization find new opportunities, improve efficiency and minimize risk. SPSS Statistics is leading statistical software used to solve a variety of business and research problems. It provides a range of techniques including ad-hoc analysis, hypothesis testing and reporting – making it easier to manage data, select and perform analyses (IBM Statistics, 2018).

Also with a help of SPSS Statistics package similar results are obtained in this case (see Table 3):

*Table 3 **SPSS Statistics results***

Number of Cases in each cluster	
Cluster 1	8
Cluster 2	6
Valid	14
Missing	0

It can be concluded that the results obtained by SPSS Statistics correspond to the manually calculated results of the clustering algorithm (8 data points relate to the cluster 1 and 6 data points - to the cluster 2).

The clustering results were tested with another IBM SPSS tool - IBM SPSS Modeler. SPSS Modeler is a leading visual data science and machine-learning solution. It helps enterprises accelerate time to value and achieve desired outcomes by speeding up operational tasks for data scientists. Leading

organizations worldwide rely on IBM for data preparation and discovery, predictive analytics, model management and deployment, and machine learning to monetize data assets. SPSS Modeler empowers organizations to tap into data assets and modern applications, with complete algorithms and models that are ready for immediate use (IBM Modeler, 2018).

The following clustering model for the implementation of the K-Means algorithm for the given data was performed with IBM SPSS Modeler (see Fig. 5).
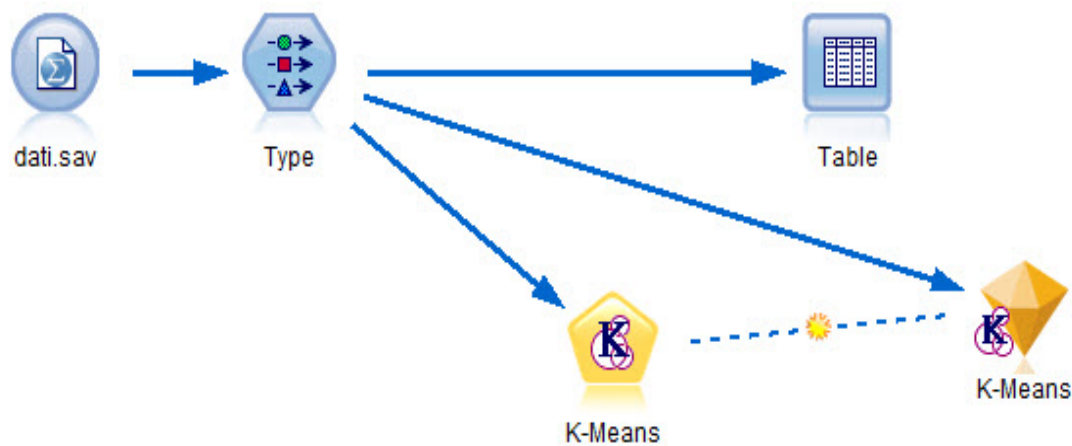
*Figure 5 **The clustering model in SPSS Modeler environment***

The sizes of the clusters are shown in Fig.6 and cluster centers in Fig.7. Similar results are obtained with SPSS Statistics - 6 data points are created in one cluster, 8 data points - in the second cluster.
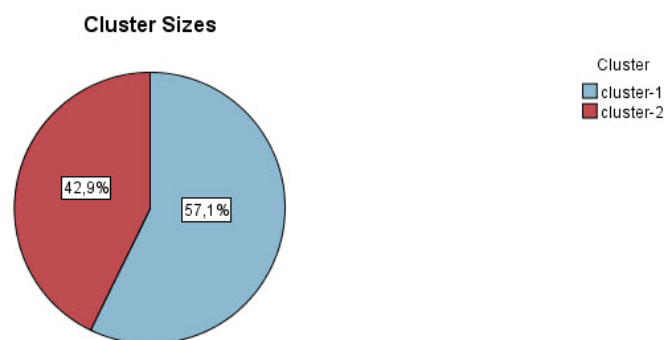
Size of Smallest Cluster	6 (42,9%)
Size of Largest Cluster	8 (57,1%)
Ratio of Sizes: Largest Cluster to Smallest Cluster	1,33

*Figure 6 **Cluster sizes***

Clusters

Input (Predictor) Importance

☐ 1,0 ☐ 0,8 ☐ 0,6 ☐ 0,4 ☐ 0,2 ☐ 0,0

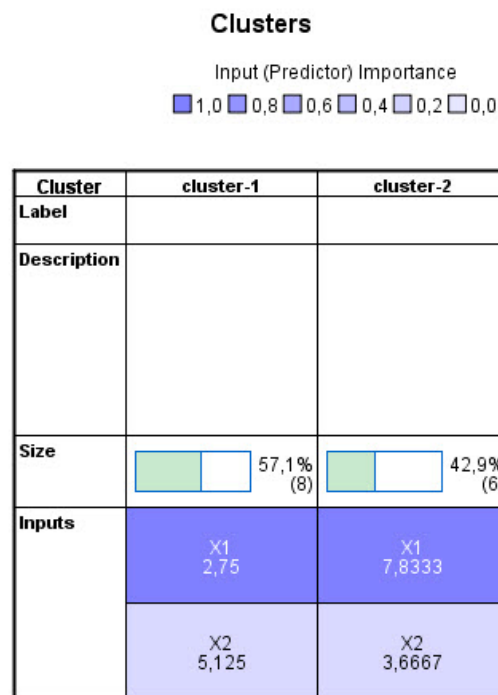| Cluster	cluster-1	cluster-2
Label		
Description		
Size	57,1% (8)	42,9% (6)
Inputs	X1 2,75	X1 7,8333
	X2 5,125	X2 3,6667

Figure 7 **Cluster centers**

As a result, the following cluster centers $C_1 = (2,75; 5,125)$ and $C_2 = (7,833; 3,6667)$ are obtained corresponding to the manually calculated cluster centers.

It can be concluded that different methods give similar results according to the K-Means algorithm.

Conclusions

The purpose of the cluster analysis as one of the basic tasks of the intellectual data analysis is to search for independent groups and their characteristics in analytical data. Solving this problem allows for better understanding of the data, since clustering can be used in virtually any application area that requires experimental or statistical analysis of data.

All clustering algorithms have common parameters, the choice of which also characterizes clustering efficiency. The most important parameters characterizing clustering are: metrics (distance of cluster elements to the center), number of clusters k.

The paper provides a practical example that enables students to understand and begin to use the possibilities of modern Big Data analysis with the help of clustering algorithms.

Summary

The term "cluster analysis" dates back to 1939. It actually includes a complex of different classification algorithms. In the different fields of research, the live question is: "How to organize observable data in clearly viewed structures?" There is a view that, unlike many other statistical procedures, in most cases cluster analysis methods are used when there is no hypothesis about classes, but the data collection stage is still in progress. Methods of cluster analysis allow to divide the objects under investigation into groups with "similar" objects called clusters.

The cluster analysis process formally consists of the following steps:

- collecting of necessary data for analysis;
- determining the characteristic size and boundaries of class data (clusters);
- grouping of data in clusters;
- definition of class hierarchy and analysis of results.

The clustering algorithm K-Means minimizes the quality score, which is defined as a square sum of distance of all points belonging to the cluster area to the cluster centre. This procedure got its name because it is based on calculating the average distances of cluster groups to the cluster centers.

As a result of the algorithm, the final cluster centers are determined, provided that the sum of the squares of the distances between all the points belonging to the group and the cluster centers must be minimal.

As an advantage of the K-Means algorithm can be considered its popularity, high efficiency and simplicity of procedure. But if the placement of objects is heterogeneous, the algorithm may not achieve good results. Then it needs to change the parameters (number of clusters centers) and try to repeat the algorithm again. The drawback is that the algorithm is not universal.

An important issue in implementing the K-Means algorithm is determining the number of clusters and the initial centers. The simplest tasks assume that the number of clusters is known in advance. For the initial values of cluster centers it is suggested to take the first objects of the training cluster.

A possible solution would be to use the SPSS packages to implement various algorithms in Information Technology areas. Often, the analytical solution is much simpler than the visual SPSS model, but in perspective, for the sake of training it gives an understanding of the usefulness of using such models.

In the research part of the study the modelling capabilities in data mining studies were demonstrated, data clustering examples using IBM SPSS Statistics and Modeler were given.

The work provides a practical example that would enable students to understand and start mastering modern Big Data analysis capabilities with the help of clustering algorithms.

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ACADEMIC TEACHERS' PREFERENCES IN SELECTING SCIENTIFIC DATABASES

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Abstract. *The objective of the paper was to determine the preferences of academic teachers in the selection of databases of scientific publications. Material consists of the results of research carried out with the diagnostic survey methods carried out with the questionnaire technique among the scientific employees and students of the selected Polish higher schools: University of Life Sciences in Lublin, University of Agriculture in Krakow. 135 scientific employees and 140 full-time students of the second cycle studies participated in the survey. University teachers the most often used publications in scientific journals and publications in the Internet. All students that took part in the questionnaire used scientific publications in the Internet and information included in the Internet. Databases of the Polish scientific publishing houses, Elsevier database, and Google Scholar database are the most useful in the scientific work. Students search for publications only in the Polish databases of publishing houses and Google Scholar base.*
Keywords: *scientific publication, Internet, library, teachers, database.*

Introduction

The education process at higher schools, particularly at universities is strictly related to scientific research carried out by researchers and teachers. The present regulations on the education quality provide that a given subject can be taught by a person whose scientific achievements include publication concerning a particular module. Unfortunately, the policy of evaluation of scientific disciplines forces the university employees to publish in journals indexed in Web of Science (WoS) or SCOPUS database. Therefore, the most valuable papers are often published in journals to which both scientific employees and students have a limited access. Even more often, periodicals publish only electronic versions of scientific papers with a free access to abstracts or the first page of the paper. Such

policy forces employees and students to search in databases for publications including full texts. However, even databases including abstracts of papers are often a valuable tool to search for publications necessary in the process of teaching students, since lecturing at the university level requires, inter alia, the use of the newest knowledge from a given field. Also students, that write control papers and projects, particularly diploma theses are obliged to use the current knowledge on a given subject. Therefore, in the world of the Internet, electronic databases of scholarly information have a significant tasks and roles to meet in the teaching process carried out at universities.

Literature review

A dynamic growth of information techniques in recent years has had a great impact on the media communication process (Lorencowicz, Koszel, Kocira, & Uziak, 2017). Development of those techniques considerably influenced the interaction inside communicative groups and intercultural communication (Bugajski, 2017). Changes in communication and searching for information concern greatly also scientific employees and students (Cupiał, Szeląg-Sikora, & Kuboń, 2018; Cupiał, Szeląg-Sikora, Sikora, Rorat, & Niemiec, 2017). Traditional search for information in journals and printed books is replaced with searching for articles and other publications in electronic databases (Milewska, 2012). It is mainly related to the amount of available information. Many journals have recently stopped to issue a printed version and instead issues an electronic version as a primary one. Also, a great number of published articles influences the fact that researchers are not able to find all articles which they should know before they start studies in a given field. Access to articles issued in an electronic version enables fast search for gigantic databases and finding interesting papers within a given scope (Lorencowicz, Bejgrowicz, Kocira, & Lorencowicz, 2013). An opportunity to use information technology methods for analysis of the publication content is a very favourable feature. It is also related to indexing of keywords and a possibility of searching for papers on the investigated issue as well as to more advanced methods of analysis.

Moreover, students in the education process even more often use the Internet and base their education mainly on the use of information techniques (Lorencowicz, Koszel, Kocira, & Uziak, 2015). They use of electronic publications mainly for writing control and diploma theses.

The objective of the paper was to determine the preferences of academic teachers in the selection of databases of scientific publications.

Methodology

Material consists of the results of research carried out with the diagnostic survey methods carried out with the questionnaire technique among the scientific employees and students of the selected Polish higher schools: University of Life Sciences in Lublin, University of Agriculture in Krakow. The questionnaire includes single and multiple choice questions. The questionnaire consists of five parts:
– printer's imprint,
– frequency of use of various forms of scientific publications and using digital resources that are made available by the Polish and foreign scientific publishing houses and on the Universities' webpages,
– place and frequency of using the publication uploaded in the Internet (both in the Polish and foreign scientific databases),
– criteria of searching for publications in scientific databases and assessment of usefulness of the selected databases in a scientific work
– making own papers available in Open Access mode and purchase of paid scientific articles uploaded in the Internet.

135 scientific employees (43 women and 92 men) and 140 full-time students of the second cycle studies participated in the survey. From among 135 investigated scientific employees, the most numerous groups were persons aged 36-45 - 41%. The second group with regard to the size, included respondents aged 40-60 - 29%. While, the so-called "young scientists" namely scientific employees aged up to 35, constituted only 12%. On the other hand, the oldest employees aged more than 60 years constituted 18% of the investigated group.

Analysis of the respondents with regard to the scientific title and degrees shows that the most numerous group in the investigated group were PhDs (36%) and the least -MScs (13%). The highest participation in the investigated group of respondents were (32%) PhDs with a habilitation degree and professors with titles - 19% of the investigated group. Such participation of particular groups of respondents corresponds to the structure of employment at the Polish universities when the biggest number of employed doctors and doctors with a habilitation degree is employed.

Research results

Scientific employees answering the question concerning the use of various forms of publishing information could choose any number of responses. The highest number of respondents used scientific journals published in the printed form - 97% (Fig. 1). The second position was taken by publications in the

electronic journal - 81% of respondents. 78% of respondents prefers books. Only 73% of respondents in their scientific work use the Internet pages. Such a low interest results mainly from the lack of trust to information included in the unauthorised Internet pages.
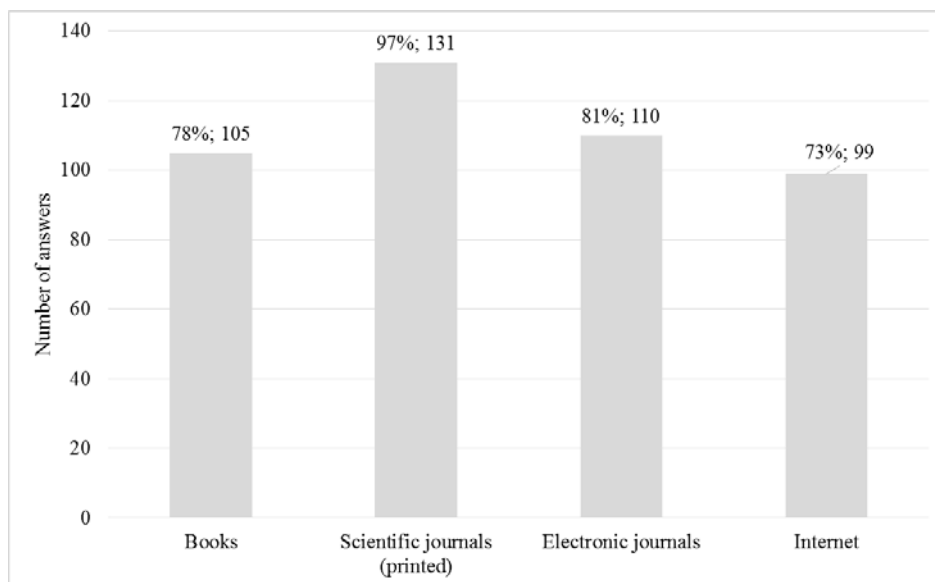
Figure 1 **Using various forms of scientific publication by scientific employees**

Students answering the question on the use of various forms of scientific publications gave diametrically different answers than scientific employees. All participants in the study emphasised that when searching for information needed for writing diploma and control theses they use both publications in the Internet and usual Internet pages (Fig. 2).

Figure 2 **Using various forms of scientific publication by students**

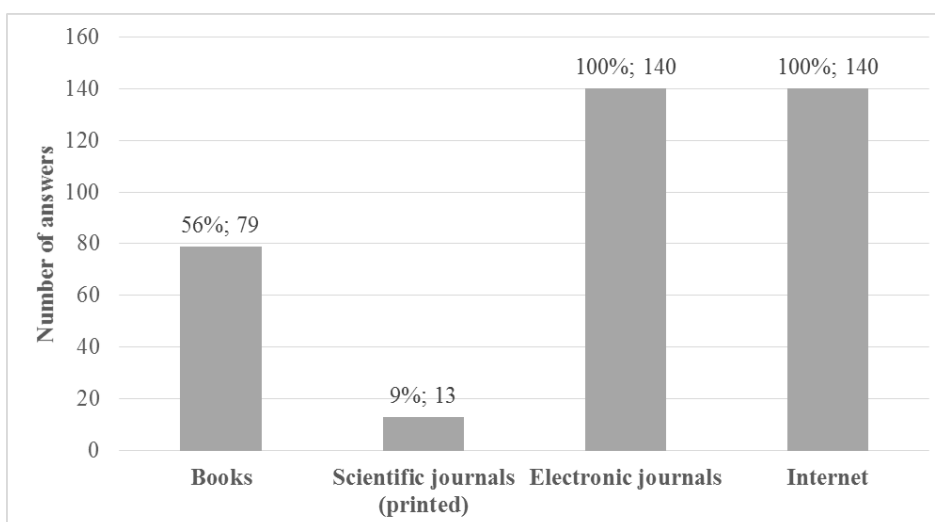The fact that 46% of students that take part in the study, use books, is interesting and surprising information. The lowest number of respondents used scientific journals published in the printed form and this situation is completely different than in the analysed group of scientific employees.

Another question answered concerned the frequency of using digital resources that are made available by the Polish and foreign scientific publishers on the webpages of the university. This question was answered by scientific employees choosing one answer for each of the digital resources. More than half of the investigated group often used national publishers (Fig. 3). Also, the most numerous group of respondents often used foreign publishing houses. The biggest group (43 people) often reached for digital resources of the university webpages.
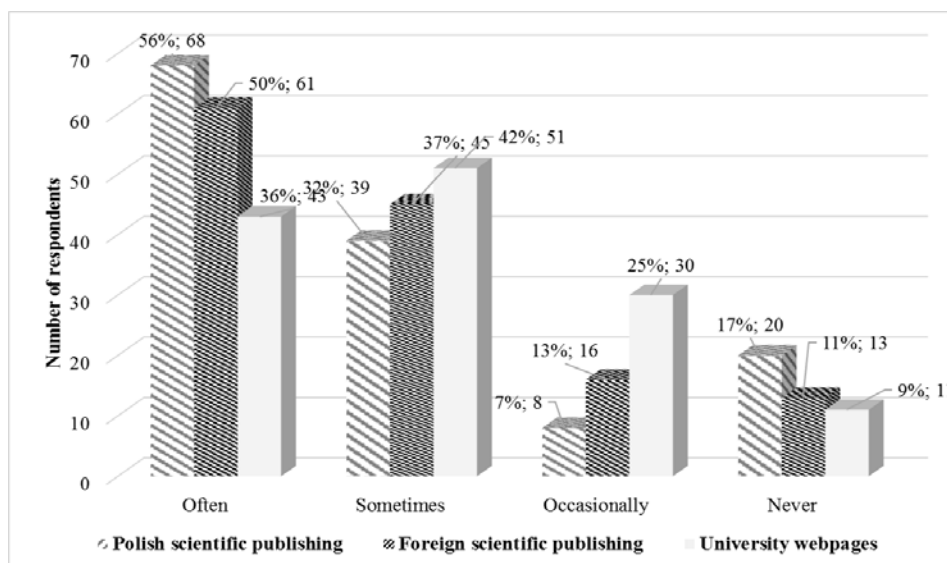
*Figure 3 **Frequency of using digital resources that are opened by the Polish and foreign scientific publishing houses and on the university webpages by scientific employees***

Scientific employees the most often search for and read publications uploaded in the Internet during their stay at home and work (51%) (Fig. 4). However, as much as 17% of respondents only at home uses scientific publications uploaded in the Internet. The attention should be noted that none of the respondents indicated that only in the library uses scientific publications posted on the Internet. Such a situation results from the possibility of access to scientific publications from own computers at work or at home. Searching for scientific articles in the Internet was marked by 31% of respondents.
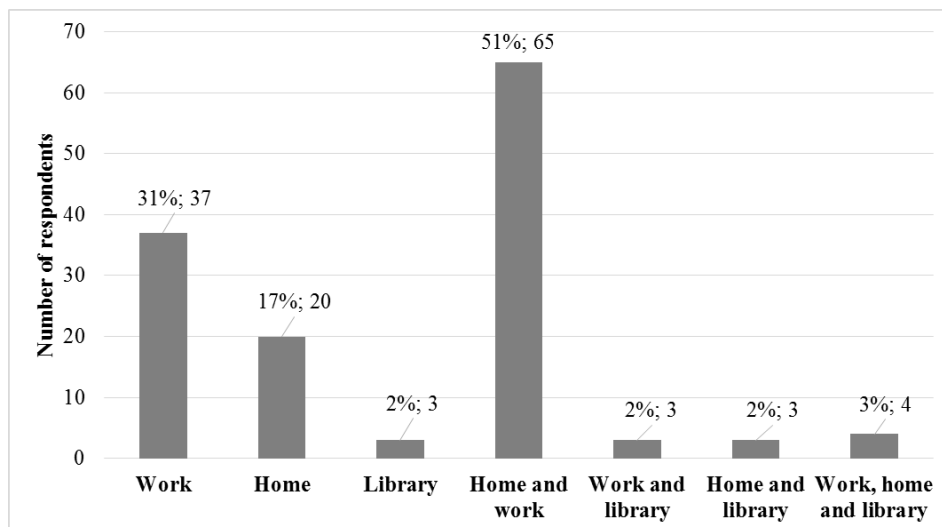
*Figure 4 **Place of using scientific publications placed in the Internet***

In the next question, scientific employees marked any number of the selected national search engines and databases that they use in their work. They also included Google Scholar to the group of databases they use, mainly due to its Polish language version and searching for articles in Polish journals and databases. The scientific employees the most eagerly used the Polish databases of scientific publishers (Fig. 5). Google Scholar was on the second position. The remaining databases were used by less than a half of the respondents. The opinion of employees that filled in the questionnaire is that "e-publikacje" database of the Polish science becomes more and more popular.

*Figure 5 **Using selected Polish scientific search engines and databases by scientific employees***

Students who answered the same question as scientific employees had a completely different preferences in using search engines and databases. They the most eagerly used Google Scholar search engine (Fig. 6). Slightl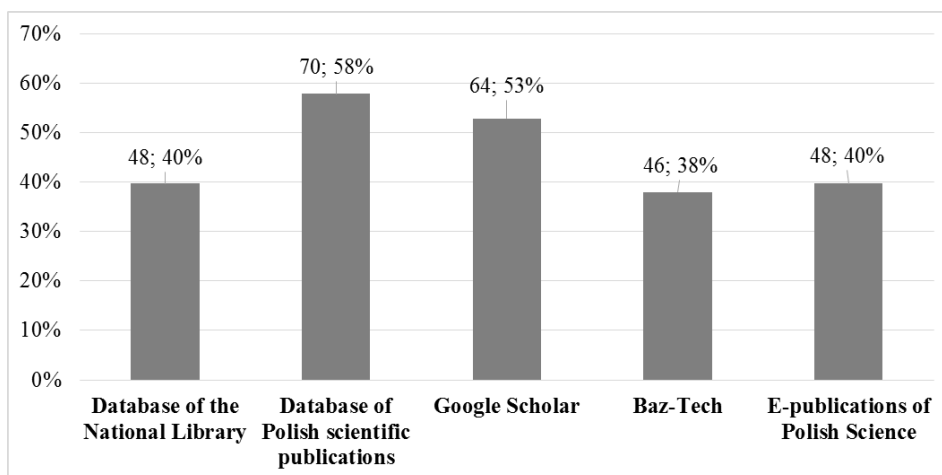y more than a half, searched for publications in the databases of the Polish publishing houses. Unfortunately, students hardly used the other databases. It is a disturbing phenomenon that requires wider research which would allow for determination and reduction of the reasons of such a situation.
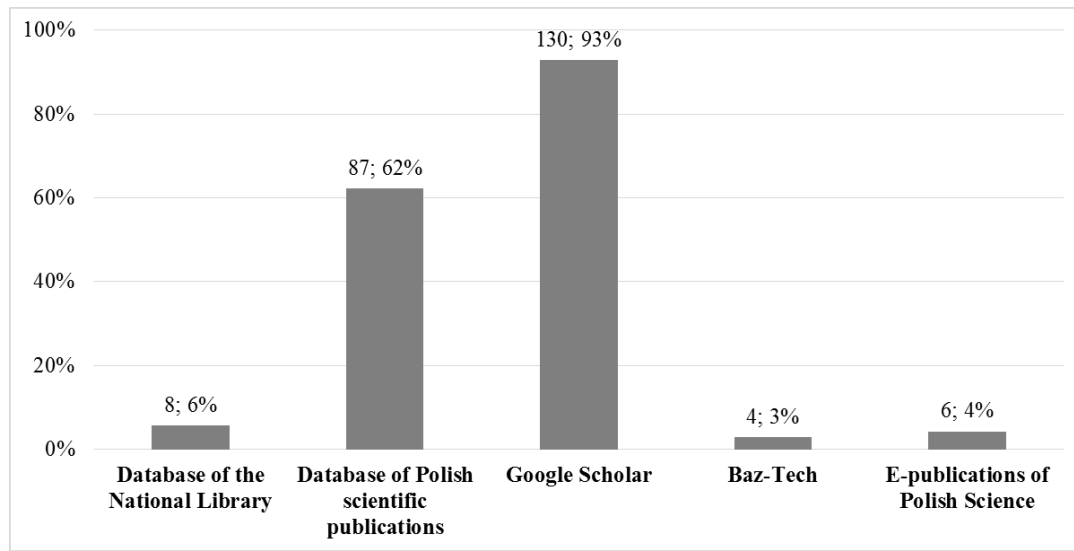
*Figure 6 **Use of selected Polish scientific search engines and databases by students***

Scientific employees that participate in the research represented agricultural and technical sciences, therefore for the analysis they selected the most popular databases that collect publications from those scientific fields. Over 71% of respondents used Elsevier base. The following databases exceeded also the threshold of 50%: Web of Science and Springier. Such an interest in the above databases results both from scientific disciplines that were represented by the respondents, but also from even a greater pressure of both the Ministry of Science and Higher Education and authorities of particular departments, where respondents work, on publishing in journals with a high Impact Factor (IF).

One of the last questions in the questionnaire was a selection of search engines and databases that are the most useful in the scientific work (multiple answers).
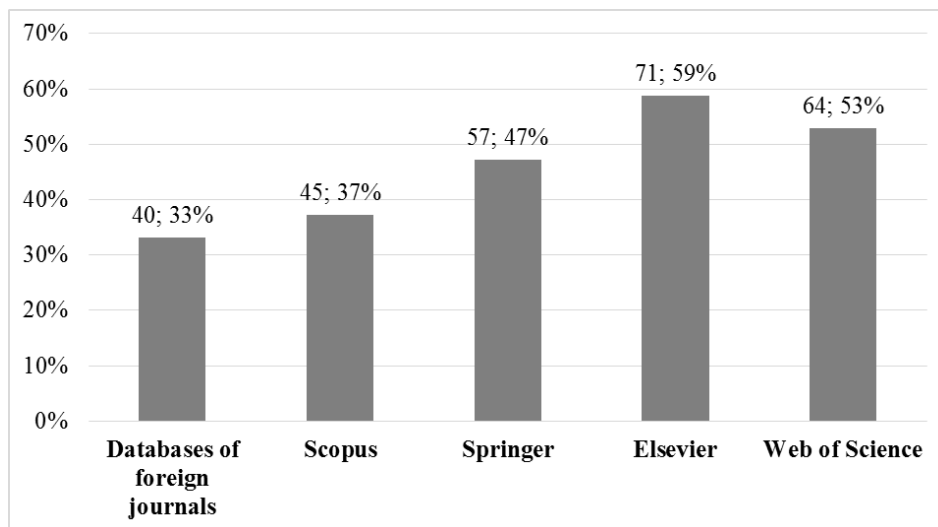
Figure 7 **Use of selected foreign scientific search engines and databases by scientific employees**

With this regard, respondents evaluated that both the Polish databases of publishers and Elsevier base are useful alike (Fig. 8). The search engine of scientific publication Google Scholar were found useful by 50% of respondents. On the other hand, the lowest number of persons marked "e-publikacje" database of the Polsih science. In comments to this answer, the respondents wrote that it is still not much known in the scientific environment.
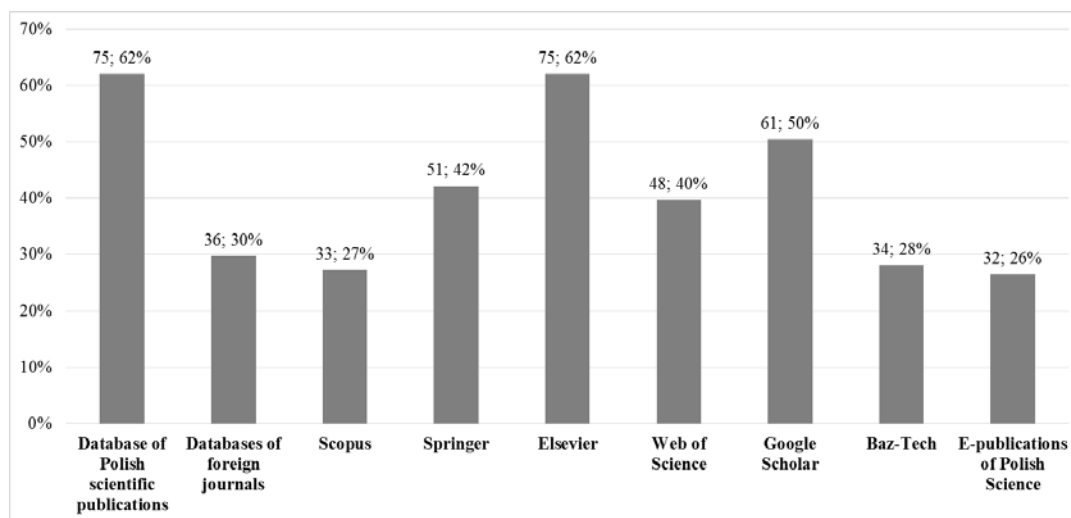
Figure 8 **Selected scientific databases useful in scientific work**

When talking about the criteria of searching for scientific publications in databases, the employees that participated in the research used keywords the most often (Fig. 9). Surprisingly not many people searched with a criterion of the paper

title. Therefore, it is also very significant to determine in the published scientific papers relevant key words according to which it will be possible to search for articles on a given subject.
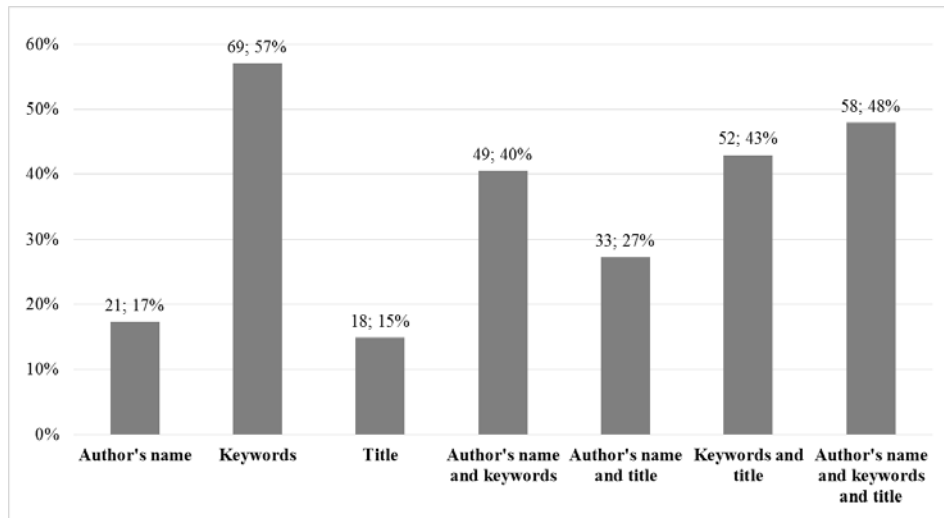
Figure 9 **Searching criteria of scientific paper in databases**

The results obtained by the authors are compliant with the research by Zmitrowicz and Weryho who investigated the use of data bases and electronic journals by scientific employees. They observed that 98% of scientific employees uses digital materials located in the data of both Polish and international journals (Zmitrowicz & Weryho, 2011). Next to selection of a relevant data base and searching for correct criteria, Bednarek-Michalska and Derfert-Wolf concluded that open access to publications is a significant issue related to the use of publications from electronic data bases by scientific employees (Open Access) (Bednarek-Michalska & Derfert-Wolf, 2008).

Porter emphasizes, on the other hand, the problems with the use of data bases for research, which with regard to the characteristics of scientific data differ with longevity, volume, variety and manner of use (Porter, 2018).

Nahodko concluded that representatives of medical, technical sciences and sciences in general use electronic bases of publications the most often while scientists of social sciences and humanities still very actively use traditional carriers (Nahodko, 2007)

Conclusions

University teachers the most often used publications in scientific journals and publications in the Internet. All students that took part in the questionnaire

used scientific publications in the Internet and information included in the Internet.

University teachers participating in the study, the most often used digital resources that were made available by the Polish scientific journals.

The respondents the most often used publications in the Internet in the place of living. Over 90% of respondents never used electronic publications in a library.

Databases of the Polish scientific publishing houses, Elsevier database, and Google Scholar database are the most useful in the scientific work.

Students search for publications only in the Polish databases of publishing houses and Google Scholar base.

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ЭПОХА DIGITAL: ВЫЗОВЫ К ГРАЖДАНСКОЙ ИДЕНТИЧНОСТИ МОЛОДЕЖИ

The Epoch of Digital: Challenges to the Civil Identity of Youth

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Abstract. *The article deals with the problem of the formation of civic identity in the epoch of digital. The authors emphasize the randomness of this process, defining it as an experiment, a "game" with social roles, statuses, and masks. The reasons for the similar nature of the identification of a person in modern society are revealed, which are associated with the erosion of virtuality and reality in the self-consciousness of young people.*
Keywords: *civil identity of youth, Internet communications, "identity crisis", the epoch of digital.*

Введение
Introduction

Состояние современного общества, его особенности и тенденции развития, безусловно, связаны с процессами «глобализации», увеличения интенсивности информации и степени открытости, размывания национально-культурных границ. Очевидно, что данные процессы оказывают сильнейшее влияние на экономическую, политическую, гражданскую, культурную и другие сферы жизни общества. Но, кроме того, они ведут и к трансформации самоосмысления и самосозидания каждой личности. В условиях быстрого роста информационного потока, его высокой плотности и неоднородности социальные технологии трансформируются, изменяя формы и способы идентификации человека.

Понятие «идентичность» в научной литературе встречается всё чаще, и это не случайно: в контексте последних социальных изменений усиливается интерес к проблеме социального выбора и самовыражения страны, личности, гражданина. Сегодня идентичность предстаёт как сложный феномен, тесно взаимосвязанный с такими процессами, как самосознание и

самоопределение, самоактуализация и персонализация, выбор и «событийность».

В обществе активизируются процессы конструирования, изменения и реактуализации идентичностей. Прежние социальные механизмы идентификации не соответствуют общественным потребностям, а новые еще только формируются. Особенно сложным процесс самоопределения и социализации представляется для молодой, становящейся личности.

Указанные тенденции настоятельно требуют осмысления сущности человеческого бытия и его специфики в эпоху постиндустриального информационного общества. При этом важно учесть, что наша страна многонациональна, поэтому прежде всего следует решать проблему формирования именно гражданской идентичности, предполагающей чувство гражданской общности, оценку каждым своего статуса российского гражданина.

В последние десятилетия общение в социальных сетях трансформировалось из периферического в главный способ интернет-коммуникации, став одним из мощнейших механизмов социального взаимодействия и управления. Сегодня молодые люди именно в сети проходят первичную социализацию, экспериментируя с ролями и статусами. Социальные сети навсегда изменили представления о потенциальных возможностях идентификации личности в интернет-пространстве. Поэтому важно обратить внимание на процессы идентификации, особенно молодежи, при этом особо сделать акцент на гражданской идентичности молодого поколения. Этому вопросу и посвящено наше исследование.

Теоретические основы исследования
Theoretical substantiation of the problem

Поскольку современная общественная ситуация определяется неустойчивостью традиционно сложившейся системы ценностей, стереотипов мышления и поведения, утратой мировоззренческих ориентиров, то идеалом в обществе становится самостоятельная, активная и конкурентоспособная личность, которая вынуждена самоопределяться в условиях «кризиса идентификации».

Отметим, что с одной стороны, новый тип социальности основан на сети микросообществ, которые соединены между собой все время развивающимися информационными связями и часто не зависят от социальной стратификации, уровня материального достатка, возраста участников и даже их мировоззрения. Это явление называется трайбализмом. С другой стороны, мировая глобализация вовлекает во взаимодействие разные сообщества и культуры и требует развития

идентичностей, диалектически противоположных социальной стандарти-зации (Пэлфри & Гассер, 2011). В связи с названными процессами основными характеристиками социального бытия становятся толе-рантность, плюрализм, космополитизм, глобализм.

Таковы условия «открытого общества», где в индивидуальном и общественном сознании возрастает неуверенность, рушатся традиционные ценности и фундаментальные социальные структуры. Проблема выбора и самоопределения индивида усложняется, он «вынужден находить собственные решения в ответ на возникающие коллективные противо-речия». Речь идет не просто об индивидуализации, а о «массовом субъективном повороте»: люди стремятся найти собственный путь к самореализации, что особенно значимо для молодежи (Коряковцева & Доссэ, 2016).

Американский социальный философ А. Этциони справедливо утверждает, что если XX век – это век борьбы идеологий, то социальные процессы XXI века будут определяться вызовами идентичности (Этциони, 2004). Тейяр де Шарден ещё в 2002 году замечает: «Мир движется в сторону усложнения, а оно сопровождается …. все большей значимостью психического сознательного» (Тейяр де Шарден, 2002).

Действительно, в эпоху Интернета традиционная шкала ценностей рухнула и в духовной атмосфере общества все более ощущается «экзистенциальный вакуум». Австрийский психолог Виктор Франкл обращает внимание на то, что «…. в отличие от человека вчерашнего дня традиции не диктуют сегодняшнему человеку, что ему должно» (Франкл, 1990). Действительно, современный молодой человек не знает, что ему нужно, что он должен, а значит, и – что хочет. Следствием этого может быть либо конформизм, либо абсентеизм, либо экстремизм.

Изменился характер социального взаимодействия, характер отношений человека с миром. Коммуникация в сети в отличие от привычных офлайн-практик децентрализована и полицентрична, инкультурация происходит в соответствии с заданными в сообществах правилами и нормами, проявляясь в усвоении традиций, норм, паттернов поведения данного онлайн-сообщества.

Постепенно происходит размывание границ виртуального и реального. Важным фактором привлекательности объединения людей в виртуальных сообществах в современном, постоянно меняющемся, стрессогенном мире становится поиск «своих», принадлежность к различным сообществам, созвучным собственным взглядам и интересам, размежевание с «другими / чужими». Человек ищет единомышленников, себе подобных, ожидая социальной оценки и поддержки. Желание принадлежать к какому-либо сообществу, быть другом повышает самооценку и собственный рейтинг в

глазах других пользователей, для социализации которых этот аспект является чрезвычайно важным. Общение и поиск друзей становятся превалирующим мотивом для использования социальных сетей у молодежи «цифрового поколения».

По мнению психологов, занимающихся проблемой групповой идентификации, потребность в самоуважении люди реализуют посредством отождествления себя с группой, которая оценивается ими позитивно. Если группа, с которой человек себя отождествляет, в силу каких-либо обстоятельств теряет в его глазах положительные характеристики, он будет стремиться либо дистанцироваться от нее физически или психологически, либо же прилагать усилия к восстановлению ее позитивного значения, каждый из этих вариантов в конкретном обществе и в конкретной культурно – исторической ситуации будет наполняться специфическим содержанием, их соотношение также будет специфично. Данной точки зрения придерживается и Н. А. Ананьева (Ананьева, 1999). Она рассматривает идентификацию с группой на примере идентификации с партнером.

Вопрос о необходимости восстановления позитивного значения группы отожествления особенно остро встает в период исторических общественных трансформаций, когда даже нация и государство теряют для человека свое позитивное значение, что и происходит в эпоху digital.

Материалы и методы исследования
Materials and methods

Проведённые нами в течение ряда лет исследования результатов некоторых социальных практик подтверждают, что в стабильном обществе доминирует объективная составляющая, а в условиях радикальной трансформации социокультурных ценностей и норм (что и происходит сегодня в процессе сетевого общения), преобладает субъективная составляющая идентичности (Бугайчук Т. В. & Коряковцева О. А., 2016). Именно это преобладание определяет особую сложность процесса становления гражданской идентичности молодёжи «цифрового поколения».

В структуре гражданской идентичности традиционно выделяют следующие компоненты: государственную идентичность; патриотизм; гражданственность. Целесообразно рассматривать гражданскую идентичность как осознанный процесс соотнесенности или тождественности человека с определенной государственной общностью в конкретном социально-политическом контексте.

В качестве примера, подтверждающего нашу обеспокоенность проблемой становления гражданской идентичности молодежи, приведем результаты исследования научной лабораторией «Изучение гражданской

идентичности студенческой молодежи» Ярославского педагогического университета социально-психологических особенностей и гражданской идентичности участников нескольких проектов (98 человек), в том числе «Молодежная общественная палата», которые являются наиболее социально активной частью молодежи региона. В основе научной работы лежит серия репрезентативных психологических исследований, анализ статистических данных.

Первичные данные собирались с применением количественных и качественных методов – анкетного опроса и авторского психосеман-тического метода исследования гражданской идентичности. Анкетный опрос был направлен на оценку уровня социальной креативности, лидерских качеств анкетируемых и уровня их личностной конкуренто-способности. Данный метод позволяет продиагностировать и соотнести все компоненты гражданской идентичности.

Результаты и их обсуждение
Results and discussion

В результате эмпирического исследования мы получили важные результаты о самооценке уровня развития социальной креативности личности, самооценке лидерских качеств, конкурентоспособности, которые позволили доказать гипотезу о том, что виртуальный мир видится молодому человеку безграничным, свободным от запретов, формируя тем самым запрос на новые идентичности с условными признаками, позволяя создавать множественные образы и играть собственными идентичностями, в том числе и гражданской. В научно-популярной литературе даже появился термин «игры с идентичностью». Пользователь социальных сетей имеет возможность примерить различные идентичности, вступая в разные сообщества и группы, создавая различные аккаунты, играя с персональной идентичностью, моделируя и проектируя собственное «Я» в карнавальной смене масок, одновременно выступая производителем (творцом) и потребителем. Анонимность, легкость конструирования и презентации становятся дополнительным преимуществом и стимулом игры с идентичностью, что и определяет развитость изучаемых нами личностных особенностей.

Итак, представляем результаты исследования. У 93 % испытуемых уровень социальной креативности высокий или выше среднего, что говорит об адекватном отношении молодых активистов к изменениям, происходящим в современном обществе, способности и готовности самим постоянно изменяться, проявлять собственную неповторимость.

Судя по тесту самооценки лидерских качеств, в исследуемой группе средний балл составляет 7,46, что авторы методики относят к высокому уровню лидерства. Высокий уровень самооценки лидерских качеств личностью, как правило, свидетельствует об уверенности в своих социально-коммуникативных и организаторских способностях, готовности принимать на себя роль лидера в различных ситуациях взаимодействия.

Данные, полученные по методике «Диагностика личностной конкурентоспособности» позволяют определить у испытуемых наличный уровень базовых критериев конкурентоспособности. При этом личностная конкурентоспособность понимается авторами как форма межличностного взаимодействия, характеризующаяся достижением целей в условиях противоборства с добивающимися этих же целей другими индивидами или группами.

Полученные результаты показывают: в среднем по выборке личностная конкурентоспособность незначительна (среднее значение 13,75). Как правило, данный уровень личностной конкурентоспособности свидетельствует о том, что индивид не имеет достаточного опыта совладания с трудностями и изменениями, но для него характерна заинтересованность, включенность в происходящее, поиск чего-то стоящего и интересного для собственного развития.

У ряда участников исследования выявлен более высокий уровень конкурентоспособности, чем в среднем по выборке. Показатели данных участников находятся в пределах среднего уровня личностной конкурентоспособности. Такие индивиды, как правило, получают удовольствие от деятельности, убеждены в том, что все то, что с ними случается, способствует их развитию за счет знаний, извлекаемых из опыта, и именно это помогает им стать более успешными.

На основе результатов психосемантического исследования гражданской идентичности студенческой молодежи и суммирования результатов ряда других исследований, можно утверждать, что молодые активисты Ярославского региона высоко оценивают себя как идеального Гражданина, что, казалось бы, является одним из показателей сформированности гражданской идентичности. Но при ответе на вопросы, связанные с оценкой других людей, они априори проявляют индивидуалистическую позицию, считая других граждан далекими от идеала Гражданина, и принижая тем самым их гражданское достоинство. Переоценка своих гражданских качеств и недооценивание других людей говорит о формировании «кастового» снобизма в среде молодежного актива. Молодые активисты попали в психологическую ловушку: где завышенная самооценка и лидерские позиции в среде сверстников, к сожалению, не только не определяют перспектив их дальнейшего

гражданского развития, но и тормозят это развитие, мешают адекватному взаимодействию с другими гражданами.

Как показывает анализ результатов исследования, современная молодежь, даже социально активная, к сожалению, далека от представлений об истинном гражданском долге. И это характерно не только для России. Доказательством планетарной значимости проблемы служат тысячи молодых добровольцев со всего мира, воюющие в рядах террористов ИГИЛ. Время ставит вопрос о настоятельной необходимости разработки технологий и моделей формирования идентичности молодых граждан в постиндустриальном обществе. А главное – о создании адекватной государственно-общественной системы социализации молодежи с опорой на научные изыскания.

Многообразие информации ставит человека в ситуацию, когда он не в состоянии осмысливать получаемую информацию, у него не остается времени делать выводы, встраивать ее в систему своего мировоззрения, он способен ее только «потреблять». Духовный мир как целостная система разрушается, приобретая черты эклектичности и релятивизма. В этой ситуации формирование идентичности осложняется разрывом социокультурных связей между поколениями и глубоким социальным неравенством, сложившимся в обществе.

Кризис гражданской идентичности связан с потерей или, лучше сказать, утратой некоторых элементов этой сложной системы ценностей, чувств, правил, традиций. Следовательно, формирование гражданской идентичности необходимо рассматривать в плоскости ее восстановления, возвращения. Но мы должны отдавать себе отчет в том, что это во многом будет новая форма идентичности, не совпадающая с прежней (например, характерной для советского времени).

Заключение
Conclusions

Расцвет эпохи digital привел к совершенно новому контексту формирования собственного «Я» и экспериментов с собственной идентичностью. Это повлекло за собой изменение баланса между публичной и приватной сферами и сформировало принципиально новый процесс идентификации личности (Лисенкова, 2017).

Молодые люди, активно включенные в пространство социальных медиа, в гораздо большей степени адаптированы к изменениям внешней среды электронно-цифрового общества. Они более активны и демонстрируют инновационное поведение, проще и быстрее ориентируются во внешней среде, принимают решения. Поведенческие

паттерны все чаще усваиваются в виртуальном пространстве, транслируя в последующем этот опыт и образы в офлайн-практики. Использование Интернета говорит о мобильности и успешности. Сети позволяют безгранично расширять круг общения, привлекать внимание, добиваясь социального одобрения.

Вместе с тем, сегодня перед обществом стоит чрезвычайно актуальная и сложная задача - найти приемлемые формы и пути обучения молодежи критическому анализу, умению видеть элементы манипулирования, владеть навыками взаимодействия с различными группами людей, понимать мотивы и способы общения. Это возможно только в условиях образования, просвещения и минимизации информационного неравенства. Сетевому взаимодействию следует обучать.

Кроме того, рассматривая роль Интернета в формировании личности, психология, социология и политология как науки должны остановиться на проблемах, которые сопровождают этот процесс. И, прежде всего, на проблеме формирования гражданской идентичности в современном обществе с его неустойчивостью, кризисами и рисками.

Но, несмотря на опасность нестабильности, которая неизбежна при кризисе идентификации, этот процесс нельзя считать исключительно отрицательным. Если бы подобных кризисов не было, то не было бы и стимулов для инноваций, развития индивидов и общества. В некотором смысле мы можем считать его одним из факторов социокультурной динамики. Следовательно, если в процессе развития общества кризиса идентификации избежать невозможно, то важнейшей задачей и социогуманитарных наук, и социальной политики может быть выработка конкретных механизмов социальной поддержки и экономических действий, которые будут способствовать направлению хаотичного процесса идентификации в рациональное русло.

Социальная поддержка осуществляется посредством включения человека в некую социальную группу (чат, форум и др.) в Интернете. Как любое сообщество, субкультура Интернет-пользователей обладает своим набором ценностей, стандартов, языка, символов, которые разделяются некоторыми пользователями. Включаясь в такую группу, человек получает определенную поддержку, что способствует, в свою очередь, формированию позитивной социальной идентичности («свой среди своих»).

Если человек может полностью реализовать в реальной жизни желаемые и допустимые для него социокультурные роли, то, скорее всего, потребность расширять количество своих ролей за счет конструирования виртуальных образов своего «Я» у него будет минимальна или будет совсем отсутствовать. В данном случае общение в Интернете станет носить характер дополнительного к основному общению в реальности.

Таким образом, проблема влияния Интернет-коммуникаций на развитие гражданской идентичности молодежи требует своего дальнейшего осмысления и в рамках социокультурного анализа.

Summary

The present raises important questions about the urgent need to study and form the civic identity of young people in the digital age, when the processes of designing, changing and re-realizing identities are activated in society. The heyday of the digital era led to a completely new context for the formation of one's own "I" and experiments with one's own identity. The system of development of civic self-awareness among the younger generation should be consistent, multi-step, multi-factorial, complex. But such a system will be effective only when adopted by young people, in whose minds there will be harmony between the personal inner world and the external environment.

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SAMPLES DISTINCTION
BY PARAMETRIC AND NONPARAMETRIC
STATISTICS IN SPSS

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Abstract. *Testing samples distinction is necessary in a wide range of practical tasks. Medicine, sociology, psychology, marketing - this is a short list of industries where it is required to conduct tests that establish effectiveness or inefficiency of a certain technology.*
Diversity of situations and techniques applied to sample distinction create a problem for compliance of testing procedures. The problem rises for tests including large and small samples (dependent or independent) with various distributions. The article proposes a list of problems created by testing differences between two samples. Limits of applicability of parametric and non-parametric tests are established based on selected distribution. Informative examples are included based on simulated data.
SPSS software was used for sample distinction tests. It is important to double-check the operation of the machine computing procedure "manually" to understand the nature of tests and in educational purposes. The article provides mathematical illustration for the algorithms used, which can be considered as supplementary information for SPSS help.
Keywords: t-test, independent samples, paired samples, SPSS.

Introduction

Testing of samples distinction is a well-studied and described in detail problem in the literature. The reference substantiating this statement is practically the entire bibliography of this article. Nevertheless, there are new publications on this issue (Luke, Corrine, & Ismail, 2012). And, due to the branching of testing cases, the task of systematization of existing methods, solved with examples of illustrations, is always relevant. This problem is solved in this article.

With minimal math justification, formulas are given for calculating the corresponding statistics. A more detailed description can be founded at IBM Knowledge Center. This is done in order to be able to repeat the calculations almost "manually" and is intended as an accompaniment of the course that is taught to students. It is assumed that the examples in this article will help in the conduct and understanding of the calculations carried out in SPSS (Official website SPSS).

Nature of the data

Two samples are tested - control and investigated. The main task is to determine whether the first and second samples belong to the same general population, i.e. whether the control and test samples are equally distributed. A condition equally distributed may relate to a certain type of distribution, for example, a normal distribution. If a distribution is established this can be related to its numerical characteristics such as expectation or variance for example.

Samples can be dependent or independent. The sample data is discrete or continuous. Discrete data can be nominal or ordinal. Total we get 12 terminal options for which certified procedures are established testing the hypothesis about the difference of samples. The very fact of the difference between the samples can be clarified by the nature of the difference, for example, the expectation is greater for the control sample. Or the variance of the investigated and control samples are equal.

There are some examples of testing the samples distinction in the paper. The data were modeled in SPSS. The main task of the generated examples is their reproducibility in any computing environment, including an ordinary calculator. This allows you to study the technique of testing the samples distinction, contributes to the understanding of the corresponding algorithm and useful in educational purposes.

Known distributions

Let the distributions of the control and investigated samples be known. There are F_{θ_x} and F_{θ_y}, where θ_x and θ_y parameter vectors. Then the task of testing the samples distinction is reduced to testing the hypothesis H_0: $\theta_x = \theta_y$.

Independent samples
T-tests
To conduct a t-test, it is necessary that the data obey the normal distribution. Or the sample should be large, and its parameter estimates are asymptotically normal.

Assume that the control sample: $X_1, X_2, ..., X_{n_x}$; X_i obeys the normal distribution with parameters μ_x, σ_x. Shortly $X_i \sim N(\mu_x, \sigma_x^2)$. Investigated sample is normal too: $Y_1, Y_2, ..., Y_{n_y}$; $Y_j \sim N(\mu_y, \sigma_y^2)$. Null hypothesis: H_0: $\mu_x = \mu_y$. The decision: "There is no reason to reject the null hypothesis" is taken according to the p-value, at a given level of significance α. Hypothesis H_0 is not rejected if $p > \alpha$. When H_0 is true

$$Z = (\overline{X} - \overline{Y}) / \sqrt{\frac{\sigma_x^2}{n_x} + \frac{\sigma_y^2}{n_y}} \sim N(0,1) \qquad (1)$$

The variances of control and investigated samples are unknown as rule. If variances are equal $\sigma_x^2 = \sigma_y^2 = \sigma^2$ then statistic

$$\chi^2 = \frac{(n_x - 1)S_x^2}{\sigma^2} + \frac{(n_y - 1)S_y^2}{\sigma^2} \sim \chi^2(n_x + n_y - 2), \qquad (2)$$

where
$$S_x^2 = \frac{1}{n_x - 1} \sum_{i=1}^{n_x} (X_i - \overline{X})^2,$$

$$S_y^2 = \frac{1}{n_y - 1} \sum_{j=1}^{n_y} (Y_j - \overline{Y})^2,$$

$\chi^2(k)$ - is χ^2 distribution with k degrees of freedom.

Dividing (1) by the root of (2), normalized to the number of degrees of freedom gives us Student statistics with $n_x + n_y - 2$ degrees of freedom (Gosset [Student, pseud.], 1908):

$$T = \frac{\overline{X} - \overline{Y}}{\sqrt{(n_x - 1)S_x^2 + (n_y - 1)S_y^2}} \cdot \sqrt{\frac{n_x n_y (n_x + n_y - 2)}{n_x + n_y}} \sim T(n_x + n_y - 2). \quad (3)$$

If the variances are not equal, then the Student statistics is

$$T = (\overline{X} - \overline{Y}) / \sqrt{\frac{S_x^2}{n_x} + \frac{S_y^2}{n_y}} \sim T(k), \qquad (4)$$

where degrees of freedom k is calculated by the formula (Satterthwaite's, 1946)

$$k = \left(S_x^2 / n_x + S_y^2 / n_y\right)^2 / \left(\frac{\left(S_x^2 / n_x\right)^2}{n_x - 1} + \frac{\left(S_y^2 / n_y\right)^2}{n_y - 1}\right).$$

In table 1 are shown the data and calculation of Student statistics for the case of equal and different variances.

*Table 1 **T-test for equal and unequal variances***
(simulated data, rounded to integer, p-value two-sided)

$\sigma_x^2 = \sigma_y^2$	X = rnd(RV.NORMAL(50,10))								Y = rnd(RV.NORMAL(60,10))						
i	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7
Var	50	64	48	47	57	40	50	61	46	57	52	57	49	71	74
Gr_Var	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
$\overline{X}$	52.125			S_x^2	63.268				$\overline{Y}$	58		S_y^2	114.667		
$\overline{X} - \overline{Y}$	-5.875			T	-1.217				p	0.245					
$\sigma_x^2 \neq \sigma_y^2$	X = rnd(RV.NORMAL(50,10))								Y = rnd(RV.NORMAL(60,15))						
i	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7
Var	51	47	58	51	51	53	38	26	72	76	66	45	53	95	50
Gr_Var	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
$\overline{X}$	46.875			S_x^2	10.190				$\overline{Y}$	65.286		S_y^2	17.509		
$\overline{X} - \overline{Y}$	-18.411			T	-2.443				k	9.377	p		0.0372		

Paired or matched samples

Paired or matched samples are a special case of dependent samples. Paired samples are appeared when the same object is measured twice, before and after exposure. For example, weight before and after the diet. Or two different objects have agreed characteristics. For example, visual acuity of the left and right eyes of the same person. For paired samples, the control and investigated variables have the same number of observations ($n_x=n_y=n$). With the validity of the hypothesis H_0 the average deviation

$$\overline{D} = \frac{1}{n}\sum_{i=1}^{n}(X_i - Y_i) \sim N(0, \sigma^2/n), \qquad (5)$$

where σ^2 - variance of differences $D_i = X_i - Y_i$.

For deciding on the hypothesis calculated Student statistics

$$T = \frac{\overline{D}}{\sqrt{S_d^2/n}} \sim T(n-1), \qquad (6)$$

where $S_d^2 = \frac{1}{n}\sum_{i=1}^{n}(D_i - \overline{D})^2$ sample variance of differences.

Table 2 presents an example of paired samples, and t-test results. In accordance with the data of Table 2, there is no reason to reject the null hypothesis that samples are different.

Table 2 **T-test for paired and matched samples**
(simulated data, rounded to integer, p-value two-sided)

X = rnd(RV.NORMAL(50,10))									
Y = X + rnd(RV.NORMAL(2,5))									
i	1	2	3	4	5	6	7	8	9	10
X_i	60	52	48	36	53	58	39	43	62	28
Y_i	70	62	48	36	52	54	41	49	60	20
D_i	-10	-10	0	0	1	4	-2	-6	2	8
$\overline{D}$	-1.3		S_d^2	34.233	T	-0.703	p	0.500		

Nonparametric tests

When conducting non-parametric tests, the differences of the samples allowed arbitrary distributions of the control and test samples. The null hypothesis is that the distributions are equal. Most often, non-parametric tests are applied to relatively small samples.

Independent observations

Mann and Whitney U-test

The Mann and Whitney test or the U test refers to ranking criteria. To carry out a rank test, it is necessary to combine the X and Y samples. Then arrange the resulting sequence. Its elements are numbered $1, 2,...,n_x+n_y$. If all values of a sequence are different (not the same), then the rank is equal to the element number of the sequence. Consecutive identical elements are assigned a rank equal to the arithmetic mean of their numbers. We obtain a sequence of ranks R_i. The belonging of X and Y in the combined sequence is fixed by additional grouping variable with two categories. The first category in this variable belongs to the control group, and the second to the investigated group.

Since, with the validity of the hypothesis H_0: $F_x = F_y$, all combinations of ranks are equally likely, the significance level of the rank criterion does not depend on the distribution of X and Y. The sum of the ranks X gives us statistics (Wilcoxon, 1945)

$$W = \sum R_i^x, \qquad (7)$$

where R_i^x – are ranks for testing variable X.

Too small W values indicate that $F_x < F_y$. Too big on $F_x > F_y$. U statistics is calculated using the formula (Mann & Whitney, 1947)

$$U = W - n_x(n_x + 1)/2. \qquad (8)$$

Z statistics is calculated by the formula

$$Z = \frac{W - E(W)}{\sqrt{Var(W)}} \xrightarrow{H_0} N(0,1), \qquad (9)$$

where $E(W) = n_x(n+1)/2$,

$\qquad n = n_x + n_y$,

$\qquad Var(W) = n_x n_y S_R^2 / n$,

$\qquad S_R^2 = \dfrac{1}{n-1}\sum_{i=1}^{n}(R_i - \overline{R})^2 .$

Moses extreme reactions test

Similar to the U-test, the Moses test is a ranking criterion. But if using the U test, systematic offsets are estimated. When using the Moses test, it is possible to estimate the multidirectional offsets of the tested variable. The Moses test is used for extreme responses compared to a control group. To carry out the test you combine samples X and Y and arrange the resulting sequence. Values of the combined sequence are assigned the ranks of R. Statistics is calculated (Moses, 1952)

$$SPAN = round(\max R_i^x - \min R_i^x + 1), \qquad (10)$$

where round(z) – is rounded z to nearest integer,

$\qquad R_i^x$ – are ranks of control variable X.

The X variable outliers can distort the test results. To exclude it SPAN statistics are also calculated with the "Outliers Trimmered from each End" option. In this option the upper and lower 5% quantiles are cut off from the X variable. After which the ranks are assigned again and the SPAN is calculated from (10).

Wald-Wolfowitz runs test

During the Wald-Wolfowitz test, samples X and Y are also combined. The resulting sequence is ordered with the group variable indicating X or Y. For example, if X, then 0, and if Y, then 1, as in table 3. The concept of different runs is introduced. These are consecutive zeroes, or ones. Different runs have different lenght. For example run with lenght 2 means 00 or 11. Length of run can be equal to 1. This means that after X immediately follows Y, or vice versa. Then is calculated (Wald & Wolfowitz, 1940)

$$Z = \frac{R - E(R)}{\sqrt{Var(R)}} \xrightarrow{H_0} N(0,1), \qquad (11)$$

where R - is equal a sum of runs,

$$E(R) = \frac{2n_x n_y}{n} + 1,$$

$$n = n_x + n_y,$$

$$Var(R) = \frac{(E(R) - 1)(E(R) - 2)}{n - 1}.$$

If number of samples n<50 and $|R - E(R)| \geq 0.5|$ equation (11) is calculated with corrector (IBM Knowledge Center)

$$Z = \frac{R - E(R) + 0.5}{\sqrt{Var(R)}}, \qquad (12)$$

when $|R - E(R)| < 0.5|$ and $n \geq 50$ then Z=0.

Table 3 presents examples of Mann and Whitney U-test, Moses extreme reactions test and Wald-Wolfowitz runs test. All tests show that there is no reason to reject the null hypothesis that samples are different.

*Table 3 **Rank tests***
(simulated data from Table 1, rounded to integer, p-value two-sided)

	X = rnd(RV.NORMAL(50,10))								Y = rnd(RV.NORMAL(60,10))							
i	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	
Var	50	64	48	47	57	40	50	61	46	57	52	57	49	71	74	
Gr_Var	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
Sorted	*Mann and Whitney U-test*															*Sum*
Var	40	46	47	48	49	50	50	52	57	57	57	61	64	71	74	
Gr_Var	0	1	0	0	1	0	0	1	0	1	1	0	0	1	1	
Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	120
R_i	1	2	3	4	5	6.5	6.5	8	10	10	10	12	13	14	15	120
R_i^x	1	0	3	4	0	6.5	6.5	0	10	0	0	12	13	0	0	56
R_i^y	0	2	0	0	5	0	0	8	0	10	10	0	0	14	15	64
W		64		E(W)			36	U			20					
S_R^2		19.821		Var(W)			74	Z		-0.930		p				0.352
Moses extreme reactions test																
max R_x^i		13		min R_i^x		0		Span		13		p		0.446		
Sorted	*Wald-Wolfowitz runs test*															*Sum*
Var	40	46	47	48	49	50	50	52	57	57	57	61	64	71	74	
Gr_Var	0	1	0	0	1	0	0	1	0	1	1	0	0	1	1	
Runs	R_1	R_1	R_2		R_1	R_2		R_1	R_1	R_2		R_2		R_2		
R	1	1	1		1	1		1	1	1		1		1		10
E(R)		8.467		Var(R)		3.449		Z		1.095		p		0.863		

Kolmogorov-Smirnov Z-test

The Kolmogorov-Smirnov test is based on the maximum absolute difference between the observed cumulative distribution functions for both samples. When this difference is significantly large, the two distributions are considered different. For the test, the sample distribution functions of random variables X and Y are calculated. This is $\hat{F}_x(t)$ and $\hat{F}_y(t)$. Then the maximum difference between them is determined (Kolmogorov, 1933)

$$D = \sup_t \left| \hat{F}_x(t) - \hat{F}_y(t) \right|. \qquad (13)$$

During the test, statistics are calculated (Smirnov, 1933)

$$Z = \sqrt{\frac{n_x n_y}{n_x + n_y}} \cdot D \qquad (14)$$

Paired or matched samples
Wilcoxon signed ranks test

The null hypothesis of the test is that the distribution $F_x = F_y$. With the same distributions of X and Y, the distribution of differences X_i-Y_i is symmetrical. During the test, the differences $D_i = X_i$-Y_i are calculated. The sequence of absolute values of differences |D_i| is being ordered. Members of |D_i| are assigned numbers and ranks starting from D_i that are not equal to zero. The ranks are the same as the numbers if all members of the sequence are not equal. Or the ranks are equal to the arithmetic mean of the numbers for the matching members. The sequence of ranks R_i is converted to a sequence

$$r_i = \begin{cases} -R_i, & \text{if } D_i < 0; \\ 0, & \text{if } D_i = 0; \\ R_i, & \text{if } D_i > 0. \end{cases} \qquad (15)$$

A statistic is computed that is asymptotically normal when the null hypothesis is valid (Sprent & Smeeton, 2007, 72)

$$Z = \frac{S^+ - E(S^+)}{\frac{1}{2}\sqrt{\sum_{i=1}^{n} r_i^2}} \xrightarrow[n \to \infty]{} N(0,1), \qquad (16)$$

where $S^+ = \sum_{r_i > 0} r_i$ - sum of positive ranks; $E(S^+) = \sum |r_i|$.

Summary

SPSS offers a wide range of statistical calculations. The size of the article does not allow presenting even a small part of these possibilities with proper quality. The article describes only one direction of statistical research. This is testing the difference of two samples or two groups. A description is given of the corresponding test algorithms for independent and paired samples with a normal distribution. Algorithms for conducting non-parametric tests included in SPSS in case of unknown distributions are also described. The above algorithms are illustrated by examples with simulated data. Sample size allows you to repeat the calculation manually. It helps to remember the work of the test and contributes to the understanding of the material.

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INFORMATION AND EDUCATIONAL ENVIRONMENT FOR MONITORING AND FORMING A CUMULATIVE ASSESSMENT OF A STUDENT'S ACADEMIC WORK IN A SEMESTER

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Abstract. *The article discusses the use of the student's cumulative assessment system of academic progress as a valid element of e-learning in universities. Today, online learning is becoming mainstream. Training on online platforms is convenient and interesting, however, it is not acceptable for all students due to the need to conclude network contracts or lack of regulations on how to recalculate the results of online training at the university, etc. Using the cumulative system becomes the mechanism that solves the issue of e-learning at universities, including using distance learning technologies, without cooperating with the online platforms. The suggested approach is a new one. The purpose of the article is to study the electronic information and educational environment of the university to monitor the students' progress. The recommended assessment means the cumulative assessment, which reflects the consistency of knowledge of the student as a participant in the training process. The recommended assessment is suggested by the information system and is calculated using a mathematical model that considers all types of student work. The assessment becomes the main one and should be considered during an interim assessment. The study of the recommended assessment formation uses the methods of mathematical statistics, data grouping, associative data sets, data verification, database manipulation. The authors also give an optimal strategy for storing large amounts of data based on minimizing their volume while maintaining the necessary access speed.*
Keywords: *information system, monitoring, academic progress, e-learning, education quality.*

Introduction

Evaluation of students' academic performance is one of the most important tasks of the learning process. The purpose of this work is to study the mechanism of formation of the recommended student grade for the discipline on the basis of their work in the semester based on the active use of information technology.

Under the recommended grade, we will understand the grade that is formed on the basis of continuous monitoring of the student's progress (Kozlov & Sheshunova, 2013) and that is cumulative, i.e. demonstrating the systematic learning of the student. In order to introduce the mechanism for the formation of the recommended grade, it is necessary to develop a supporting information system that implements all the necessary communications in the teacher-student scheme and mathematical calculations. The recommended grade is suggested by the information system and is calculated on the basis of a mathematical model that takes into account all types of student's compulsory work (Kozlov, 2010).

The practical result of the introduction of the information system, which creates a mechanism for the formation of the recommended grade, is an increase in the absolute academic performance of students and the quality of their training due to their motivation for systematic and regular activities during the semester, and not against the clock before the exams. Any employer needs employees who will work evenly, regularly and according to a predetermined plan. A student's motivation to work systematically throughout the semester makes it possible to make them such a specialist. In addition, the assessment of a student's training on a regular basis will allow to more accurately and fully assessing the quality of their training (Ershova, 2016). Any point control in the form of an exam or a test does not allow one to assess the completeness of the student's mastery of the entire educational material in a discipline. The proposed cumulative system does not deny the intermediate control, but specifies it, allowing the teacher to make an assessment of the level of student's knowledge throughout the semester.

In the study of the mechanism of formation of the recommended grade, the methods of mathematical statistics, network programming, network security organization and delimitation of user rights, big data grouping, work with associative data sets, data convolution were applied. During the development of the information system, the problem of network operation of many users and their synchronization was solved. Also, an important task of the study was the choice of the optimal strategy for storing large amounts of data based on minimizing their volume while maintaining the necessary access speed.

Goal Setting

University training of specialists is determined by the curriculum and training strategy based on the chosen pedagogical scenarios and organizational learning model. Pedagogical scenarios determine the main types of educational activities of students and teachers (lectures, seminars, independent work, consultations, testing, written examinations, etc.), as well as methods for their remote interaction (specialized website, email, forum, chat, newsgroups, etc.) that are to be implemented as part of the e-learning system. At the Samara State

Technical University, it was decided to create a cumulative academic performance system and develop an appropriate information system (Yusupova, Alontseva, Kozlov, & Kulakova, 2017).

Quantitative Characteristics

The information system for forming the cumulative assessment of students' academic achievements was developed and introduced into pilot use as part of the bachelor and specialist programs in the 2016/17 academic year for the first-year students of the Faculty of Mechanical Engineering, Metallurgy and Transport; in the 2017/18 academic year for the first-year students; in the 2018/19 academic year for the first and second-year students. Quantitative characteristics of the volume of implementation are shown in Table 1 and Figure 1.

*Table 1 **Quantitative characteristics of the implementation volume***

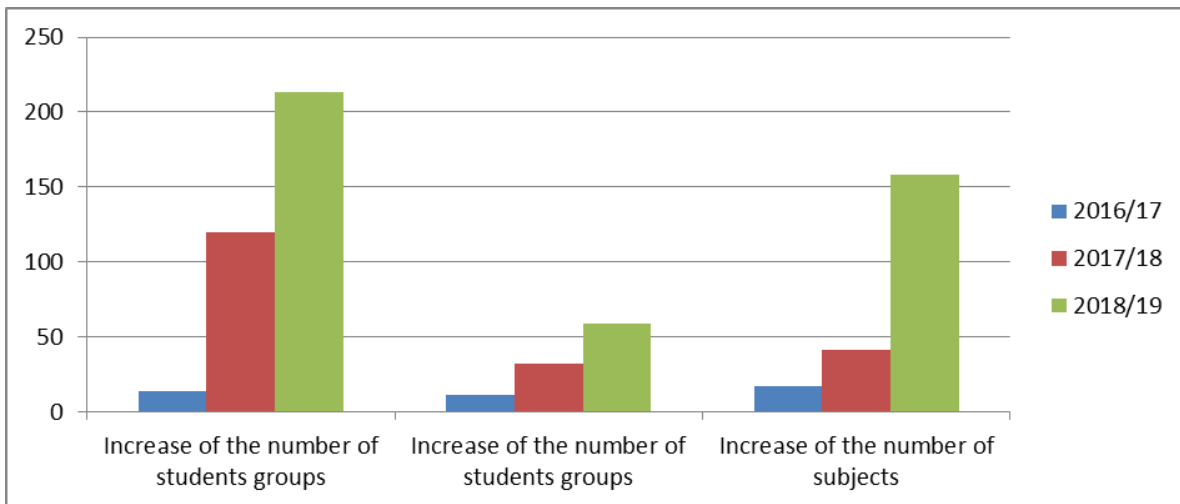| Academic year	Increase of the number of faculties	Increase of the number of students groups	Increase of the number of students	Increase of the number of departments	Increase of the number of subjects
2016/17	1	14	238	11	17
2017/18	15	120	2401	32	41
2018/19	15	213	4935	59	158

*Figure 1 **Quantitative characteristics of the implementation volume***

As follows from the data presented, the coverage of students and academic disciplines monotonously increases, which indicates the relevance of the work and its essential character (Yusupova, Gubanov, & Kozlov, 2017).

Formation of Expected Estimates and Mathematical Formulas

The cumulative assessment of a student is formed as a normalized (in percent) sum of student's grades by stages (topics) of mastering academic disciplines. To implement the cumulative approach to the assessment of knowledge, it is proposed to highlight logically completed blocks - stages in the academic discipline, formulate requirements for their level of mastering, estimate the weight of each block in points and make a recommended schedule of reporting, thus creating a trajectory for teaching students in the discipline (Aleksanova & Kozlov, 2016). Often, the concept of a control point is used. The difference between the mastering stage and the control point is the linking of the stage to the logic of studying the discipline and the possibility of adjusting the grade in the future, and not to simply controlling the level of mastering the discipline on a specific date. This does not require an additional effort from the teacher since all the work necessary for this should already be carried out by the teacher when drawing up the working program of the discipline (module).

The developed information system is characterized by the flexibility to evaluate and take into account this assessment in the formation of the cumulative recommended assessment (Table 2).

Table 2 Assessment types of the stages in studying the discipline

No.	Type of evaluation phase	Features of assessment
1	Simple assessment	Setting the maximum possible score
2	Assessment with a minimum passing score	Setting the maximum possible score and the minimum score, up to which the stage is considered undeveloped
3	Optional assessment	Setting the maximum possible score
4	Assessment through testing	Setting the maximum possible score and assigning a computer test for assessment

Each stage has a reporting date. The valuation approach is used when forming a cumulative assessment.

In addition to various ways of assessing the stages of studying the discipline, the information system provides for the possibility of individualization as applied to the students (Kozlov, 2010). So, stages can be assigned to:
- the whole group of students;
- individual students;
- the whole group, except for individual students.

Mathematically, the process of accumulating points by a student is their accumulation (Zhuravleva & Kozlov, 2017).

$$M = \frac{\sum_i B_i K_i^{\text{вкл}}(1 - K_i^{\text{искл}}) K_i^{\text{дата}}}{\sum_i B_i^{max} K_i^{\text{вкл}}\left(1 - K_i^{\text{искл}}\right)\left(1 - K_i^{\text{бонус}}\right) K_i^{\text{дата}}}$$

where M – cumulative student score for the discipline; i – control point number; B_i – student score for the i–stage; B_i^{max} – maximum possible score for the i–stage; $K_i^{\text{вкл}}$ – the sign (1, if $i \in I^{\text{вкл}} \cup I$), that the i–stage should be mastered by the student; $K_i^{\text{искл}}$ – the sign (1, if $i \in I^{\text{искл}}$), that the i–stage should not be mastered by a student; $K_i^{\text{бонус}}$ – the sign (1, if yes), that the i–stage is a bonus; $K_i^{\text{дата}}$ – the sign (1, if yes), that the i–stage must be mastered at the current time; $I^{\text{вкл}}$, $I^{\text{искл}}$ – sets of stages, assigned and not assigned to be studied by a student; I – set of all stages in the discipline.

Thus, the proposed method gives at each time point a normalized value characterizing the student's cumulative score, taking into account the individualization of the educational trajectory (Kozlov, 2010). However, to recommend a grade, it is necessary to pass the stages with the set minimum score or no "fines" (Ш = 0) for their failure.

$$Ш = \sum_i Ш_i \, K_i^{\text{вкл}}(1 - K_i^{\text{искл}}) K_i^{\text{дата}}$$

where $Ш_i$ – the sign that the i–stage is mastered at an insufficient level ($1, if\, Ш_i < B_i^{min}$, $B_i^{min} - passing\,grade$).

In the future, the recommended grade is formed on a standard scale:
> 90% is excellent;
> 75% is good;
> 50% satisfactory;
in all other cases—unsatisfactory.

Description of the Information System

To implement the proposed methodology for the formation of a student's assessment, an information system has been developed that allows the above-described algorithm to be implemented in combination with elements of interactive distance work using a student-teacher scheme (Anikina, Gushchina, & Panyukova, 2017). First, let us consider the capabilities of the information system on the part of the teacher. Figure 2 shows a summary of the discipline. Each discipline in the student group is given one line, which shows the integral characteristics: the percentage of students who have grades, the percentage of completion by stages, the distribution of marks, the date of actualization, and the number of days since that moment.

Faculty disciplines and groups

Figure 2 Summary information for the teacher

Figure 3 shows detailed information on the group (Aleksanova & Kozlov, 2015). It demonstrates the main types of control stages. For the Module Test stage, the student has attached a file with the completed test and thus, this stage is evaluated on a remote basis, the Conference stage is a bonus one and is not taken into account when calculating the maximum possible score, but is taken into account when calculating the points scored by the student and therefore only increases the score.

Figure 3 Information on the stages of mastering the discipline (teacher)

Ideally, the stages of studying the discipline should be determined in advance, but in practice, it is often necessary to dynamically adjust the educational trajectory (Kozlov & Sheshunova, 2013). Figure 4 shows the dialogue for creating or adjusting a discipline stage.

New

Close Create

Date 12/10/2018 , , days
Full name: New
Maximum score: 0
Passing score: 0
Bonus control point: ☐
Control in the form of testing
-            ▼
- ▼
Perform a task from the manuals on page 34 for options.

	For ALL	Individually	Besides
1. Student 1 ✔			
2. Student 2 ✔			
3. Student 3 ✔			
4. Student 4 ✔			
5. Student 5 ✔			
6. Student 6 ✔			
7. Student 7 ✔			
8. Student 8 ✔			

Figure 4 **Creation and adjustment of the stage of mastering the discipline (teacher)**

Figure 5 shows a fragment of the student-teacher dialogue necessary to ensure interactivity in the application of distance learning elements.

New message Update
yyPetrov (22.11.2018 13:24:27): Good morning.
yyPetrov (22.11.2018 13:24:55): Tomorrow will be a test
yyPetrov (22.11.2018 16:14:21): You can also submit a practice report.
Student 1 (22.11.2018 16:18:17): Can i also submit a lab report?
yyPetrov (27.11.2018 11:19:37): Of course, If we have time
Student 1 (27.11.2017 11:20:28): Thank you

Figure 5 **Student-teacher messaging (teacher)**

Figure 6 demonstrates the capabilities of the content delivery information system. Content here is understood as theoretical material, tasks for independent work and methodological guidance necessary for remote work with the course. The information system keeps records of the use of these materials by students. This feature is an element of distance learning.

Choose File No file chosen
Collection of tasks X
Methodical instructions X

Save changes
When studying the discipline, special attention should be paid to the following questions.

Figure 6 **Content delivery (teacher)**

On the student side, there are similar opportunities for monitoring the progress and the possibility of interaction with the teacher. Figure 7 shows the student's summary information for one semester. Here you can see information about the timeline for studying the discipline, the number of discipline hours, control, accumulated points, the recommended grade and the date of the last certification. Figure 7 shows that the Simple stage is assessed using the ON-Line test (No. 293), the result of which is scaled from a 100-point scale to a 25-point scale (stage weight). According to the test results, the statistical characteristics of the test base are calculated, which can be used by the teacher for the iterative refinement of the test base.

Student 1, yy-1, EM, 1 course
baccalaureate - 990399 - EM - Educational management

N	Cathedra	Lecturer	Discipline	Control points	Last certification	Hours skipped	Accumulated points	Mark	Term	Monitoring	Classroom hours	Study period
1	EM	yyIvanov@EM	Mathematics	0		0	0 out of 0	-	1	Ex	Lec-18, Pr-18	01.11.2018 23.01.2019
2	EM	yyIvanov@EM	Phisics	6	2019.02.03	0	40 out of 67	-	1	Ex	Lec-36, Pr-18	01.11.2018 23.02.2019
3	EM	yySidorov@EM	Chemistry	1	2019.02.10	0	3 out of 10	-	1	Of	Lec-36	01.11.2018 23.02.2019
4	EM	yyPetrov@EM	Operation systems	7	2018.11.22	0	21 out of 65	-	1	Ex	Lec-36, Lab-36	01.11.2018 23.01.2019

*Figure 7 **Summary information (student)***

Clicking on the link in the Control Points column will show detailed information on the stages of mastering the discipline (Figure 8).

Student 1
Discipline: Operation systems
Lecturer: yyPetrov@EM, EM
yy-1, 990399-259 Educational management
Study period: 01.11.2018 - 23.01.2019
Auditorium hours: Lec-36, Lab-36, Monitoring: Ex, Term: 1

Date	Control point	Content checkpoint	Max. score	Min. score	TEST	Your score	My files
15.10.2018	Practical work		10	4	-	3	Choose File No file chosen
16.11.2018	New		10	-	-	10	Choose File No file chosen
17.11.2018	New		5	-	-		Choose File No file chosen
23.11.2018	Test		10	6	-	8	Choose File No file chosen / report X
18.11.2018	New		25	-	293	0	Choose File No file chosen
21.11.2018	Conference		10	-	-		Choose File No file chosen
19.11.2018	New		10	-	-		Choose File No file chosen
TOTAL			65	failed	1	21	-

*Figure 8 **Information on the stages of mastering the discipline (student)***

Figure 9 shows an interface for messaging and accessing learning materials by the student.
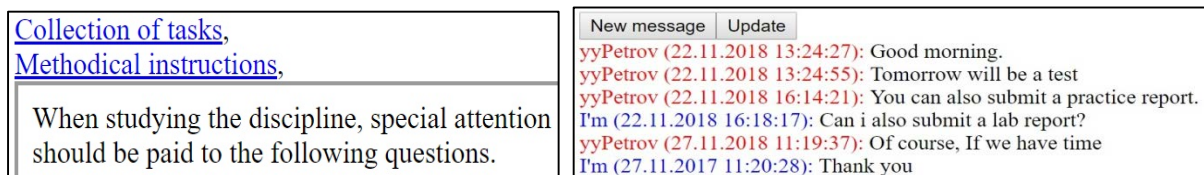

Figure 9 **Content and student-teacher messaging (student)**

Results of the Research Work

As a result of the pilot introduction of the cumulative system in the fall of 2016 among the first-year students of the Faculty of Mechanical Engineering, Metallurgy and Transport, the absolute academic performance increased from 27% (fall 2015) to 50% (fall 2016) (Yusupova & Kozlov, 2017). Next, it was possible to ensure the high dynamics of the implementation of the proposed system in the educational process (Table 1). The information system itself is developed in the C ++ programming language using the Qt cross-platform framework and the PostgreSQL database management system distributed under the PostgreSQL License (based on BSD and MIT licenses), and has the following advantages:

1) flexibility - the ability to do both full and partial distance courses; variable control and evaluation part;
2) transparent monitoring of the educational process in the semester;
3) lack of dependence on external developers;
4) all components are cross-platform and free.

Conclusions

In conclusion, it should be noted that the continuation of the project will increase the transparency of the educational process, reduce the likelihood of a conflict of interest, protect both the teacher and the student from possible unfounded mutual claims, and therefore ensure further development of the positive image of the Samara State Technical University in the Samara Region.

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ON-LINE PROFESSIONAL TRAINING FOR WORKERS WITH THE MOODLE SYSTEM TO IMPROVE PROFESSIONAL SKILLS IN GREEN CONSTRUCTIONS

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Abstract. *On the global agenda, environmental issues are becoming ever more pressing every moment. At present, it is not enough for individual countries to tackle global climate issues on their own. The time has come for a joint effort to mitigate climate change. The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change, dealing with greenhouse-gas-emissions mitigation, adaptation, and finance, starting in the year 2020. The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 C above pre-industrial levels, and to limit the increase to 1.5 C, since this would substantially reduce the risks and effects of climate change. It is not enough for states to sign this type of act, they need to take active steps to implement them and achieve the set goals. Energy, green construction, resource saving, educating the population, new and advanced teaching methods - all that is required for any global setup to be locally addressed. Now, we are in a situation where the exchange of transnational experience and knowledge is an important stage in solving energy efficiency issues through the education prism. This article will provide an analysis of the experience of four countries in the field of green construction.*
Keywords: green constructions, on-line professional skills, MOODLE, learning modules

Introduction

The world is changing very intensively before our eyes. Today we are witnessing unprecedented social and economic changes, changes brought about

by rapid globalization and incredible advances in science, technology and technology. If we want to manage and use these changes, we need to prepare for the big challenges they pose to us such as climate change, scarcity of food resources and clean drinking water, endangered ecosystems, and so on (Bräuer et al., 2006; Albers et al., 2011; Carbon Trust, 2005; Architectural Institute of Japan, 2009). The European Union has be set ambitious targets in its climate and energy policy. Europe is faced with the complex task of producing a roadmap for achieving ecologically compatible economic growth (Communication form the commission to the European Parliament).

The concept of the green economy has established itself on a global level in the context of sustainable development as a new environmental policy model. The key message of the concept that environmental protection can not generally be regarded as a cost but - on the contrary - offers great opportunities for economic growth and invites an increase in prosperity and social justice.

By 2020, greenhouse gas emissions and energy consumption are projected to decrease by 20% and the share of renewable energies in electricity consumption to increase to 20%. To achieve the so-called "20-20-20" targets, the construction sector plays an important role as it consumes about 40% of all energy and accounts for more than one third of all harmful greenhouse gases (Niesing, 2011). These data show that the potential for savings in this sector is enormous. In order to achieve these objectives in the construction sector in the coming years, rehabilitation activities at European and national level need to be significantly accelerated. This applies to both new construction, which increasingly requires the construction of low-energy buildings as well as to existing buildings requiring extensive energy renovation (Asif, 2016). However, this task can only be achieved if, in addition to R&D know-how, there are enough workers with the necessary knowledge and skills and with the necessary competence to act on construction sites. Expectations are that demand for workers with such skills in the EU will reach 700,000 in 2020. This is also the reason today to actively work on developing new educational and training modules for the workers in this sector.

Achieving EU objectives for the efficient use of natural resources leads to the use of new materials, techniques, norms and standards in the construction sector that require the acquisition of new skills and competencies of employees in the sector. The main task in this project is in line with the EU Skills Program for Europe, 10.06.2016, and in particular the Green Skills Program. The lack of green skills in the professions in the construction sector is already present and, unfortunately, traditional educational institutions cannot meet this demand. The report considers the possibility of creating within the Erasmus+ project an educational product of 4 interactive multimedia modules to improve the green skills and skills of workers in the construction sector. The Erasmus+ project (No

2017-1- LV01-KA202-035483) is being developed by an international team of 5 partners from 4 countries (Bulgaria, Germany, Hungary, Latvia).

Identification of main topics of the modules for improving the green skills

During the first phase of the project, the latest trends in the rapidly developing construction sector and its needs for workers with appropriate skills in the green sector were analyzed.

According to tasks:
− O1 Analysis of the needs for improvement of professional skills in green construction.
− O2 Define the main themes of the green skills modules.

Based on a survey and analysis of labor market needs in the green skills of construction workers and an analysis of the needs of environmental skills training programs, the project team identified the content of the modules for improving green building competences at a special meeting with all participants in the project.

On the basis of the studies and analyzes carried out in the four European countries by the international project consortium, unanimous agreement was reached: developing the following 4 modules for e-learning in the next phase of the project:
− Materials for green construction.
− Energy efficiency and green technology.
− Passive house technology.
− Glossary "Green construction" - foreign language (Bulgarian, German, Hungarian, Latvian).

Analisys of the WEB wased distance learning environment

This project task was decided at the second stage of the project. In the analysis and evaluation, two of the partners of the Association "European center for education, science and innovations – Bulgaria and iTStudy Kft. - Hungary project was actively involved. They prepared a specialized report that was reviewed at the regular second meeting of the consortium.

Figure 1 **Two Learning Management System MOODLE and The Blackboard Learning System (i.e., WebCT)**

The study analyzes two platforms Learning Management System (LMS), MOODLE and The Blackboard Learning System (i.e., WebCT) fig.1. Attractive features of consideration are:

- According to the full description, this platform allows it to be adapted to many operating systems (Windows, Linux, Sun and UNIX) and software environment (MySQL, Postgre SQL, MS-SQL Server, Oracle and Access).
- MOODLE can be installed on an institutional server and allows creation and maintenance of courses of different categories stored in a portal page catalog. This can cover a wide range of themes and themes.
- MOODLE supports more services than other courses. The teacher organizes the modules so students can use them. The order is flexible and editing is possible at any time. Available modules are: Assignment, Choice, Forum, Journal, Resource, Quiz and Survey that meet the needs of our course project.
- The available course formats (Weekly, Themes, and Social) provide templates to set the course, making it easier for teachers to design work.
- There are capabilities for uploading files from different formats that allow the use of materials from previous regular courses and easy extension of existing courses. A link to the web directory that contains the files can also be given.
- MOODLE supports multiple languages with the ability to add extra languages.

When choosing an LMS, a reasonable question arises: what's better - a free open source solution that requires further development or an expensive product that's out of the box? This question reveals two common investment factors: starting price and future property costs. Both factors are highly dependent on institutional policies and instructors are expected to use the chosen product. Moodle is a great alternative for those looking for a full-featured LMS with a relatively low cost. But customizing the system to meet specific needs may require significant programming efforts. Blackboard is leading in the LMS industry, but it is expensive.

As far as functionality is concerned, there is no predominance. The Moodle organization for learning content is more transparent and built-in constructivist style. Blackboard seems to require prior training for instructors and students, while Moodle is intuitive and easy to use. These aspects also confirm our preference for using our Moodle development as an Learning Management System fig. 2.
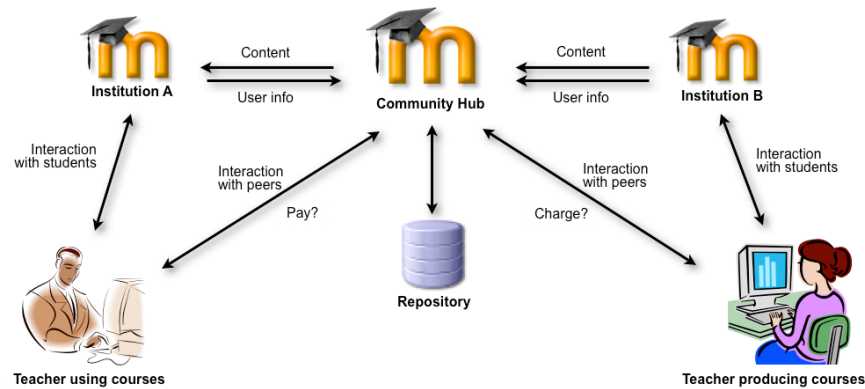
*Figure 2 **The Learning Management System MOODLE***
source: https://wordpress.miracosta.edu/darnaud2/2013/03/18/week-18-the-course-or-learning-management-system/

Methodological concept for the development of learning modules

The structure of the training course and the learning modules in the system MOODLE is selected to have consistency and consistency in the learning process between the modules fig.3. Initial is the "Green Building Materials" (first module) training, which goes on to the topics covered in the second module "Energy Efficiency and Green Building Technologies". At the third stage of the training are the topics associated with "Passive House" and the contemporary European standards related to the construction of such homes.

The main requirements that led the authors' teams working on creating the learning content of the modules during the third stage of the project are related to the postulates underlying the theory of "Continuing education" of the beneficiaries (construction workers). Continuing education is related to creating and improving conditions for acquiring, expanding and developing interests, personal competences, professional qualifications to improve competitiveness for employment, professional careers and individual development.

The mission of continuing education is to support the professional development and career development of people of all ages by synchronizing their professional competence with European strategies, policies and practices. Consequently, the aim of the continuing training is to create and improve the conditions for acquiring, expanding and developing the professional qualification of the workforce in order to improve the employability, professional careers and individual development.

In the times of constant change, we live in, times of new inventions and developments, happening faster than ever before, we are forced to (almost daily) adapt and continue to learn new things throughout our lives. Learning is not a matter solely for school classes, lectures and exams. Learning is a lifelong

process - we learn be able to adapt to the changes in the environment that surrounds us. Progress is so fast that things are constantly changing. This does not concern only technology - we prepare different foods, the language we are speaking today differs from the language of yesterday, technology is constantly developing. We notice this in our daily lives as well as in our work environment and we are learning continually - consciously or subconsciously. Whether we apply the conscious approach to learning or not is the key element in successful learning. When it comes to formal education, we simply can not imagine that it can take place without our conscious efforts. Here consciousness can be seen as a conscious decision, as to whether our learning is intentional or on the contrary. Ideally a person chooses an approach, which would meet his/her educational needs; he/she would consciously choose the field and the type of training, which are suitable for them. Accordingly, the type of educational program is chosen, and a person seeks ways to apply the newly acquired knowledge in practice. If this does not take place, the overall effect of learning is significantly weakened, and a certain amount of valuable information remains unused. The desire to learn new things and to participate in educational programs varies from person to person. Employers, however, consider lifelong learning one of the most important competencies of their employees. If they want to be successful on the market, they need to employ people who are capable and willing to receive new information, develop independently, participate in different educational programs and accordingly apply successfully everything they have learned in their work, accordingly.
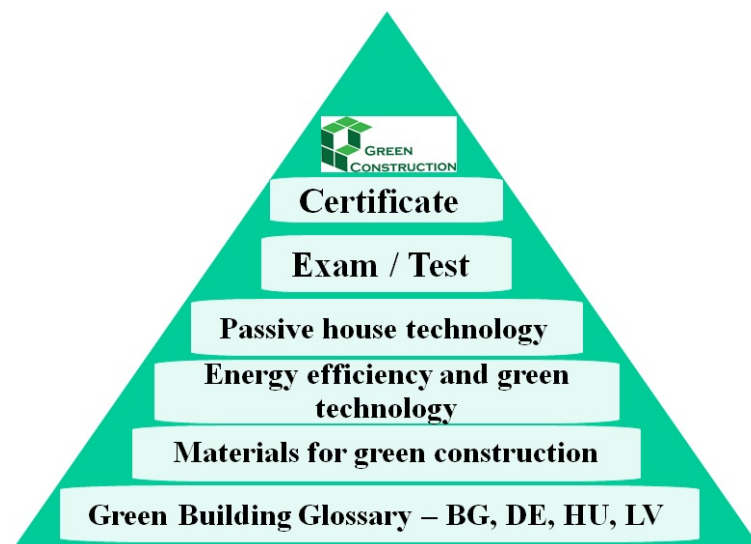

*Figure 3 **Scheme of modules for development and implementation of vocational training under the project***

The purpose of this course and the modules is to improve vocational education and training in the field of green building and enhancing professional skills in environmental construction. The aim is to achieve a change in the workers' approach towards a wise use and management of energy resources and creating a sense of environmental responsibility – which is a prerequisite for providing the green future for future generations.

The methodology of this course developed under the project offered a mixed training model that could help achieve the project goals in the most appropriate way. Combined learning as a method of learning includes elements of distance learning and attendance training, optimally combining the strengths and benefits of each. The use of combined learning is intended to partially address the main task of modern education - with a limited number of teachers to help a large number of learners get the skills they need in the shortest possible time. Combined learning is a flexible technology that combines virtual and direct communication, in which discussions, debates, exchanges of experiences and practices, deep self analysis of parts of the matter through online technologies are held. These allow you to save time actively exercising and learning certain skills and habits in the classroom:

– Combined Learning develops critical thinking and creates skills for independent learning and work, relevant information (exploration, analysis and selection of materials) is used in training and career development.

– In combined learning, training materials are provided not only in print but also in accessible electronic text and / or media option, which allows students to choose individual mode of learning (access to the materials as many times as they need at a convenient time and place).

– Combined learning is interactive, it provides the opportunity for communication "teacher-learner" and "learner-learner", expression of personal opinion and perspective, exchange of opinions and possibility of changing topic directions in the studied material.

– In combined learning, individual psychological characteristics of the trainee are taken into account, because the combination of various forms of work enable students to express themselves with their different temperament and speed of absorption of matter. Thus, combined learning fits and supports the ideas of personality-oriented approach to training.

The complexity, versatility and multifactoriness of the learning process in learning contexts dictates the need for a methodologically new approach to learning from the standpoint of individualisation of learning. The use of combined learning nowadays is associated with solving the problem of the

individualization of learning, its intensification and optimization. The ability of the online environment to individualize learning, enables a new way to approach the possibilities of using combined learning in the educational process.

Combined learning is the most logical and natural result of the evolution of the traditional model of education. As the name implies, the method is a combination of the traditional model (Without the use of ICT) and e-learning. In other words, this method offers courses, combining innovative tech developments in e-learning and the established by long experience traditional learner - lecturer interaction within the classroom. Combined Learning provides a degree of flexibility and can be adapted to both the outer and the inner conditions, to adapt to the level of development of the individual student and take him to a higher level in accordance with the needs of the system. An important role is also played by the performance of the teaching material. Sometimes the information in the printed publications is old and dated even before they are issued. The electronic component of the course can be updated at any time and the new information could become available in minutes. One of the important elements of training has always been the assessment. In combined learning assessment can be a powerful stimulus for developing the personality and potential of learners. The electronic environment with its automatic testing knowledge gives students a clear picture of the acquired knowledge and skills. In the evaluation process the prevailing component is not control, but the evolving function, i.e., the teacher is able to edit and remodel the task so that to revise and openly discuss the mistakes made by the course students. Such a mode of assessment forms a strong motivation for self-development and self-improvement and significantly reduces the willingness of students to copy and cheat. Modern educational paradigm is oriented towards the development of creative personalities of their active role in the learning process, but it requires certain changes in technology training. The transition to innovative learning technologies provides not so much turning the student into the mere subject of training but also, a person understanding the mechanism of self-learning, raising and boosting self-interest and able to construct their own educational direction. The purpose of the combined learning is giving the students the ability to plan and organize their educational activities targeted to the final result. The students learn to make their own decisions, to make a conscious choice and take responsibility for it. Students learn to search, analyse and contemplate information themselves, and to present the results of their work through various modern technologies. Combined learning fits into the concept of modernization of contemporary education, which is based on introducing new educational standards. The online learning part of the process described above will be implemented through an interactive online platform that should facilitate the key aspects of the model which are:

- group- work,
- access to online resources,
- uploading tools,
- sharing of resources by pupils and teachers,
- collaboration and support by external experts,
- facilities and tools to create original learning materials for both teachers and pupils,
- social networking.

Conclusion

The sustainability of the project activities can be considered in two aspects. On the one hand - this is the effect the project will have in the long term plan and thus the sustainable continuation and development of the activities, the objectives and the project's results at local, regional and European level, and on the other hand - the sustainable development of the project results can be applied to other economic sectors.

Creating a web-based multi-lingual platform for training in the field of ecological construction is in itself a sustainable result, its positive impact increases with time and in the long term period the skills of construction workers increase, the thinking of people for sensible use and management of the energy resources changes.

The implementation of the project results has a long term positive social, educational and economic effect.

The created platform helps increase the number of trained workers, acquainted with the latest ecological innovations in construction and is a prerequisite for ensuring of a "greener" future for the next generations.

Acknowledgment

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THE APPLICATION OF AUTOMATICALLY CONTROLLED EXPERIMENT FOR INTERDISCIPLINARY STUDENT MOTIVATION

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Abstract. *The article analyses the application of automatically controlled physics laboratory experiment using information technology to enhance students' motivation and interdisciplinary communication. The paper reveals how the application of interdisciplinary methods promotes students' interest in studies, enhances the learning process and the quality of the students' learning results from the very beginning of learning process. It was practically justified that during the fundamental science laboratory experiments, the first-year students realistically assess their future career prospects. Students become aware of the perspective of the further studies because they work with equipment designed by higher courses students. As a practical illustration of the authors and students of physics experiment designed automated equipment. The experiment system realized combines mechatronics, electronics, and programming technical areas corresponding to students' professional specialization. The system of physics laboratory experiment, has attracted particular interest students and the author conviction increased student motivation to learn.*
Keywords: interdisciplinary motivation, automated experiment.

Introduction

The aim of the specialty education is to train qualified specialists who understand the principles of operation of various devices, measuring instruments and devices, can manage them, can explain complex production processes, offer and implement innovative proposals. The profiling of the subjects taught and the interdisciplinary training apply to this task. The use of traditional and non-traditional teaching methods increases the level of logical thinking and activity of students during lectures. Interdisciplinary relationships allow you to maximize the content of common subjects in subjects used in future practice (Debnath, 2005).

Interdisciplinary connection in the learning process provides the following advantages:

- Improves the learning process, affects the quality of knowledge acquired by students;
- Stimulates student activity, assimilating new material and demonstrates practical application;
- Develop educational interests and broaden the horizons of students;
- Promotes student creativity.

Interdisciplinary relationships not only increases the level of students' knowledge, but also contributes to logical thinking, the ability to analyse and distinguish the main subjects, explore new theoretical material and apply their knowledge in further practice.

Interdisciplinary relationships are realized by combining the first-year core subjects (mathematics, physics) with the subjects taught in the later subjects.

Motivation for interdisciplinary learning is realized through integrated lectures, practical experiments, general interdisciplinary links and additional technical applications.

The article presents a system of laboratory experiments in physics implementing three different fields of specialty (see Figure 1).
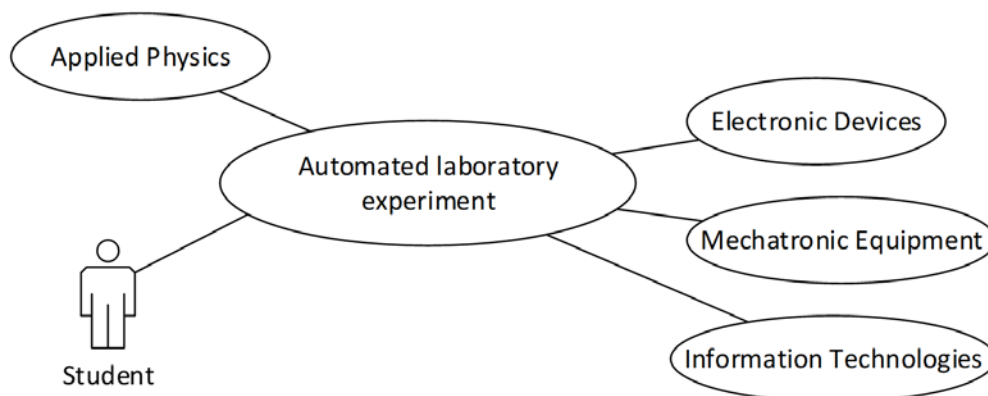
*Figure 1 **Interdisciplinary relationships are demonstrated through an automated experiment***

In this way, during the course of physics, the student gets acquainted with the subjects of electronics, mechatronics and informatics, which will be taught in later courses.

Realization of educational experimental System

Applying modern information technology, all computer-based experiments are conducted on a similar methods and have a similar architecture that can be

considered typical for microprocessor control tools with National Instruments LabVIEW software.

At the Physics Laboratory slider out an experimental laboratory experiment based on information technology. Figure 2 illustrates an automated experiment. An activity chart is provided.
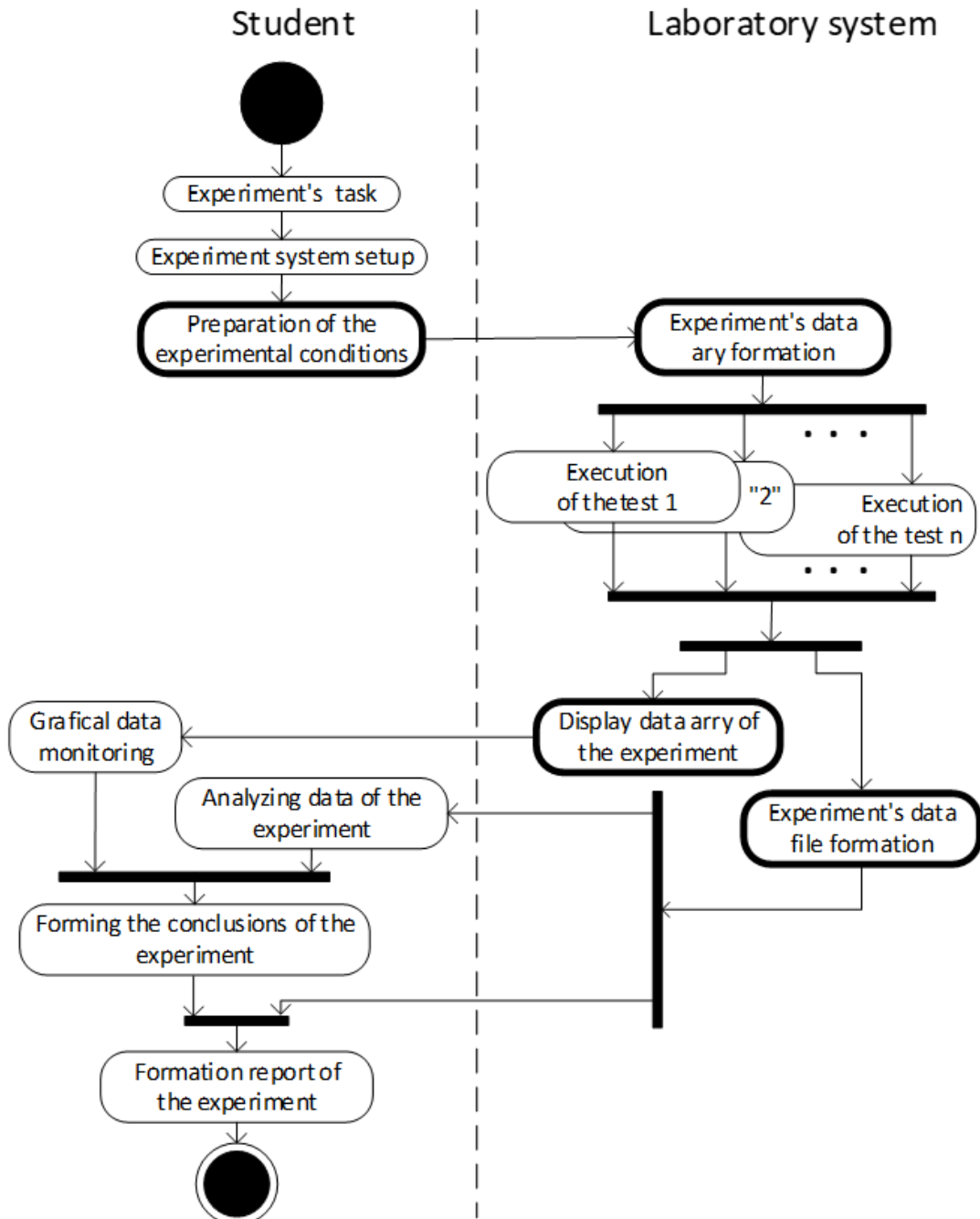

Figure 2 ***The activity diagram of Laboratory Experiment***

The following key actors are involved in the research experiment: an experimental student - (student) and an automated research system - (experimental system).

In the case of an automated experiment (Fig. 2), the student receives the task of the experiment and determine the conditions of the experiment and configuring the hardware and software to perform specific measurements. The automated system forms the test conditions, which are divided into groups of tasks for separate measurements. An automated system slider out a research group that may have a large number of defined tests: 1, 2, ... n. From such a complex research group, a data array is obtained whose graphical representation is displayed in the user interface. The same data is used to generate a result data file that is passed to the student. The student uses a text data file for further analysing of the results and preparation of the report. Conclusions are formed by comparing graph families, as many experiments are performed during the experiment.

The Equipment of the Laboratory Experiments is a complex mechatronic system contains hardware and software. Figure 3 shows the scheme of the system structure.

Experiments system
- performs measurements
- process data
- formuoja rezultatų failą

Mechanical system
- starts moving the slider
- measures the time of movement

Control system
-starts teh slider

Eksperimts system software
- reads motion data
- calculates distance and acceleration
- saves the data to txt file
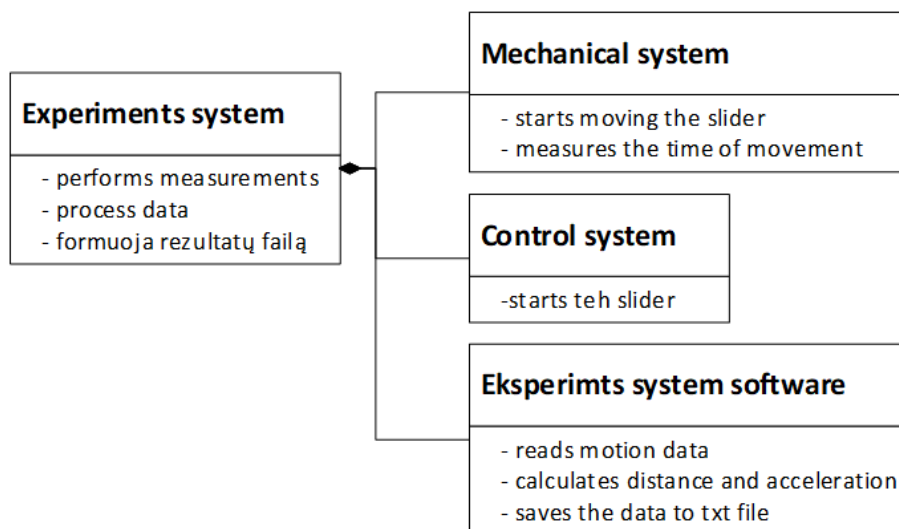
Figure 3 **The structure of experiment system**

The overall view and components of the mechanical system are shown in Figure 4. (PHYWE, 2016).

The main part of the test apparatus consists of a hollow rectangular tube with airflow from the compressor (a) to facilitate movement of the slider (e). For stabilizing the slider force, a small weight (h) is used with a thread attached to the slider holder and passing through a wheel (g) with a motion sensor. The weight of the slider can be changed using special weights (d) that are mounted on the top.

The mechanical control system is designed to run the wheelchair and synchronize its movement with data recording (PHYWE, 2016).
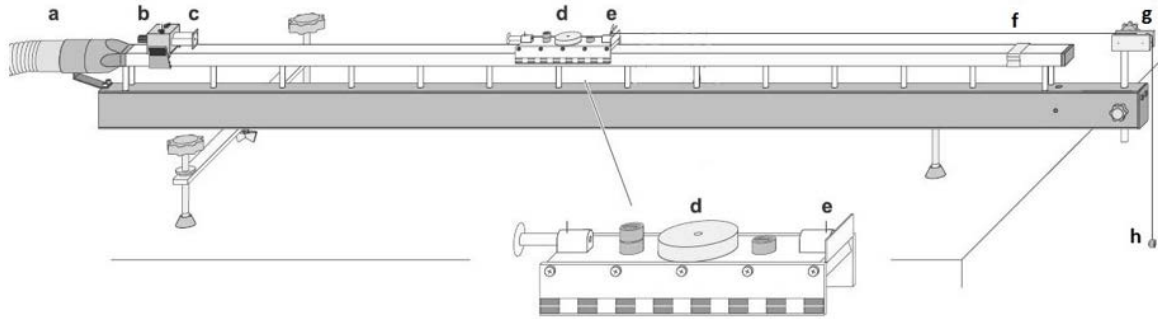
a - airflow supply from the compressor, b - the core of the electromagnet, c - the electromagnet who holds a slider, d – 100g weight, e - the slider with the bracket, f - the brake ribbon, g - the wheel with the optical sensor, h - the test weight .

*Figure 4 **Linear motion test mechanical system** (PHYWE, 2016)*

The structure of the experimental system software is illustrated in Figure 5.
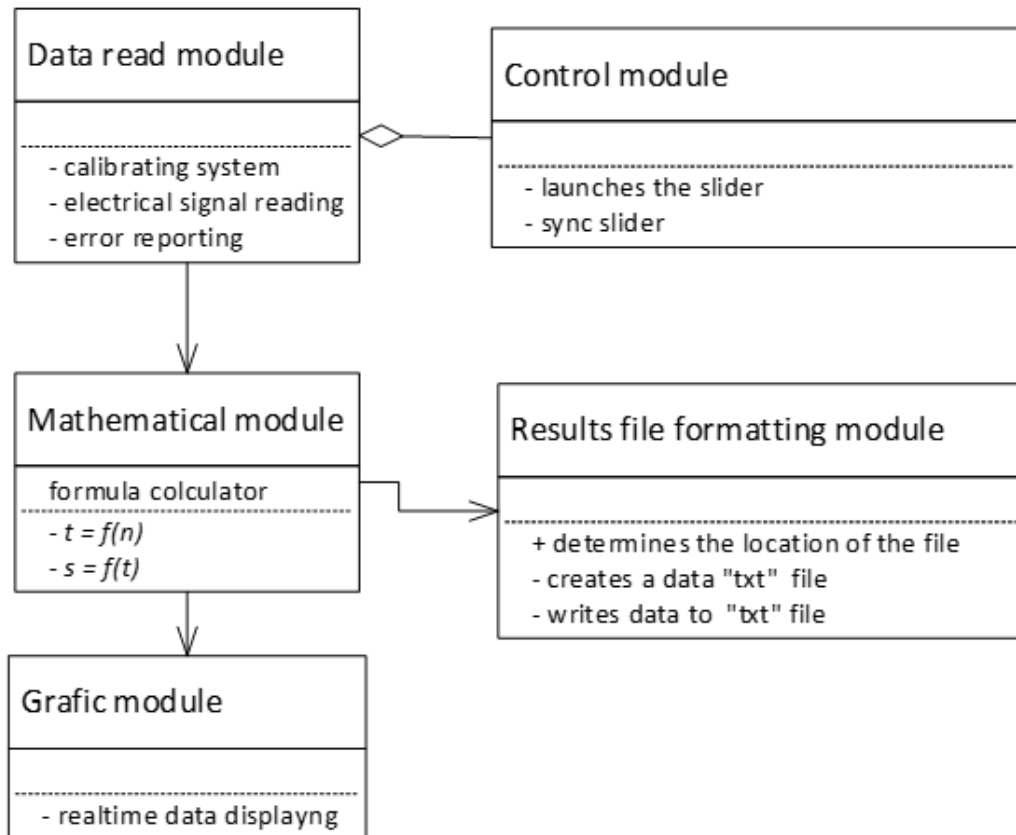

*Figure 5 **Experimental system software class diagram***

The data read module designed to retrieve data from a mechanical part sensor and convert it into a form understood by a computer system. Control module designed to automatically control slider startup and is an integral part of the data reading system. The mathematical module contains mathematical functions needed to calculate the time interval t and the distance s. The graphic module represents the speed of movement. The result file formatting module saves the calculated information as data array of discrete values of measurement results.

Experimental software developed by LabView and running on a personal computer (National Instruments Corporation, 2009).

Example of Physics Laboratory Experiment

In physical experiments, linear motion is most often studied. The concepts of distance, displacement, speed and acceleration are used to describe this motion. The linear motion can be of two types: uniform linear motion and non-uniform linear motion with variable velocity or non-zero acceleration. The equations of kinematics for an object moving along the x axis with uniform acceleration a (constant in magnitude and direction) are:

$$\vec{v} = \vec{v_0} + \vec{a}t \qquad (1)$$

$$\vec{s} = \vec{v_0}t + \frac{\vec{a}t^2}{2}. \qquad (2)$$

Those expressions enable us to determine an object's velocity (1) and position (2) at any time in terms of the initial velocity and the acceleration. These relationships can be demonstrated graphically. The gradient of a line on a displacement time graph represents the velocity. The gradient of the velocity time graph gives the acceleration while the area under the velocity time graph gives the displacement. The area under an acceleration time graph gives the change in velocity. To help with this discussion of the signs of velocity and acceleration, we can relate the acceleration of an object to the force exerted on the object. In use a Newton's second law of motions we establish that force is proportional to acceleration:

$$\vec{a} = \frac{\vec{F}}{m}, \qquad (3)$$

where: a - acceleration, F - acting force, m - mass.

In the experiment, the uniformly accelerated motion of a slider on an inclined linear air track is studied. At the lower end of the air track the slider is reflected by a massive block. (see Figure 6). The total mass of the slider is easy to vary by adding masses. Using these tools, you can determine how the net force on the cart, its mass, and its acceleration are related.

When the slider moves, the thread turns a circle with 40 four-millimeter-sized flat holes. Walkway signals are obtained using an infrared optical pair. The received signal, via the standard audio subsystem, enters the computer. Data is collected and processed on a personal computer using software specifically designed for this experiment. The data reading user interface window is shown in Figure 7. The measurement results are recorded in a text file in txt format that is compatible with most data analysis applications. The data is automatically documented with the possibility of further processing, and the progress of the study can be monitored in real time by the student.

The auto-start system, specially designed for this work, consists of an Arduino microcontroller module with software in it (Durfee, 2011).

Figure 8 shows the main window of the slider control program. Slider Launcher communicates with the Arduino microcontroller via the USB interface that controls the electromagnet (see Figure 4c) (Petry et al., 2016; Organtini, 2018).
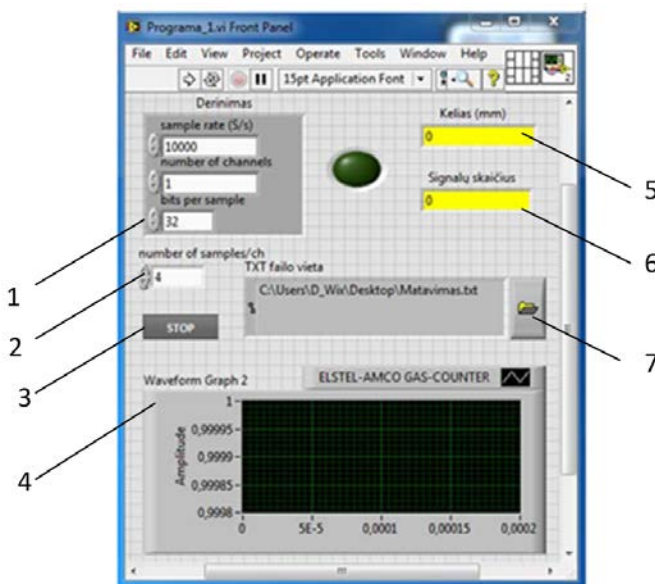
*Figure 6 **Data output software settings user interface:** 1 – settings, 2 – number of samples, 3 – manual stop bottom, 4 – waveform graph window, 5 – distance at time, 6 – quantity of measuring signals, 7 – the path to saving txt file.*
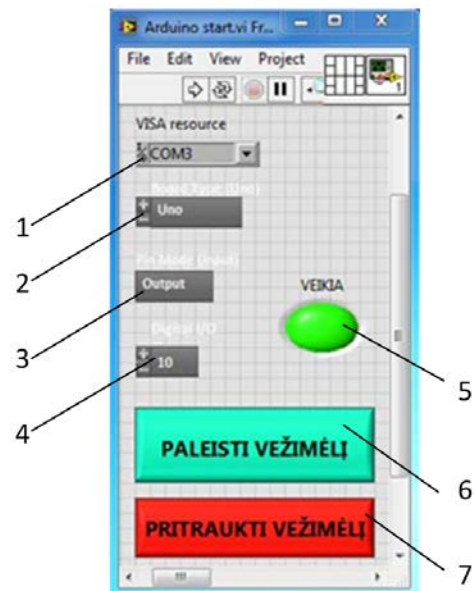
*Figure 7 **The main slider's control window:** 1,2, communication settings 3 – data output settings, 4 – number of measurements, 5 – measuring process indicator, 6 – slider start bottom, 7 – slider stop bottom.*

The slider starts moving and the motion data is scanned by the computer software running on the computer. The software stops when the slider goes to the end of the track. The data is saved in text file. The student can repeat several measurements using different masses.

Figure 9 **Graphical Comparative Expression of Results of Laboratory Experiment II**
Newton Law Study

The results are displayed as a function of the time dependence of the track on a different slider masses.

Further experimental results are processed with mathematical data processing applications. In a particular case, the student can use the Origin software. A computer application represents the entire motion of the slider as a path-time diagram and makes possible further evaluation of the measured values. In particular, computation of the velocity and of the acceleration can be activated with a mouse click. The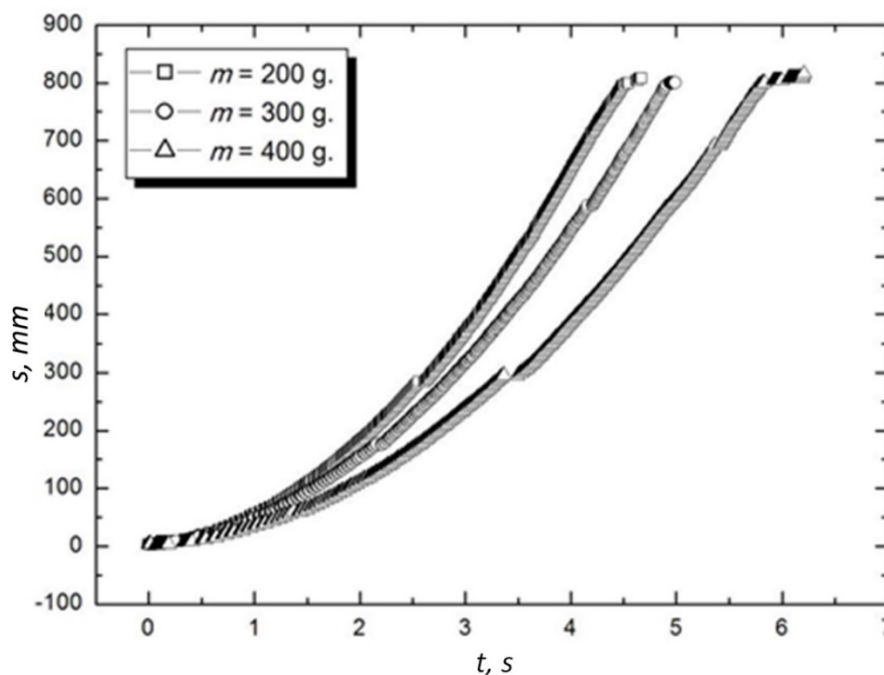 resulting graphical expression of the experiment results is shown in Figure 9. Three different masses ($m = 200$g, $m = 300$g and $m = 400$g) in one diagram, processed with the „Origin" mathematical application (Originlab, 2018). shows in Fig. 12. According to the graphical information, the student draws conclusions about the body movements of different masses, linking it with the theoretical knowledge gained during the lectures (Mandelis, 2018).

Interdisciplinary relations and student motivation

In the first year, students of many specialties have a practical exercise in physics, and therefore it is worth to raise students' motivation and interest in further studies from the first year. The author of the above-mentioned laboratory experiment system is a third-year student.

The Laboratory experiment system designed by student and implemented ir learning process, demonstrates not only the interdisciplinary links between

mechatronics, electronics and programming, but also encourages students rely on their abilities. In Figure 10 presented UserCase diagram illustrates the interdisciplinary connections implemented by a particular laboratory experiment system.
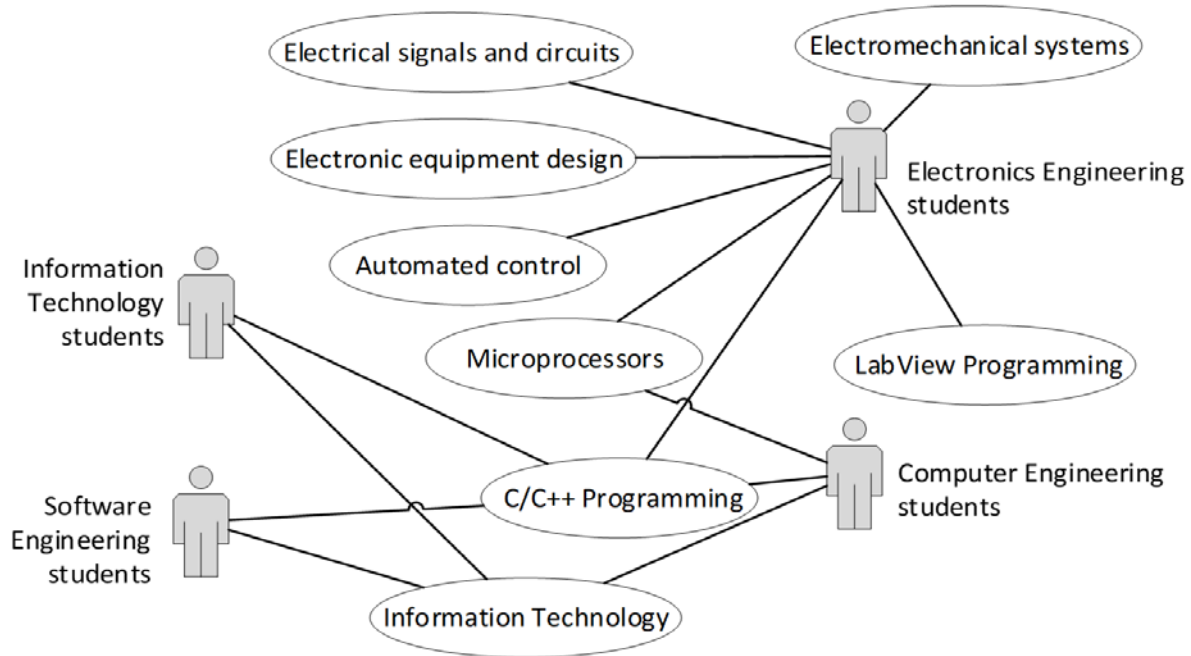
*Figure 10 **Interdisciplinary links with the laboratory experiment system***

Since the experimental system implemented in the physics laboratory is developed by the learner student, it motivates the students for further studies and builds their self-confidence. Experience from practical classes with first-year students shows that six interested students from Computer Engineering and Electronics Engineering specialities not only continued to study but also showed excellent results in individual subjects. Therefore, that means that the practically illustrated method of students motivation is effective.

Conclusions

The following conclusions can be made from the analysis of the application of the automated physics laboratory experiment developed by the students:
- Motivation of students for further studies is encouraged by the fact that students are able to see the applicability and possibilities of their specialty in the first year.

- As the automated experimental management system is designed for higher course students, it encourages first-year students to gain more self-confidence and improves the quality of their knowledge.
- During first year the student actually sees the practical benefits of the individual subjects studied. A student interested in the study process has less reasons to quit studying.

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THE DIGITAL GENDER DIVIDE: AN OVERVIEW

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Abstract. *It has been observed that women, especially in developing countries, have significantly lower technology participation rates than men. This is generally considered to be the result of socio-cultural attitudes related to the expected role of women in society. The consequence is the low percentage of women working in the high-tech industry. However, nowadays, women make ample use of internet technology and access social media just as much as men.*
This article will explore the issue of the digital gender divide, focusing on which factors can impede and/or facilitate access to and use of digital technologies. It represents the preliminary results of an ongoing research conducted within a bilateral project entitled "Gender aspects of digital readiness and development of human capital" that involves the Latgalian region in Latvia and the Ternopil region in Ukraine, two regions that share similar socio-economic problems.
The aim of the research is to increase the level of women's inclusion in the labor market of the future, which itappears will be increasingly dominated by digital technologies. From this perspective, reducing the digital divide is crucial, but alternative forms of digital education will need to be introducedin order to facilitate the acquisition of digital competences.
Keywords: *gender occupations, digital gender divide, women's inclusion, women's empowerment, digital education.*

Introduction

In the early 2000s, girls and young women showed little interest in higher level computer classes as a consequence of the problems/issues initiated right from the early stages ofthe schoolingsystem (Verbick, 2002). Over the last decade, the number of women in science and engineering has been growing, but men continue to vastly outnumber women in these fields. Indeed, although girls and boys attend the same math and science programs at school, the family and school environment didn'ttend to encourage young girls into technology-related areas.

A report by Hill, Corbett, & St. Rose (2010) confirmed the effects of societal beliefs as well as the influence of the learning environment on girls' achievements and interest in science and math. The report shows that if teachers and parents

encourage girls in learning math, theyperformmuch better in math tests and are more likely to say thatthey want to continue to study math in the future. The authors of the report argue that implicit biases against women in science may prevent girls and women from pursuing science from the beginning. Parents can encourage or discourage their daughters from pursuing science and engineering careers bytheir socio-cultural context and relatedopinionsregarding the role of women.

Figure 1showshow biases regarding girls' ability in science, technology, engineering, or math (STEM) influence their low achievements, and how these low achievements are, in turn, interpreted as the result of their low ability in STEM.
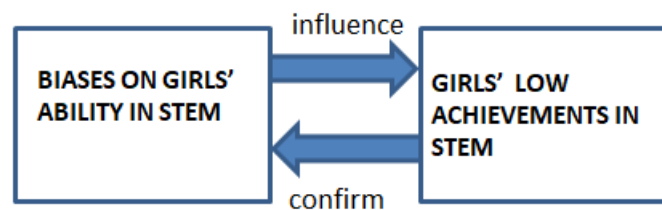
Figure 1 **The effect of biases on girls' ability in STEM**

Socio-cultural biases negatively affect women's empowerment and their career development. For example, one of the most important skills in the future job market, creative thinking, tends to be associatedwith qualities more typically ascribed tomen than to women. Creative thinking is stereotypically considered to be amasculine trait, whilst social harmony and interconnectedness are seen as being feminine (Baer & Kaufman, 2008). Men are judged to be more creative than women, although in acontext in which collaboration and integration of perspectives as well as feminine attributes such as refinement and elegance are emphasized, women can emerge as more creative than men(Proudfoot, Kay, & Koval, 2015; Abraham, 2016).

This article focuses on the factors that hinderwomen'saccess to and use of digital technologies, highlighting the situation in Latvia. It represents the preliminary results of ongoing research conducted within a bilateral project entitled "Gender aspects of digital readiness and development of human capital". The project involves the Latgalian region in Latvia and the Ternopil region in Ukraine, two regions that share similar socio-economic problems.

Research methodology and objective

In our study, we adopted a desk research methodology to obtain a general overview of the factors that can influence the low percentage of women working

in the high-tech industry, as well as the barriers that hinder their career advancement in high-tech companies. Data was collected from literature and official statistics. Articles and reports on feminine and masculine occupations were gathered and analyzed, taking into account their period of reference. We attempted to identify the changes in the female working culture and isolate the elements that seem to be persisting.

The primary objective of our research is to establish an interregional network between the Latvian Latgalian region and the Ukrainian Ternopil region in order to increase women's participation in STEM. Accordingly, we are concentrating on an interdisciplinary effort to identify and formulate a common strategyto ensure the equal participation of women in the labor market of the future, whichwill increasingly be characterized by technology.

In the following paragraphs, we present the principal results of our research, such as gender stereotypes in the current working culture and the relationship of womenwith digital technology.

Feminine and masculine occupations

A recent ILO report, *Women at work* (2016), reveals that occupations are still considered to be either "feminine" or "masculine" according to the skills that a job entails, as well ason the working culture that exists in that field.

Jobs that require interpersonal skills or involve caregiving are classified as "feminine", since they are seen as being typically feminine and fitting with the stereotyped familial division of labor (Bettio & Veraschcagina, 2009). In contrast, jobs that are associated with the use of physical strength, risk-taking, or decision-making are considered "masculine".

Research confirms that very often, women are associated with caregiving roles and the family, whilst men are generally associated with the role of "breadwinner" and career building (Sinno, Schuette, & Killen, 2014). It has been observed that these stereotypes are "data-driven representations of social reality that become consensual gender roles and, in turn, influence gender-stereotypic behavior" (Wood & Eagly, 2012, 91).

From the literature, it emerges that such gender stereotypes are acquired and consolidated during childhood. For example, research at the end of the 1990s showed the girls are typically collaborative in their conversations whereas boys are frequently assertive (Leaper, 1998). It has also been observed that, between the ages of 1 and 3, girls are significantly moretalkative than boys, and this suggests that they develop language more quickly (Tenembaum, Aznar, & Leman, 2014).

In Europe, despite the fact that, in the last decades, women have been excelling in higher education, they represent only a third of researchers. The

number of female heads of higher education institutions rose from 15.5% in 2010 to 20% in 2014, but there is still a long way to go before we reach a position of gender equality in European research and innovation professions (European Commission, 2015).

Recent data shows that, globally, occupational segregation has actually increased over the last two decades with skill-biased technological change, notably in developed and emerging countries (ILO, 2016).

Women and digital literacy

Nowadays, digital literacy is a fundamental ability in every sector.However, a comparison of the digital inclusion of women and men (namely, access to mobile phones and the internet) shows that women, onaverage, enjoy only 84 percent of men's access (McKinsey Global Institute, 2015).

Statistics reveal that women have made notable progress within the categories of science and engineering, where the number of women has grown by an average of 11.1% per year, but women employed in these fields remains 6% below average (European Commission, 2015). Figure 2 shows the proportion of women working as scientists and engineers.
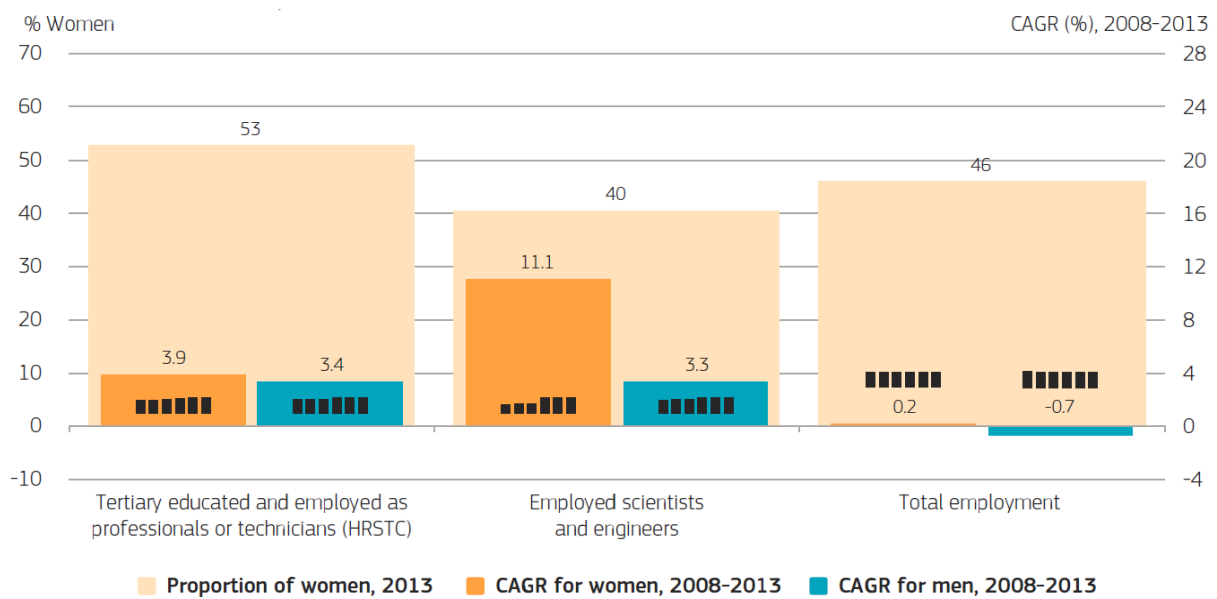
*Figure 2 **Proportion of women in the EU-28 compared to total employment, the population of tertiary educated professionals and technicians, and the population of scientists and engineers, in 2013, and compound annual growth rate (CAGR) for women and men 2008–2013** (Source: European Commission, 2015, 43)*

Social care and health care policies influence women in a STEM career. Most women take a break to raise and look after their families, and it'stough to maintain

a successful career in academia and also worry about a family (Mavriplis et al., 2010). Furthermore, women with a STEM degree are less likely than their male counterparts to work in a STEM occupation; they are more likely to work in education or healthcare (Beede, Julian, et al., 2011).

A few years ago, negative stereotypes about women's math abilities were reviewed. Such stereotypesare transmitted to girls by their parents and teachers at preschool and primary school, undermining their performance and interest in STEM (Shapiro & Williams, 2012).

Strengthening gender equality in Latvia

At the beginning of the 2000s, the role and status of women in ex-soviet countries were varied and rife with contradictions (Lafont, 2001) since the advent of democracy, economic liberalization, and the competitive market system have led to a widening of the gender gap and have increased women's unemployment and underemployment.

Recently, the situation has been changing, and theincreasing interest in the condition of womensuggests a more optimistic outlook for the future. In particular, Baltic countries manifestfewer restrictions and appear more "job-friendly" for women than other ex-soviet states. However, from research conducted in Baltic countries, it appears that women scientists may still not be seeking leading positions. Thisfact emerges from the results of the EC FP6 project, *Baltic States Network: Women in Sciences and High Technology* (BASNET), developed in 2007-2008, which suggests thatwomen seem not to havea high level of confidence in their abilities to be a "good leader" and to perform the administrative and managerial tasks involved. Table 1 reports the positive and negative trendsof women in leadership roles that emanate from the project (BASNET project, 2007).

Table 1 **Women's leadership: positive and negative traits** *(source: BASNET project, 68)*

Positive traits	Negative traits
Precision	Emotionality
Sensitiveness, taking care of others, which helps to keep warm	Difficulties in winning respect
relations with subordinates	Sensitiveness, inability to apply sanctions for subordinates
Disposition towards compromises, avoidance of conflicts	Finicky
More efficient organization of work, ability to save time	Family responsibilities

In 2015 the Latvian Presidency of the Council of the European Union made gender equality as well as the need for more women in politicsone of its main priorities (Women Political Leaders Global Forum, 2015). Thanks to the governmental efforts in favor of gender equality, Latvia achieved a Gender Equality Index score, based on data from Eurostat, of 57.9 out of 100, increasing by 4.5 points (EIGE, 2018) andmoving up one position to 17th place in the index ranking. This progress is in line with the EU-28 average. Nevertheless, although Latvia progressed in all domains, generally at a faster pace than other EU-28 member states (Figure 3), the occupation of women in STEM continues to be critical. Five times more men (30%) than women (6%) work in the STEM sphere.
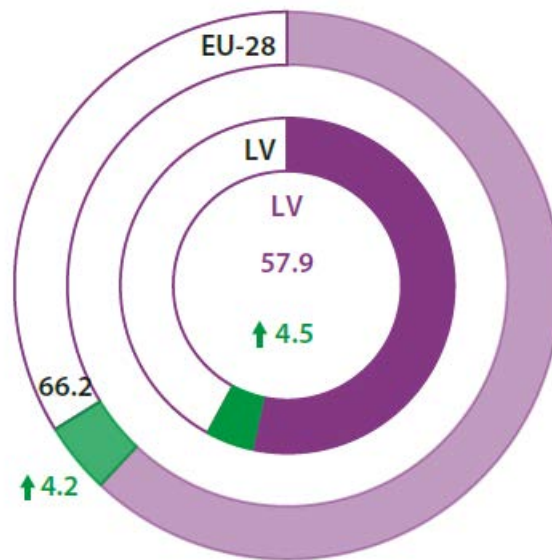
*Figure 3 **Occupation of women in STEM: change in score from 2005 to 2015** (source: EIGE 2018)*

Educational challenges in Latvia

It has been argued that tackling gender equality is a complex task requiring various interventions, including developing future women leaders and overcoming cultural biases (Grimson & Grimson, 2019).

In Latvia, the specific situation in education heightens this problem. The *Education and Training Monitor 2018* preparedby the European Commission shows that the Latvian education system is making many signs of progress butthat critical issues remain (European Commission, 2018). The student populationis shrinking, the teaching corps is old, the school network is not effective, and higher education institutions are fragmented meaning that the study programs, consequently, are also fragmentary. Furthermore, although the proportion of graduates is high and growing, the share of STEM graduates is one of the lowest in the EU. Nevertheless, the chief problem is the fact that, although Latvia invests

a comparatively high share of its GDP in education, expenditure per student is, in absolute terms, actually quite low.

The application of quality standards and the internationalization of higher educationare, however, increasing the general quality of the education system. In the last few years, the Ministry of education has standardized the acquisition of competences and hasincentivized applied research that focuses on the social use of technology. A national science program demonstrates the recent interest in social issues and in the modernization of social service provision through social telerehabilitation (Marzano, 2017). This three-year multidisciplinary program (2015-2018), entitled VPP INOSOCTEREHI ("Innovative solutions in social rehabilitation in Latvian schools in the context of inclusive education") was conducted by four Latvian Universities (Rezekne Technology Academy, Latvia University, Riga Technical University, and Liepaja University).In this framework, the contribution of women in social innovation can be strategic due to their specific sensitivity towards social and family needs.

We are persuaded that educational women's empowerment represents the best means to allow them to participate as protagonists in social development process. According to Hillary Clinton's speech at the third annual Women in the World summit held at the Lincoln Center in New York on March 10th:

Nations that invest in women's employment, health, and education are just more likely to have better outcomes. Their children will be healthier and better educated. […] so, this is not just the right thing to do for us to hold up these women, to support them, to encourage their involvement; this is a strategic imperative (Wordpress.org, 2012).

Unfortunately, a recent research found that many barriers hinder social innovation in Latvia: a lack of openness towards other countries' experiences, a low collaborative capacity of the people, an absence of legal frameworks, little support from stakeholders, a lack of knowledge in realizing social innovative projects, and a lack of access to information (Oganisjana, Eremina, Gvatua, Kabwende, & Chukwu, 2017).

Conclusion

The preliminary research results have revealed that gender equality can have an impact on the development of technology, since women can contribute to bringing a new viewpoint to meeting the needs and demands of society. However, achieving gender balance, especially in the technology sector, will not be automatic. Gender inequalities can only be eliminated by neutralizing the cultural biases regarding women. This requires policy interventionsthat will influence the existing societal discrimination against women.

From our analysis, cultural factors appear to be the primary cause influencing the low percentage of women working in the high-tech industry, as well as the barriers that hinder their career advancement in high-tech companies. Indeed, negative stereotypic attributions generate serious setbacks for women's in STEM field

Furthermore, from the Latvian situation and the results of our preliminary investigation, we have identified a set of priorities that we will analyze in the following steps of our research:

- Improving the digital competences of social educators;
- Investing in the digital media literacy of teachers, especially those who are working inpreschools and primary schools.

Two facts suggest this strategy:

- The greatest proportion of women are involved in teaching activities and social services.
- Digital social innovation can benefit from the contribution of women's sensitivity and competence.

The sustainability of such investments should be assured through the economic gains made by social businesses that, in Latvia, could be significant, due to increasing reductions in levels of public intervention in the health and welfare sectors. Digital social innovation could reduce the social burden considerably, both for local public administrationsand for social services.

Acknowledgement

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ИССЛЕДОВАНИЕ ТОЧНОСТИ ИЗМЕРЕНИЯ ЛАТЕНТНОЙ ПЕРЕМЕННОЙ В ЗАВИСИМОСТИ ОТ ЗАШУМЛЕНИЯ РЕЗУЛЬТАТОВ ТЕСТИРОВАНИЯ

Investigation of Measurement Precision of Latent Variables Depending on the Noise Test Results

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Abstract. *Measurement precision is an important aspect of experimental studies because it affects the effectiveness of decisions. The precision of measurements is influenced by many factors, including the quality of the original data or how the data was obtained. When measuring a latent variable, one of these factors is the precision of the indicators. For example, there may be situations in which, for various reasons, the subject gave the wrong answer instead of the correct answer and vice versa. This fully applies to conducting surveys. In general, we are talking about the noise of the original data. The aim of the work is to analyze the precision of measurement of the latent variable depending on the degree of noise of the original data. The results of the simulation experiment are used as initial data, which allows to simulate the necessary experimental situations. The analysis is conducted within the framework of the theory of latent variables, which allows to obtain estimates of the latent variable on a linear scale. The measurement precision of the latent variable is determined on the basis of absolute error. The noise level of the original data varies from 0 to 0.10 %. It is shown that even minor noise of the original data significantly reduces the precision of the measurement of the latent variable.*
Keywords: latent variable, precision of measurement, Rasch model.

Введение
Introduction

Измерение латентных переменных является важным атрибутом экспериментального исследования. Во-первых, уточняется сам смысл измеряемой латентной переменной, поскольку латентная переменная определяется в виде набора индикаторов, то есть в виде набора ее проявлений. Во-вторых, латентная переменная измеряется на линейной шкале, что позволяет использовать широкий класс статистических процедур, влияющих на латентную переменную (Rasch, 1980). Вот почему теория латентных переменных находит широкое применение в самых различных социальных

системах (Bond, 2015; Engelhard, 2013; Krabe, 2017; Leus & Maslak, 2018; Maslak et al. 2005; Maslak et al. 2018; Maslak & Pozdniakov, 2018; Maslak et al. 2015).

Поскольку процедура формирования набора индикаторов является неформальной и зависит от предпочтений того или иного специалиста, то возникают вопросы, а какие должны быть формальные параметры набора индикаторов, чтобы обеспечить наибольшую точность измерения латентной переменной. В лаборатории объективных измерений Кубанского государственного университета проведены многие исследования по оценке влияния параметров набора индикаторов на точность измерения латентной переменной. Необходимо отметить работы, в которых исследуется точность измерения латентной переменной в зависимости от диапазона варьирования индикаторов (Маслак et al., 2017) и в зависимости от части правильных ответов в задачах тестирования (Маслак et al., 2012).

Целью исследования является точность измерения латентной переменной в зависимости от числа ошибок в дихотомических индикаторах. На практике это означает, например, что на некоторые тестовые задания по некоторым причинам испытуемый дал неправильные ответы. Очевидно, что чем больше ошибок, тем ниже точность вычисления латентной переменной. Это обуславливает необходимость определения точности измерения латентной переменной в зависимости от числа ошибок в значениях индикаторов. Фактически речь идет о зашумлении данных. Использовалось одиннадцать уровней зашумления полученных наборов: 0,00 %, 0,01 %, 0,02 %, …, 0,10 %. Процедура зашумления состояла в том, что значение случайным образом выбранного элемента набора заменялось на противоположное, то есть «1» заменялась на «0», а «0» на «1». Ошибка измерения вычислялась как абсолютная разность между моделируемым значением и соответствующей оценкой.

Поскольку шкала измерения является интервальной, то исследуется абсолютная ошибка измерений. Поэтому необходимо установить количественную зависимость абсолютной ошибки измерения от числа ошибок в значениях индикаторов и подготовить соответствующие рекомендации.

Исследование проводится на основе имитационного эксперимента в двукратной повторности.

Данные
Data

Данные имитационного эксперимента генерируются в соответствие с моделью измерения (моделью Раша), т.е. априорно сгенерированные данные адекватны модели измерения.

Для генерации матрицы тестирования использовалась следующая схема. Было выбрано 30 студентов, уровень подготовленности которых равномерно варьировался на отрезке [–4; +4] в логитах. Этот диапазон практически охватывает большинство практических задач. Число индикаторов было выбрано равным 30, которые также равномерно варьировались в диапазоне [–5; +5] логит. Эта ситуация характерна для многих практических ситуаций.

Модель Раша для измерения уровня знаний испытуемых имеет вид

$$p_{ij} = \frac{e^{\beta_i - \delta_j}}{1 + e^{\beta_i - \delta_j}}, \tag{1}$$

где β_i – уровень подготовленности i-ого испытуемого (в логитах),
      δ_j – трудность j-ого задания (в логитах).

Здесь уровень подготовленности и трудность тестового задания являются латентными переменными. На основе матрицы результатов тестирования размера $I \ x \ J$ (всего $I \ x \ J$ данных) производится измерение латентных переменных (всего $I + J$ параметров). Имитационный эксперимент проводился в двукратном повторении.

Методология исследования
Research Methodology

Процедура имитационного моделирования состоит в следующем. Прежде всего, на основе модели Раша для дихотомических индикаторов по формуле (1) вычисляется Pij – вероятность правильного ответа i-ого испытуемого на j-ое задание. Затем на основе вычисленных вероятностей по формуле (1) генерируются результаты матрицы тестирования:

$$Xij = \text{Int} \ (Pij - \text{Rnd} +1), \tag{2}$$

где   Int (Y) – целая часть числа Y,
      Rnd – случайное число, равномерно распределенное в интервале (0; 1).

В табл. 1 в качестве примера приведен фрагмент матрица результатов тестирования.

Таблица 1. **Матрица результатов тестирования, число инвертированных значений индикаторов равно 0 %**
Table 1 **Matrix of test results, the percentage of inverted indicator values is 0 %**

№ п/п	Индикаторы
-4.000	110100000000000000000000000000
-3.724	111010000000000000000000000000
-3.448	011111010100000000000000000000
-3.172	101001101000000000010000000000
-2.897	111111010100100000000000000000
-2.621	111010110010000000000000000000
-2.345	111111101001000000000000000000
-2.069	111110111000000000010000000000
-1.793	111011110110000001000000000000
-1.517	111111101011110100000000000000
-1.241	111111111100000000000000000000
-0.966	111111111111101000000000000000
-0.690	111111100111000010000000000000
-0.414	111111101011101110000000000000
-0.138	111111010101100110000001000000
0.138	111111111111100000100100000000
0.414	111111111111110000000100000000
0.690	111111111111110100100000000000
0.966	111111111110100111000000000000
1.241	111111111111111101011000000000
1.517	111111111111110110011000000000
1.793	111111111111101110011100010000
2.069	111111111111111101101000000001
2.345	111111111111111110100100000001
2.621	111111111111101111010010000000
2.897	111111111111111111101101010010
3.172	111111111111111111100001000000
3.448	111111111111111111111100000000
3.724	111111111111101100101110000000
4.000	111111111111111111110001100000

Уровень значимости статистики Хи-квадрат (Chi-square probability) для этой матрицы равна 0,767, индекс дифференциации объектов (person separation index) равен 0,939.

*Таблица 2. **Матрица результатов тестирования, число инвертированных значений индикаторов равно 0,10 %***
*Table 2 **Matrix of test results, the percentage of inverted indicator values is 0.10 %***

№ п/п	Индикаторы
-4.000	101010111001000100000000000000
-3.724	101010001001000000000000000000
-3.448	010111000100000000000000000100
-3.172	111110010100000001000000000000
-2.897	100101110000000000010000000000
-2.621	111101011000100000000001001000
-2.345	111011010000000000000010000000
-2.069	100101100011000010000000000000
-1.793	111100111010000000000001000000
-1.517	111111000101000000010000000000
-1.241	111111110110000010000100001010
-0.966	111111001101001010100000000000
-0.690	111110111100100001000000000000
-0.414	111110101010100100101000000000
-0.138	011101111111101000111100010
0.138	111111110111100010001000000
0.414	111111111111110000001000010110
0.690	111111111111011110000101000000
0.966	111110111101011101011100100000
1.241	110011111010111100000000000
1.517	111011111111111100110000100000
1.793	111101111111111011010000000000
2.069	110111111110111001100000100011
2.345	011111111111111111111100100000
2.621	111111011011110111101010000000
2.897	111111111111111110110000100000
3.172	111101101101110011111101000100
3.448	101111111101011111110010100
3.724	111111111111111111111101100010
4.000	011111101111111011111111100000

Уровень значимости статистики Хи-квадрат (Chi-square probability) для этой матрицы равна 0,258, индекс дифференциации объектов (person separation index) равен 0,865.

Результаты
Results

Далее сгенерированные данные использовались для вычисления оценок $\hat{\beta}i$ и $\hat{\delta}j$ истинных значений латентных переменных β_i и δj. Для нахождения оценок использовалась лицензионная диалоговая система ИЛП (Измерение Латентных Переменных), разработанная в лаборатории объективных измерений Кубанского государственного университета.

Затем вычислялась абсолютная погрешность вычисления латентной переменной:

$$\Delta i = \left| \hat{\beta}i - \beta i \right| \tag{3}$$

Число ошибок в индикаторах варьируется на 11 уровнях – 0,00 %, 0,01%, 0,02 %, …, 0,10 %. Имитационный эксперимент был проведен дважды, соответствующие результаты представлены в табл. 2.

*Таблица 3. **Точность измерения латентной переменной в зависимости от зашумления данных***
*Table 3 **Precision of measurement of latent variable depending on data noise***

	Доля ошибок										
	0,00	0,01	0,02	0,03	0,04	0,05	0,06	0,07	0,08	0,09	0,10
Повторение 1	0,45	0,45	0,52	0,66	0,81	0,74	0,85	0,86	1,18	1,15	1,06
Повторение 2	0,47	0,56	0,61	0,86	0,79	1,01	0,85	0,92	0,99	1,12	1,14
Среднее	0,46	0,51	0,57	0,76	0,80	0,88	0,85	0,89	1,09	1,14	1,10

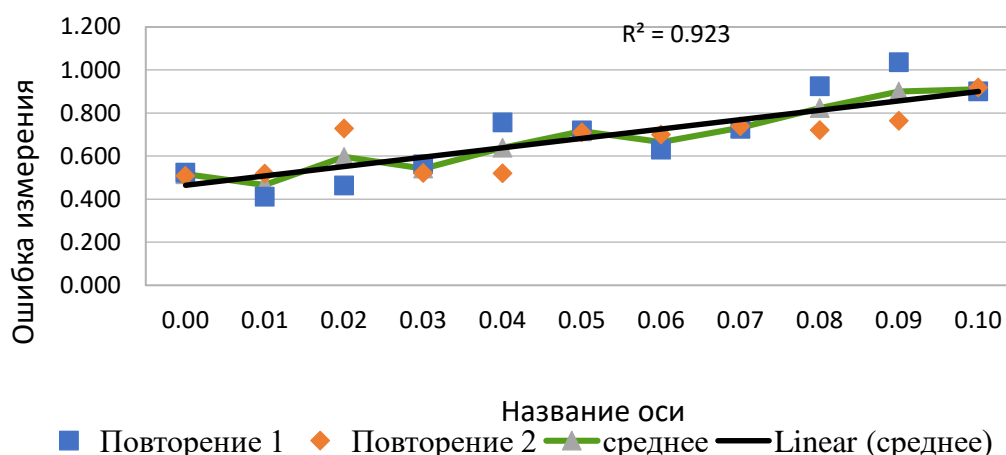Иллюстрация полученных результатов представлена на рис. 1.

*Рисунок 1. **Абсолютная ошибка измерения латентной переменной в зависимости от зашумления результатов тестирования***
*Figure 1 **Absolute error of measurement of the latent variable depending on the noise of the test results***

Как следует из рис. 1 абсолютная ошибка измерения латентной переменной прямо пропорционально зависит от доли ошибок в индикаторах. Необходимо отметить, что коэффициент детерминации очень высокий и равен 0,923. Минимальная ошибка наблюдается в случае отсутствия ошибок в индикаторах и равна 0,5 логит, максимальная ошибка наблюдается, когда число ошибочных значений равно 0,1 % и равна 0,9 логит.

В целом, наличие ошибок в индикаторах существенно влияет на точность измерения, поэтому таких ошибок необходимо избегать.

Выводы
Conclusions

Проведенное исследование показало, что зашумление данных тестирования и/или опросов в значительной степени увеличивает ошибку измерения. Ошибка измерения латентной переменной прямо пропорционально зависит от степени зашумления результатов тестирования и/или опросов. Коэффициент линейной детерминации очень высок и равен 0,923. При степени зашумления данных в 0,10 % абсолютная ошибка измерения увеличивается на 0,5 логит. Это свидетельствует о необходимости тщательной организации проведения процедуры тестирования и/или опроса для устранения причин зашумления данных.

Summary

A simulation experiment was carried out in two-fold repetition to generate sets of test results with the specified parameters. Eleven noise levels of the obtained sets were used: 0.00 %, 0.01 %, 0.02 %, ..., 0.10 %. The noise procedure was the following: the value of a randomly selected element of the set was inverted; that is, "1" was replaced by "0" and "0" by "1". The investigation was conducted within the framework of the theory of latent variables. To estimate the latent variable, the interactive system MLV (Measurement of Latent Variables) developed in the laboratory of objective measurements of the Kuban State University (Russia) was used. The measurement error was calculated as the absolute difference between the simulated value and the corresponding estimate. It is shown that the measurement error is directly proportional to the degree of data noise; the coefficient of determination is 0.923. This means that testing and polling procedures must be carefully organized to eliminate data noise.

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АНАЛИЗ ОПРОСНИКА ДЛЯ ОЦЕНИВАНИЯ ЛИДЕРСКИХ КАЧЕСТВ СТУДЕНТОВ

Analysis of the Questionnaire for Assessing the Leadership Qualities of Students

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Abstract. *The quality of the questionnaire as a measuring tool largely determines the relevance of the results. The aim of the work is to analyze the quality of the questionnaire as a measuring tool used to evaluate the latent variable "leadership qualities of students". The study was conducted within the framework of the theory of measurement of latent variables, which has important advantages. First of all, the latent variable is determined operationally, through a set of indicators (questionnaire items), the more indicators, the higher the accuracy of the latent variable measurement. The latent variable and indicators are measured on the same interval scale in logits. This allows the use of a wide range of statistical procedures for the analysis of measurement results. The analysis of the following aspects of the quality of the questionnaire as a measuring tool: the presence of extreme indicators in the test, the compatibility of a set of indicators, the compliance of the questionnaire to the level of students on the measured latent variable, the uniformity of the distribution of indicators on the interval scale. The indicators that differentiate students with high and low levels of leadership qualities better than others are highlighted. Recommendations on the adjustment of the questionnaire as a measuring tool for assessing the leadership qualities of students are given.*
Keywords: latent variable, leadership qualities, Rasch model.

Введение
Introduction

Объектом исследования является качество опросника как измерительного инструмента для оценивания лидерских качеств студентов.

Прежде всего об актуальности оценивания лидерских качеств студентов. Одной из важных областей, где обсуждается значение лидерства является образование. Рассматривается роль лидерства в реорганизации самого процесса обучения (Davies, 2010; Greenier & Whitehead, 2008; Greenier, Leithwood, & Jantzi, 2008). Подчеркивается роль креативного лидерства, что особенно важно для научно-технического прогресса (Harris, 2009).

Качество опросника как измерительного инструмента в значительной степени определяет релевантность получаемых результатов. Во многих работах подробно рассматриваются аспекты разработки и использования опросников и как получаемые результаты относятся к другим видам исследования (Gillham, 2011). Однако статистическим характеристикам опросника как измерительного инструмента уделяется мало внимания. Есть общие рекомендации, каким должен быть опросник (Boynton & Greenhalgh, 2004). Исследованы некоторые аспекты точности измерения латентных переменных в зависимости от параметров опросника (Маслак, Моисеев, Осипов, & Поздняков, 2017).

В данной работе на примере измерения лидерских качеств студентов рассматриваются основные статистические качества опросника как измерительного инструмента. Качество опросника можно определить только на основе анализа результатов опроса. Этим и обусловлена данное исследования.

Цель работы состоит в анализе качества опросника как измерительного инструмента, используемого для оценивания лидерских качеств студентов (Немов, 1999).

Данные
Data

Респондентами были студенты филиала Кубанского государственного университета в г. Славянске-на-Кубани, всего 206 студента, среди них девушек 159, юношей 47.

Методология исследования
Research Methodology

Исследование проводилось в рамках теории измерения латентных переменных на основе дихотомической модели Раша. Получаемые при этом результаты отличается от других способов оценивания по следующим важным аспектам:
- латентная переменная определяется операционально, через набор индикаторов (пунктов опросника), чем больше индикаторов, тем выше точность измерения латентной переменной;
- проверяется совместимость набора индикаторов, т.е. действительно ли все индикаторы определяют измеряемую латентную переменную;
- модель измерения (модель Раша) является вероятностной;

- модель Раша превращает измерения, сделанные в дихотомических и порядковых шкалах, в линейные измерения, в результате качественные данные анализируются с помощью количественных методов;
- оценка индикаторов не зависит от выборки испытуемых, на которых была получена;
- оценка латентной переменной не зависит от используемого набора индикаторов;
- пропуск данных для некоторых комбинаций (испытуемый – индикатор) не является критическим.
- латентная переменная и индикаторы измеряются на одной и той же интервальной шкале в логитах. Это позволяет использовать широкий спектр статистических процедур для анализа результатов измерений.

Кроме того, эта теория показала свою эффективность при решении многих практических задач (Engelhard, 2013; Leus & Maslak, 2018; Maslak, Karabatsos, Anisimova, & Osipov, 2005; Maslak & Pozdniakov, 2018).

Результаты
Results

Анализ качества опросника как измерительного инструмента состоит из нескольких позиций.

1. Прежде всего, проверена совместимость набора индикаторов (пунктов опросника), действительно ли все они определяют одну и ту же латентную переменную, в данном случае лидерские качества студентов. Другими словами, соответствует ли набор индикаторов модели измерения. Оказалось, что индикаторы 3 «Какой язык в общении с коллегами вы предпочитаете (краткий, точный или эмоциональный, образный)?», 26 «Регулярно ли вы читаете специальную литературу?» и 29 «Любите ли вы выполнять сложную, но интересную работу?» не соответствуют модели измерения. В качестве примера на рис. 1 приведена характеристическая кривая индикатора 3.

Номер: 3   Индикатор: 3   Оценка: 1,859   Хи-кв.: 32,950   Р(Хи-кв.): 0,000   N=206
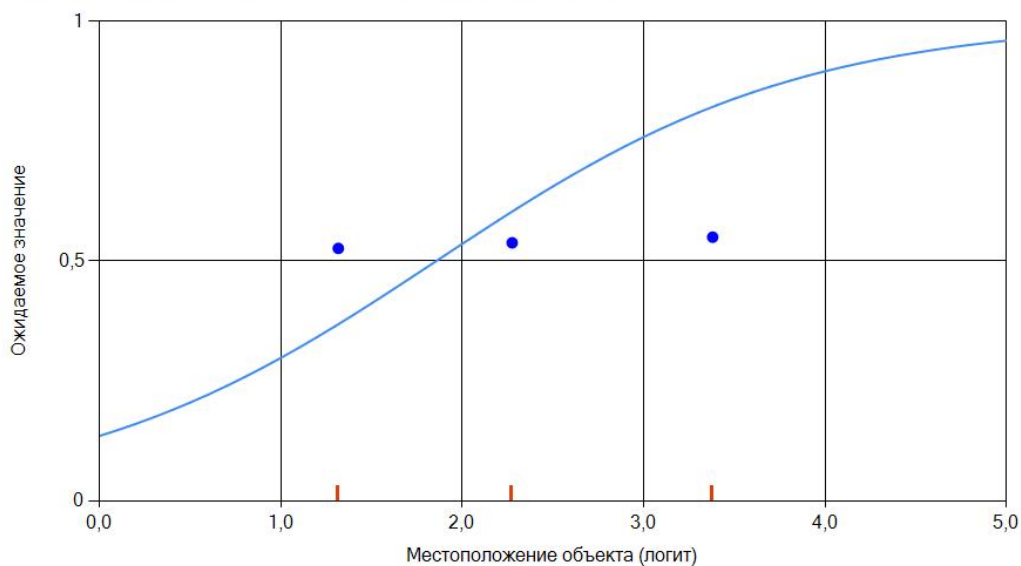
Рисунок 1. **Характеристическая кривая индикатора 3 "Какой язык в общении с коллегами вы предпочитаете (краткий, точный или эмоциональный, образный)?"** *Figure 1 Characteristic curve of the indicator 3 "What language do you prefer to communicate with colleagues (short, precise or emotional, figurative)?"*

Структура этого и других аналогичных рисунков подробно рассмотрена в []. Все студенты по уровню лидерских качеств разбиты на три подгруппы – с низким, средним и высоким уровнями, которые на рисунке обозначены точками. Как видно из рис. 1 индикатор 3 практически не дифференцирует эти подгруппы и поэтому он исключается из опросника. По аналогичной причине из опросника исключены индикаторы 26 и 29.

2. Проведен поиск экстремальных индикаторов, то есть индикаторов, на которые все студенты ответили отрицательно или положительно. Таких индикаторов не выявлено. В случае наличия экстремальных индикаторов их необходимо исключить, поскольку они не дифференцируют студентов.

3. Определено соответствие опросника уровню студентов по измеряемой латентной переменной. Результаты измерения лидерских качеств студентов представлены на рис. 2.
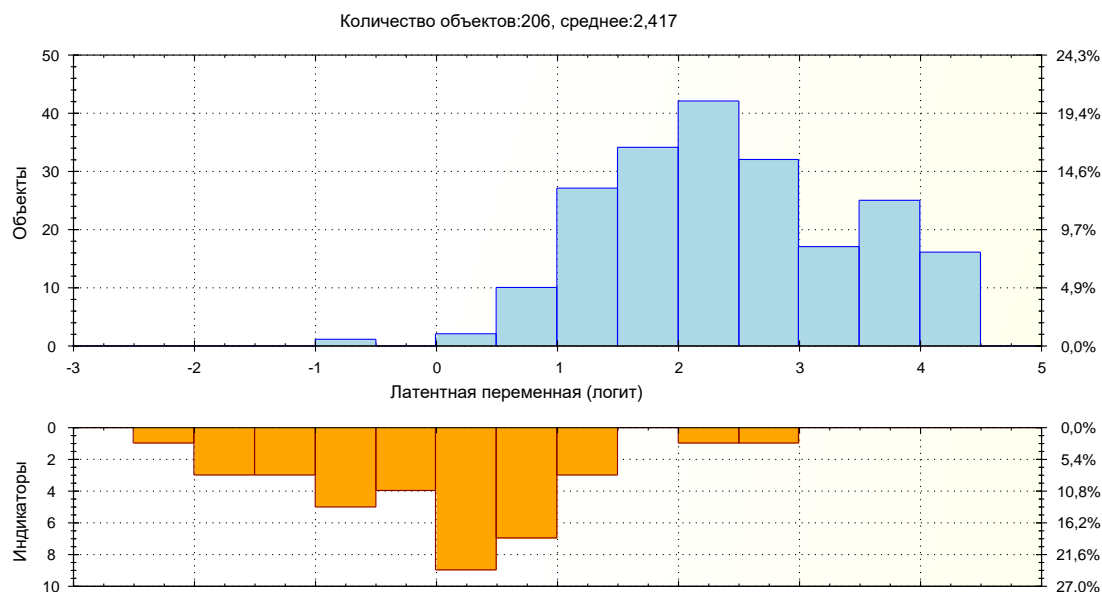
*Рисунок 2. **Результаты измерения латентной переменной "лидерские качества студентов"***
*Figure 2 **Results of measurement of the latent variable "leadership qualities of students"***

Как видно из рис. 2 оценки лидерских качеств студентов сильно смещены относительно опросника, смещение составляет 2,417 логит. Это означает, что уровень лидерских качеств у испытуемых измеряется с разной точностью. В данном случае точность измерения высоких лидерских качеств значительно ниже, чем точность измерения низких и средних уровней лидерских качеств. Для уменьшения смещения в опросник необходимо добавить более «трудные» индикаторы, то есть индикаторы, которые характеризуют испытуемых с высокими уровнями лидерских качеств.

В качестве примера на рис. 3 и 4 приведены характеристические кривые индикаторов лучше других дифференцирующих студентов с низкими и высокими уровнями лидерских качеств соответственно.

Характеристическая кривая индикатора 34 находится выше кривых других индикаторов, это означает, что большинство студентов ответили положительно на этот индикатор. Кроме того, точка наибольшая крутизна этой кривой находится слева, что означает, что этот индикатор лучше других дифференцирует студентов с низкими уровнями лидерских качеств.

Номер: 34   Индикатор: 34   Оценка: -2,488   Хи-кв.: 0,746   P(Хи-кв.): 0,689   N=205
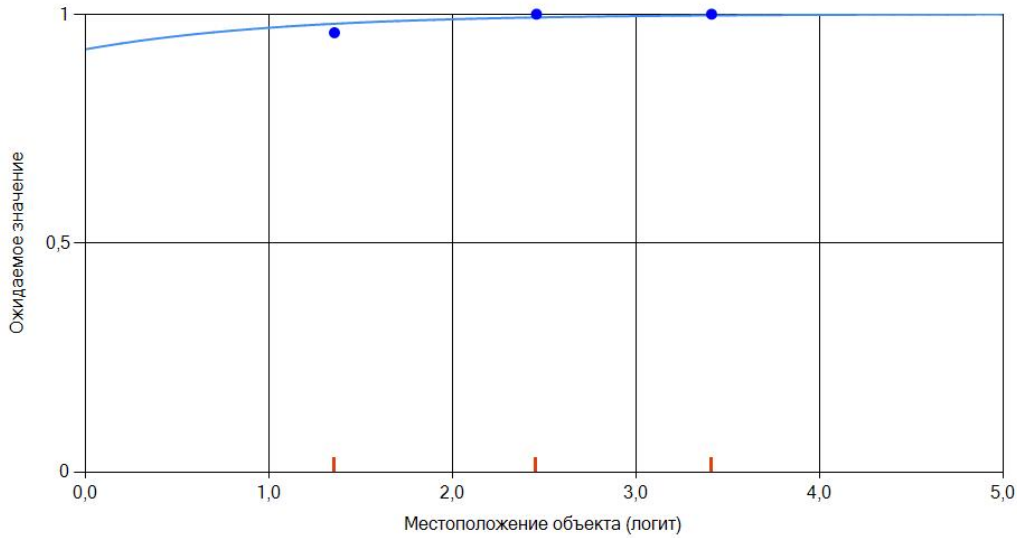
*Рисунок 3. **Характеристическая кривая индикатора 34 "Относитесь ли Вы к своим подчиненным со вниманием и уважением?"***
*Figure 3 **Characteristic curve of the indicator 34 "Do you Treat your subordinates with attention and respect?"***

Номер: 38   Индикатор: 38   Оценка: 2,046   Хи-кв.: 1,093   P(Хи-кв.): 0,579   N=203
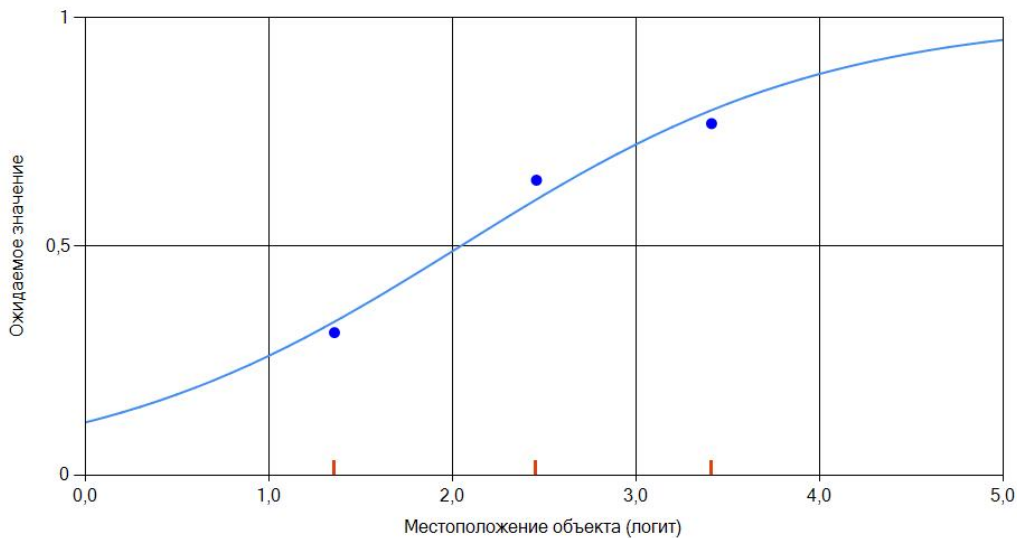
*Рисунок 4. **Характеристическая кривая индикатора 36 "Хорошо ли вы знаете свои сильные и слабые стороны?"***
*Figure 4 **Characteristic curve 36 of an indicator of "how Well do you know your strengths and weaknesses?"***

Как видно из рис. 4 характеристическая кривая индикатора 36 находится значительно ниже, это означает, что далеко не все студенты положительно ответили на этот пункт опросника. Этот индикатор лучше

других дифференцирует студентов с высокими уровнями лидерских качеств.

4. Проведен анализ равномерности распределения индикаторов на шкале измеряемой латентной переменной. Для обеспечения одной и той же точности измерения латентной переменной на всем диапазоне ее варьирования индикаторы должны быть распределены равномерно. В данном случае это условие не выполняется.

5. Диапазон варьирования индикаторов достаточно большой от -2,0 логит до +3,0 логит. Однако индикаторы, как уже было отмечено выше, сильно смещены относительно оценок студентов.

Выводы
Conclusions

Полученные результаты анализа качества опросника по измерению лидерских качеств свидетельствуют о необходимости корректировки опросника.

1. Выявлены индикаторы (3, 26, 29), которые несовместимы с остальными и которые необходимо исключить из опросника. Это индикатор 3 «Какой язык в общении с коллегами вы предпочитаете (краткий, точный или эмоциональный, образный)?», индикатор 26 «Регулярно ли вы читаете специальную литературу (нет, да)?» и индикатор 29 «Любите ли вы выполнять сложную, но интересную работу (нет, да)?».

2. Опросник слишком легкий для измерения лидерских качеств студентов, необходимо в опросник добавить более «трудные» индикаторы.

3. Распределение индикаторов на шкале «лидерские качества» должно быть более равномерным.

4. Данная процедура может быть использована для анализа качества аналогичных опросников.

Summary

The analysis of the quality of the questionnaire as a measuring tool for assessing the leadership qualities of students was fulfilled. The investigation was conducted within the framework of the theory of latent variables. To estimate the latent variable, the interactive system MLV (Measurement of Latent Variables) developed in the laboratory of objective measurements of the Kuban State University (Russia) was used. As a result, the items of the questionnaire (indicators) that are not compatible with the model of measurement of personal qualities are identified. There are misfitting 3 indicators. The

indicators that differentiate students with low and high level of personal qualities better than others are revealed. In general, the questionnaire was easier for the investigated population of students. It is recommended to add more difficult indicators to the questionnaire.

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FACTORS THAT INFLUENCE ICT INFRASTRUCTURE IN HIGHER EDUCATION: A CASE STUDY

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Abstract. *This article analyses essential factors that can affect the Information and Communication Technology (ICT) infrastructure in higher education. There is a general lack of research on providing the general criteria for infrastructure that could be used as guidelines for education institutions. Higher schools usually develop their own infrastructure based on experts' advice or delegate this task to the private IT companies. The article aims to investigate how users' demands influence higher education ICT infrastructure. Therefore, the university-wide students' demands that affect not only their academic performance but also particular activities are epitomized in the paper. As a case study, the ICT infrastructure of Kaunas University of Technology (KUT) was investigated in order to determine how university e-services fulfil the students' demands. The research showed that some KUT e-services comply with specific students' demands, while the others are universal and widely applicable. On closer inspection, it was inferred that not all demands are supported by e-services in the university as only the general information about a particular service is provided.*
Keywords: e-services, ICT, students' demands, influence factors

Introduction

Universities are noticed not only as teaching institutions but also as organizations that create a new intelligence and support the social demands (Numprasertchai & Poovarawan, 2006). What essential factors do influence the ICT infrastructure of higher education?

One of the main factors over the last decades determining the essential changes in educational environment of higher education institutions is the growing needs among the learners (Sileikiene, 2009). This is especially peculiar

for the adult learning because they must combine their studies with work, intensive community activity, responsibilities for the family and other activities.

The second factor can be regarded as the education price (Sileikiene, 2009). Education is expensive that requires great capital investments and high qualification of the education suppliers. Education should be viewed in the same way as any other services that have their own prices, market, users, and suppliers, and that should be organized only when it is expected to cover the expenses and to get the profit.

The third factor influencing the main changes while forming the higher education institution environment over the last decades is a rapid development of new learning technologies (Potter, 2013), (Mickus & Vidziunas, 2009), (Pukelyte, 2010), (Zhang, Yang, Chang, & Chang, 2016). It is obvious that the introduction of resent technologies requires the preparation of advanced education environments and methods in line with these technologies. The development of ICT and the occurrence of innovative technologies increasingly influence the infrastructure of higher schools. Even though higher schools pay special attention to the involvement of ICT solutions in the education process, the study of the literature sources shows that there is no unique methodology of a coverage of study demands by ICT.

Combination of the three factors (demands, costs and new ICT technologies) might define a competition process between higher education institutions. This article pays attention to the first and the third factors. As there is a lack of scientific literature that present generalised criteria for ICT infrastructure concerning the demands of users, this article contributes to fill this gap. The paper extents the content of our earlier published research (Miseviciene, Sutiene, Ambraziene, & Makackas, 2018).

Research aim. Investigate how users' demands influence the ICT infrastructure of higher education.

Research tasks:

- Overview the main study models and estimate their technological aspects.
- Generalize students' demands that affect not only their academic performance but also particular activities.
- Investigate ICT infrastructure provided by KUT and research how it fulfils the students' demands.

Research methods include: Research methods include analysis of scientific literature and publications, legal acts and other documents of KUT, and workshops' information with KUT student organization representatives and administrative staff.

The article is structured in the following way. First section reviews scientific literature on main study models and estimates their technological aspects. Second section evaluates university-wide students' demands. The last section presents a list of e-services provided in KUT and explores at how these services fulfil the students' demands.

Literature review of study models

Educational infrastructure depends on the study model. Literature sources (Mickus & Vidziunas, 2009) disclose main study models, such as the traditional full-time education, distance learning and their combination.

So far, the traditional full-time education form with the expanded possibilities of ICT solutions in the educational institutions prevails in Lithuania. The traditional full-time education is based on the explanation of the material proposed by the lecturer. Information technologies have only the additional service functions in the kind of such studies. Computer tasks, e-books for individual studies or internet sources, and consultation via e-mail are mostly used during such lectures. The individual study material is typically presented in the institution's intranet system ("Web CT", "Moodle", "Blackboard", etc.).

Distance learning is the learning when the lecturer (or the person who presents the study material) is not in the same place with the student. Learner support is designed to study individually or in groups, when the students and the lecturer work in distance and/or different times, and the collaboration and cooperation as well as the study materials are delivered using information and communication technologies. Such studies are based on the newest ICT solutions, when the students can study at their work place or at home using the computer connected with the Internet. In addition, such students can co-operate with the lecturer and their colleagues via e-mail and interactive discussion sites. Distance learning study form is more oriented to the working people. Distance learning is attractive because it gives the learners the possibility to study individually when and where they want to study. Present level and variety of ICT gives many different distance learning possibilities starting from correspondence to virtual classes. Another advantage of such distance learning is the maximum adaptation to the individual needs, i.e., it enables students to study at their own discretion in the chosen communication circle and environment. Besides, the distance learning minimizes the tension of social inequality and stimulates cultural integration processes. Distance studies infrastructure includes the network infrastructure, the computing infrastructure, the system and application software, the Internet Service Provider, the bandwidth, the policy framework and the security infrastructure (Mickus & Vidziunas, 2009).

The combined infrastructure of full-time learning and distance learning is often used alongside with the traditional learning. This infrastructure gives the learners the same advantages and privileges that a traditional on-campus learner has always received. Many new learning models appear because of this reason. One of them is virtual learning environment (VLE). The standard VLE covers the means for the presentation of the learning material, the tools for the communication of the registered actors in the interactive environment, the tools for student collaboration and co-operation, and activities in the virtual environment (Kaklauskas & Kaklauskiene, 2011). However, the virtual learning environment can be directed to the administration of specific courses.

Combined methods with virtual courses or virtual means are often proposed in the learning study program (Al-Shehri, 2004), (Kalagiakos & Karampelas, 2011), (Akhavan & Arefi, 2014). These means provide the principles of ICT application presenting the individual material for the studies in virtual environment, ensuring constant study progress or academic record control, maintaining friendly relations with the students and developing of group work skills.

University-wide students' demands

There is a general absence of scientific research that would provide general principles of infrastructure used as guidelines for educational institutions. Higher schools usually develop their own ICT infrastructures based on experts' advice or delegate this task to private IT companies.

Many scientific literatures only evaluate costs and benefits of the use of ICT. Some authors (David & Abreu, 2014) focus in advocating the importance of the recent developments on ICT in education, particularly in higher education. Other authors discuss the general development trends of ICT in education (Zhang et al., 2016).

This paper contributes by structuring the principles of ICT infrastructure in line with students' demands. Literature sources on definition of students' demands are also quite limited. Many authors define the demands of students through '*a spectrum of activities organizing and management of students support*' (Simpson, 2013). The author divides academic and non-academic demands. Other authors distinguish only academic needs. For example, researches (Potter, 2013), (Mickus & Vidziunas, 2009), (Pukelyte, 2010) characterize students' demands through communication or information and learning issues. Authors (El Mhouti, Erradi, & Nasseh, 2018) illustrates the needs through learning process as organization of contents, resources, delivery of training courses, documentation, and administration tasks.

In order to better fulfil users' interests in the learning process, the characterization of participants involved in this process is necessary. In the Figure 1, we highlighted the possible participants that interact through the environment of the study process.
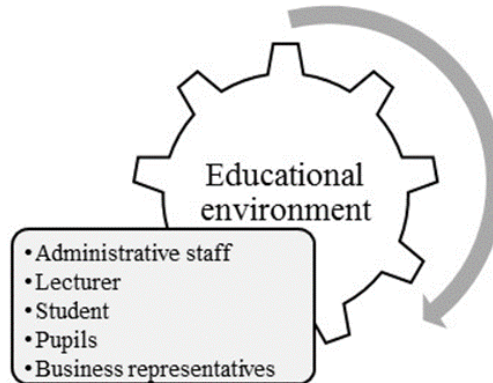
*Figure 1 **Main participants interacting in the educational environment***

There are main participants groups: administrators, lecturers, students, business representatives, and pupils. Every higher school may have other additional users that have their own role in the process. Students are the main group that participate in the study organization process themselves and use the modern education facilities. Lecturer is the person who communicates with students satisfying the demands of such students. Administrative staff accomplishes admission, graduation, financial aid, documentation of student and faculty members' records. Pupils are also interested in later studies of higher schools. Business representatives propose students positions for practice during their studies.

The article generalizes only students' demands more widely. Figure 2 exemplifies the possible student's demands in the main groups like studies, finance, library, leisure, IT services, career-planning, documents, academic help support, study process quality assessment, and so on.

*Figure 2 **Groups of general student's demands***

Table 1 characterizes the group's activities.

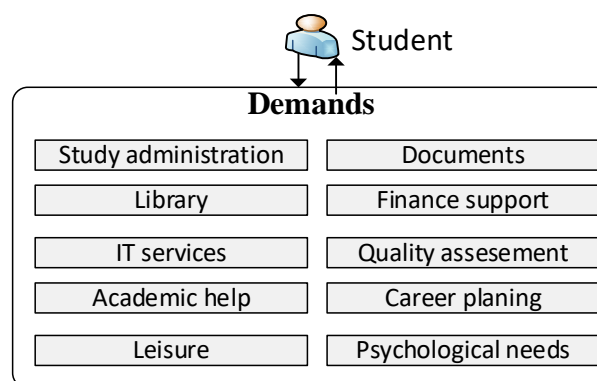*Table 1 **Demands groups characteristics***

Demand groups	Activities
Study administration	Registration, termination or interruption of studies. Graduation from the University. Individual study plans. Mirror studies. Knowledge evaluation. Rotation. Appeals. Academic Certificates. Course Schedule. Course materials. Academic environment. Lectures. Technical support.
Library	Books ordering. E-resources. Scientific publications database.
Finance support	The tuition fee and compensation. Financial Aid. Study loans. Scholarships. Incentive scholarships. Social support.
IT services	E-mail. Printing and copying. Software for self-study. Wireless network. Private network. Social network. Web services.
Physiological needs	Psychological and spiritual help. Accommodation, dormitories. Health services. Catering services.
Documents	Documents procedure descriptions, rules, regulations. Faculty address, contacts. Faculty data. FAQ. Events, news.
Leisure	Sport activities. Student organizations. Art societies. Trade union.
Career planning	Practice organization. Exchange programs. Internships. Support for students' international activity. Scientific research. Non-formal education. Part-time jobs.
Quality assessment	Academic ethics questions. Application of penalties. Surveys.
Academic help supports	Mentorship program: career mentor, research mentor, tutor. Academic assistance: academic advisor.

Investigation of ICT infrastructure: a case study

KUT is running e-services on infrastructure (Figure 3). The infrastructure allows safely and efficiently administer services via Web, in computer classes and for self-working at home. The e-services are combined in categories due to their functionality: Information systems, E-communication tools, Virtual learning environment, Website, Help system, Network services and other services.
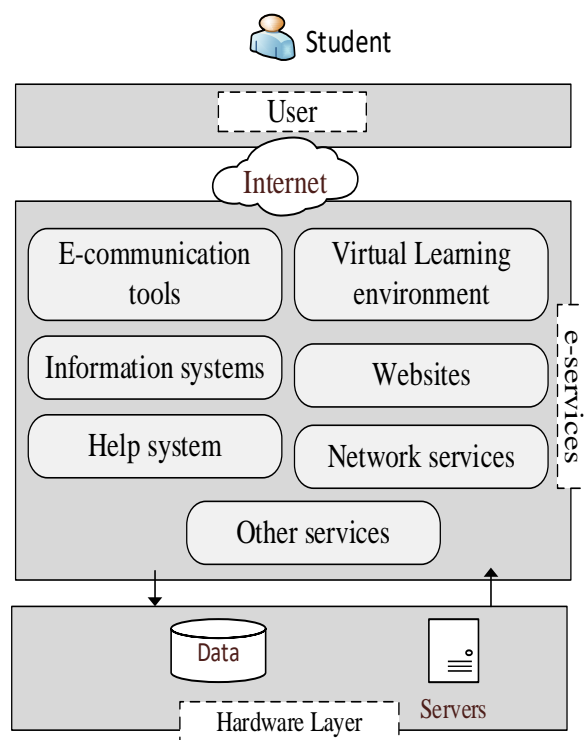
Figure 3 **Scheme of e-services provided by KUT**

Table 2 more deeply characterise the services.

Table 2 **E-services characteristics**

Information Systems
E-identity Management System (IMS) deals with identifying users in a system and controlling their access to resources and services within university.
Academic Information System (AIS) provides registration for classes, making of individual plans, documenting assessment scores, building schedules, maintenance of student data, reporting of surveys, handling of mentoring program and so on.
Document Management System (DMS) allows monitoring, managing, searching and storing documents.
Library Information System (LIS) provides support a search in university libraries and access to subscribed scientific databases.
E-communication Tools
E-mail for students' platforms Microsoft Office 365, MS Exchange Online service
MS Office 365It is a cloud-based service that is designed to provide access to Office 365 tools.
Virtual Learning Environment
E-learning system (MOODLE) interactive online learning environment including forums, quiz, wiki, workshop, assignment, wiki activities
Video lectures and conference service (VIDEO) access of video lectures and conferences through student / lecturer work places and mobile devices.

Computerized Testing System (CTS) provides capabilities to check students' knowledge on a specific field using interactive web-based system.	
Websites	
University website and Department websites branches out into many sections designated to departments, institutions, centres that, in many cases, have their own websites.	
Help System	
Incident registration and management system (Help desk) system is used to manage support queries from university personnel and students, to register IT, DMS and telephony incidents.	
Network Services	
Virtual Private Network (VPN) is a network service which allows university personnel and students to securely connect to the University network.	
Wireless network (Wi-Fi) wireless networks can be used by KUT community, as well as by students from educational institutions participating in the Edu roam project.	
Other Services	
Self-service to register for access to IT systems and services (SELF). University has implemented an identity management and single sign-on solution for university IT services. All employees and students are provided with University IT user credentials.	
Copying / Printing / Scanning services (CPS) are multifunctional self-service devices for copying, printing and scanning that have been installed in the university.	

Table 3 presents interaction between student demands and e-services provided by KUT. The demands are intersected with e-services.

Table 3 Interaction between students' demands and e-services

E-services / Students' demands	IMS	AIS	DMS	LIS	E-mail	MS Office	Moodle	VIDEO	CTS	Website	Help desk	VPN	WiFi	SELF	CPS
Studies	A	A	A		I	A	A	A	A	I	A	A	A	A	A
Finance	A	A	A		I					I					
Library	A			A	I					I		A	A		
Leisure										I					
IT services	A				I					I	A	A	A	A	A
Career planning			A		I					I					
Documents	A	A	A		I					I		A			
Academic help	A	A								I	A				
Quality assessment	A	A	A		I				A	I					
Other services	A				I	A				I		A		A	A

A – e-service, which is used to accomplish the demand; I – e-service only informs about possibility to achieve the demand.

Taken together, the table provides important insights into the necessity of certain e-service. Closer investigation of this table shows (displayed in Figure 4) that some of e-services comply with specific students' demands (alike LIS service), while the others are universal ones and widely applicable (related to university Websites, e-mails or IMS).
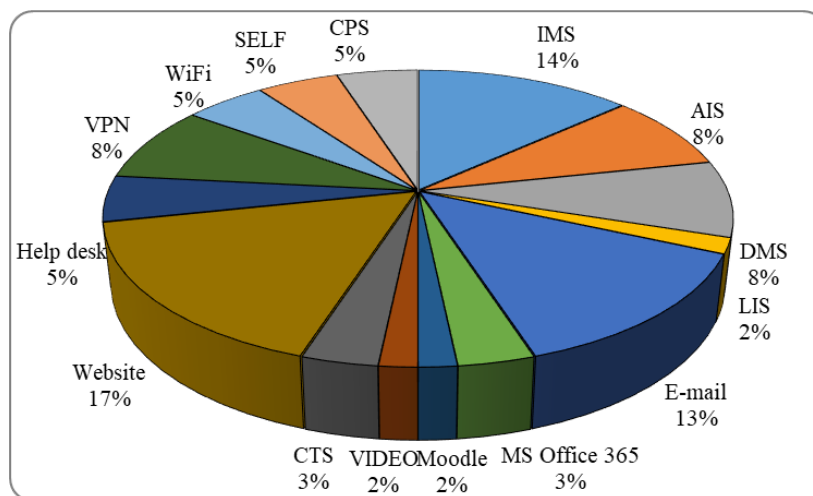
*Figure 4 **Usage of e-services fulfilling students' demands***

It is apparent from the Figure 5 that the study demands, being as one of the main functions in the university, is supported by most the e-services, in contrast to Leisure service, for which only information can be found.
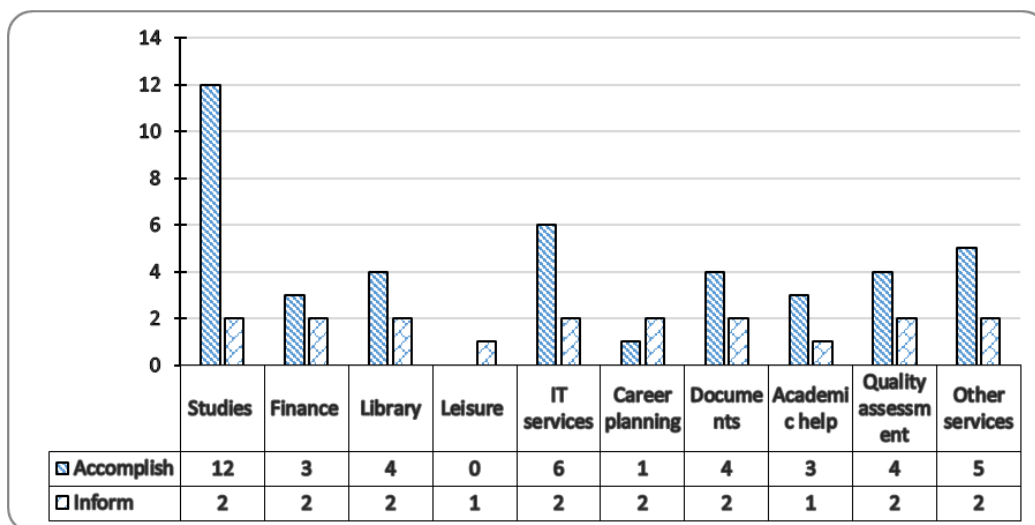
*Figure 5 **Amount of e-services fulfilling students' demands***

Conclusions

Education institutions have different understanding how to ensure the effective provision of university-wide support. The institutions usually develop their own ICT infrastructures employing their own specialists or delegate this task to private IT companies. There is a general lack of scientific publications that would present general criteria for ICT infrastructure.

This paper focused on the developing of general criteria based on students' demands that include not only their academic performance but also particular activities. Closer investigation how these students' demands are fulfilled by KUT e-services concluded that some of e-services comply with specific students' demands while the others are universal ones and widespread. Furthermore, not all demands are supported by most of the e-services, so only information can be found.

The research results could be used as guidelines for education institutions to design or upgrade their ICT infrastructure.

Summary

The main challenge for higher education in the nearest future is the global competitiveness. Thus, traditional universities must adapt educational infrastructures in response with the global requirements.

Higher schools usually develop their own infrastructure based on experts' advice or delegate this task to the private IT companies. This article analyses essential factors that can affect the change of educational infrastructure. As there is a lack of researches on providing the general criteria for infrastructure that could be used as guidelines for education institutions, the article aims to investigate how users' demands influence the ICT infrastructure in higher education. The article is structured in the following way. First section reviews the scientific literature on main study models and estimates their technological aspects. Second section proposes the university-wide students' demands that can affect not only their academic performance but also particular activities. The last section presents a list of e-services provided in KUT and explores at how these services fulfil the students' demands. Research methods include analysis of scientific literature, publications, legal acts and other documents of KUT and workshops' information with KUT student organization representatives and administrative staff.

Investigation results conclude that some of e-services comply with specific students' demands while the others are universal ones and widespread. Furthermore, not all demands are supported by most of the e-services, so only information can be found.

The research results could be used as guidelines for education institutions to design or upgrade their ICT infrastructure.

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INFLUENCE OF INFORMATION SOURCES ON TOURISTS: A CASE STUDY OF STUDENTS OF MARKETING AND MANAGEMENT IN THE SILESIAN REGION

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Abstract. *This paper presents the results of a field research on the changes that take place in student preferences regarding communication with tourism services, preferences on the ways to search for information sources about place destination and a first inside about payment forms for tourism and hospitality services. The study was conducted twice, in 2015 and 2018, among students of tourism management and recreation at the Kukuczki Academy of Physical Education in Katowice and the Banking Higher School in Chorzów.*
Keywords: consumer communication, consumer satisfaction, hospitality service, information search, Internet, tourism services.

Introduction

The beginning of the Internet in Poland dates back to 1990 when the first e-mail to the Institute of Nuclear Physics in Krakow was sent from European Council for Nuclear Research (Conseil Européen pour la Recherche Nucléaire – CERN). Unfortunately, the development of the internet was conditioned by the practices of monopolists. First, the process was withheld by the National and Academic Computer Network, which became the actual monopolist dictating the technical and pricing conditions of Internet access, followed by monopoly functions taken over by Telekomunikacja Polska, which until the early 2000s used its dominant position in access to the Internet (Meissner, 2016). Over the past few years, an expanding range of Internet access options has had an impact on the massive development of the online community in Poland.

In this paper, we present the results of an ongoing research that aims at investigating the attitudes of young people in the use of the internet for planning travels and tourist services.

On this purpose, we compared the outcomes of two surveys, one conducted in 2015 and the second in 2018 among students of tourism management and recreation at the Kukuczki Academy of Physical Education in Katowice and the Banking Higher School in Chorzow. Our paper illustrates the changes that took place in student choices regarding communication with tourism services, e.g., preferences on the ways to search for information sources about place destination and the forms of payment for tourism and hospitality services.

Five travel sites can be considered the best places to start travel planning (Table 1). They provide functions to search for the different forms of holidays and types of accommodations.

Literature review

Since tourism is one of the primary economic sectors and, accordingly, many countries are competing to attract tourists through all means of communication and such communication has become a major driver of touristic sectors all over the world. The role of communication is to inform prospective tourists and influence their choices regarding touristic destinations and the type of touristic products they purchase. To attract prospective tourists in this digitized world, modern ICT strategies are needed, and it is necessary for the tourism industry to rely on ICTs and especially the internet as tools of international communication (Wagaw & Mulugeta, 2018).

Tourism as an information intensive industry can gain important synergies from the use of the Internet. The tourism sector has been a pioneer in adopting and developing ICT applications and today is rated among the top product or service categories purchased via the Internet (Deyna & Mroczek-Czetwertynska, 2018).

Travel products and services appear to be well suited to online selling because they possess the characteristics that can function in the electronic environment. Products and services that have a low cost, are frequently purchased, have an intangible value proposition and/or are relatively high on differentiation are more amenable to be purchased over the Internet (Ochoa, Herman, & Marzano, 2016). Specifically, travel products are high involvement products that are less tangible and more differentiated than many other consumer goods, which make them suitable for sale through the Internet

Travel and hospitality have always been about assisting and anticipating needs, and we're barely scratching the surface in terms of how this technology can be used to simplify and streamline the entire consumer journey," Heckmann said. "As an industry, we're getting to a place where we can help travellers get whatever information they need about a new destination, flight, hotel or activity

as quickly and easily as possible, with smarter recommendations that learn and evolve over time (Loo, 2017; Ochoa, 2018)

To understand the tourist preferences of university students and the role of the Internet on planning a trip, it was decided to conduct a survey involving students of Sport and Tourism management at the Kukuczki Academy of Physical Education in Katowice. The better understanding of their virtual behaviour in their search for information for tourism destinations will encourage tourism operators to invest in a proper way in e-promotion and e-resources, in order to increase their business (Schiopu, Padurean, Tala, & Nica, 2016)

The best travel site (see table 1) should be a valuable tool in creating your ideal trip, whether you're planning an overseas vacation, a business trip, or a weekend road-trip. These websites work like robotic travel agents. Instead of asking you to go to the dozens of airline websites and hundreds of hotel websites to search for your ideal dates and route, travel sites perform all of these searches with a single click. To find the best, we looked for websites which could search for a variety of bookings, and tracked prices and user experiences focusing on flights, rental cars, and hotels, and bring us back the best services at the best prices (reviews.com, 2018).

To decide the best travel sites, reviews.com decide to analyse four factors:
- price is the undisputed king in the travel world
- flexible date tools let you see what happens if you slightly adjust dates for a proposed trip
- whether tracking down the right hotel amenities, locating a specific car type, or making sure our plane ticket covers baggage fees, it's crucial to have great comparison features on a travel site
- the best travel site should have pages that load quickly, display relevant results, and don't leave us wondering if we've accidentally clicked on spam

*Table 1 **The best travel sites** (reviews.com, 2018)*

Sites' name	Booking	Expedia	Kayak	Hipmunk	Priceline
Topic	Best Airfare Site	Best Car Rental Site	Best for Flexible Planning	Best for Comparing Features	Runner-Up Best Car Rental Site
Airfare Prices	Best	Average	Good	Good	Expensive
Car Rental	N/A	Best	Average	Average	Expensive*
Flexible Dates Options	+/- 3 days	N/A	+/- 3 days; monthly search	+/- 3 days	+/- 1 day
Web page	https://www.booking.com	https://www.expedia.com	https://www.kayak.pl	https://www.hipmunk.com/	https://www.priceline.com/

Source: own study based on: The future of travel. Think with Google, 2018.

Research approach and methods

The study was conducted twice among students of management and tourism and recreation at the Kukuczki Academy of Physical Education in Katowice and the College of Banking in Chorzów. In 2015, 93 women and 50 men (average age 22.6, standard deviation 1.2 years) took part in the research. In 2018, 112 men and 91 women (mean age 22.8, standard deviation 2.8 years). he tests were carried out each month in the month of May / June. To conduct the survey, the Google forms tool was used to create an online questionnaire and then by providing a hyperlink to students to conduct an online survey. The results available through Google sheets have been transferred to Statistica 13 from StatSoft, Inc. The questionnaire used closed single choice questions, hierarchy questions as well as open questions. For data analysis, descriptive statistics and quantitative techniques were used. To test the hypothesis that two qualitative traits in the population are independent, a $\chi 2$ test was used to compare the rates observed with expected frequencies.

$$\chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i} \qquad (1)$$

where:

$\chi 2$ = Chi-squared test, **also written as** χ^2 test, is any statistical hypothesis test where the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true

O_i = the number of observations of type i

E_i = the expected number of observations of ty*pe i*

Also The Mann-Whitney U test which is a nonparametric alternative to the t-test for independent samples:

$$Z = \frac{R_1 - R_2 - (n_1 - n_2)(n+1)/2}{\sqrt{n_1 n_2 (n+1)/3}} \qquad (2)$$

where:

R_1 means the sum of the rankings awarded to the values of the first sample

R_2 is the sum of the ranks given to the values of the second sample

n means the total number of observations ($n = n_1 + n_2$)

Discussion and results

Students assess the "very useful" usefulness of the Internet to find attractive tourist offers. Students see more and more Internet-related strength. In 2015 - 62.2%, and in 2018 - 66.0% of respondents stated that the Internet is very useful for the above purposes. Also at the moment the assessment of the extent to which they use the Internet to find an interesting tourist event? "Increased the number of people using the Internet.

In this year's research, more than 41.3% use only the Internet to search for interesting offers is a slight increase compared to the answers from 3 years ago (0.5%), however the greater difference is in the answers at the option level 4. Here, the difference is 3.5%. Generalizing for 78.6% of respondents, the Internet is a very important opportunity to get to interesting events. In subsequent questions, students were asked to determine the importance of individual electronic communication channels with a travel company on a scale of 1 to 5, where 1 - is not needed at all, and 5 - is very necessary. The most important channel turns out to be an e-mail. Almost 90% of respondents state that this communication channel is important or very important (82.7%). The popularity of email is great despite the fact that many letters get in the form of spam. However, it is certainly a big advantage of the e-mail that in its form the e-mail is closest to the traditional letter, which can still create a sense of credibility. All contracts and invoices have been credited until recently with signatures on "normal paper". However, there is a slight decrease in the importance of this channel. In the 2015 study, the e-mail was valid or very important for 89.4%.

Another important communication channel can be a discussion group. 47.1% of respondents in 2018 described this channel as necessary or very necessary. However, this is more than a seven-percent decrease compared to 2015 when 54.6% thought so. Despite the fact that with the advent of chats or software for direct communication, discussion groups have become a less-used communication tool, however, this environment is still considered by many Internet users as a place for factual and substantive discussions. Also the significance of chat or software enabling communication with the company on the website slightly decreases. In 2015 - 44.8% of respondents stated that the chat was needed or very necessary, while in 2018 it granted 43.0%.

E-mail, discussion group and chat lose their validity, while the drop in discussion groups is statistically significant (Z = -1,913 at p = 0.05). What is the reason? You could probably specify that the last time you can fan page on a social network, that is, in the overwhelming majority of Facebook. In 2018, respondents were also asked about this channel. 81% of them stated that it is needed to a large or very large degree, which almost equalled communication via e-mail. Probably fan page is not yet used in a conscious manner by many companies, however, this potential should be managed.

Respondents asked for the answer which for them is the favourite way of communication with the tourist company for the most part choose e-mail. However, during the three years there is a quite large drop from 55.3% in 2015 to 45.7% in 2018. A direct conversation, which three years ago was an important option mentioned by 16.6% of respondents in the last 3 years, almost lost its full significance (0.5% in 2018) for a phone call which was chosen by 40.8%. It can be explained sometimes, which is saved as a result of a lack of a visit to a tourism

office or a tourism company. The role of chat has dropped from 8.0% to 1.6% in the last three years, while Facebook has increased from 1.5% to 4.3% in 2018.

The distribution of responses in 2018 with the division into women and men turns out to be interesting. Over 51% of women and only 36% of men chose e-mail as a favourite communication channel. This is a statistically significant difference ($\chi2 = 6.44$, with $p = 0.0111$). Men more often choose a telephone call (42.3%) with 34.8 percent of women (see fig. 1).
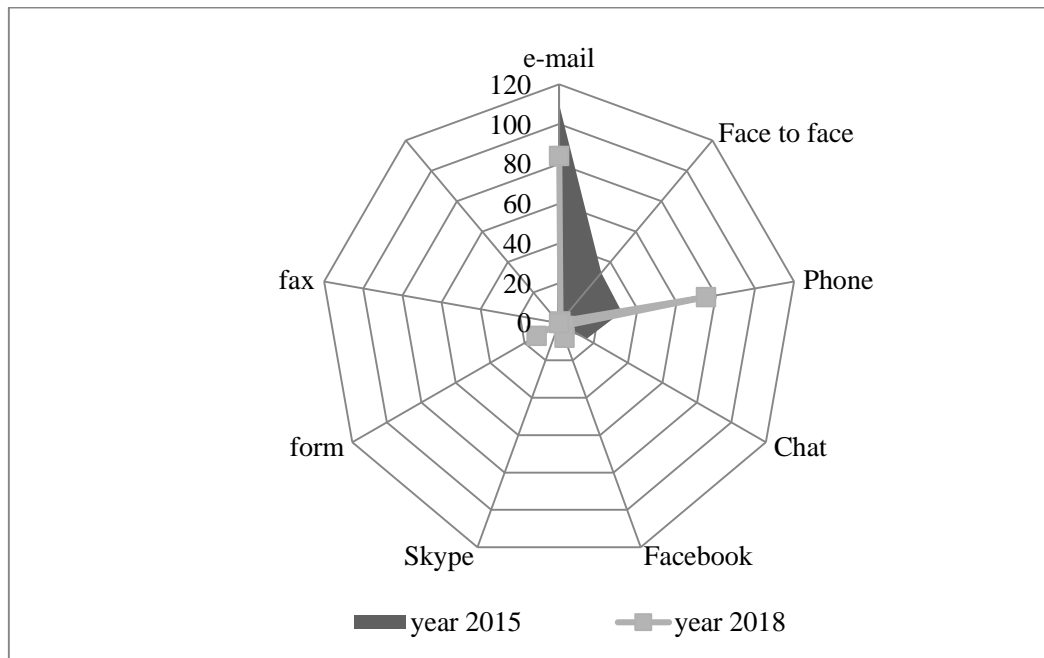

*Figure 1 **Favourite way to communicate with the travel company 2015 & 2018***
(own study)

Considering that e-mail is still the most important channel of communication with a tourist company, and not in real time, the next question arises itself. How long should we wait for the reply of the letter sent. It turns out that respondents are more and more demanding in this area.

As recently as in 2015, 17.1% of people were able to wait for the answer two days and more. This percentage decreased in 2018 to 6.5%. In turn, the number of people within 3 years increased by 13.6%, which they believe that the response to the e-mail should come within 12 hours (37.9% in 2015 and 51.5% in 2018). This is a big jump of customer requirements. Thus, over 90% of clients (93.6%) want to know the answer within one day.

At the same time, when analyzing this year's gender research, it is not possible to present a thesis (as 3 years ago) that there is a statistically significant difference between men and women. The women's requirements have leveled out with men and even slightly overtook them. 52.7% of women and 50.9% of men

think that the reply to the letter should arrive within 12 hours. Three years ago, over 45% of men and 35% of women said they should get a response within 12 hours (The Mann-Whitney U test $Z = 2.48$, $p = 0.01$).

Major changes concern preferences in the search for tourist services. In 2015, the most popular was browsing group purchases such as Groupon or TravelBird (35.3%). This way in 2018 dropped to the level of 16.9%. Meanwhile, the most popular platform in the meantime was booking.com, which jumped from 3 percent to as much as 39.8%. The meteo search engine, in turn, had 33.6% of responses in 2015, while in 2018 28% of Airbnb gained popularity as well. A small amount three years ago has been transformed into 5.7% this year. It should be noted that there were many other indications this year. Answers other than the above this year are almost 10% (compared to 5.1% 3 years ago). Among these answers were listed such.pl.pl (2.4% of all responses), holiday pirates (1% of all responses), tripadvisor, fly4free, and hostelworld. There are no major differences between the sexes in the preferences of the parties. Only the higher Airbnb preference among men (13% of responses) than women (4% of responses) is noted (see fig. 2).

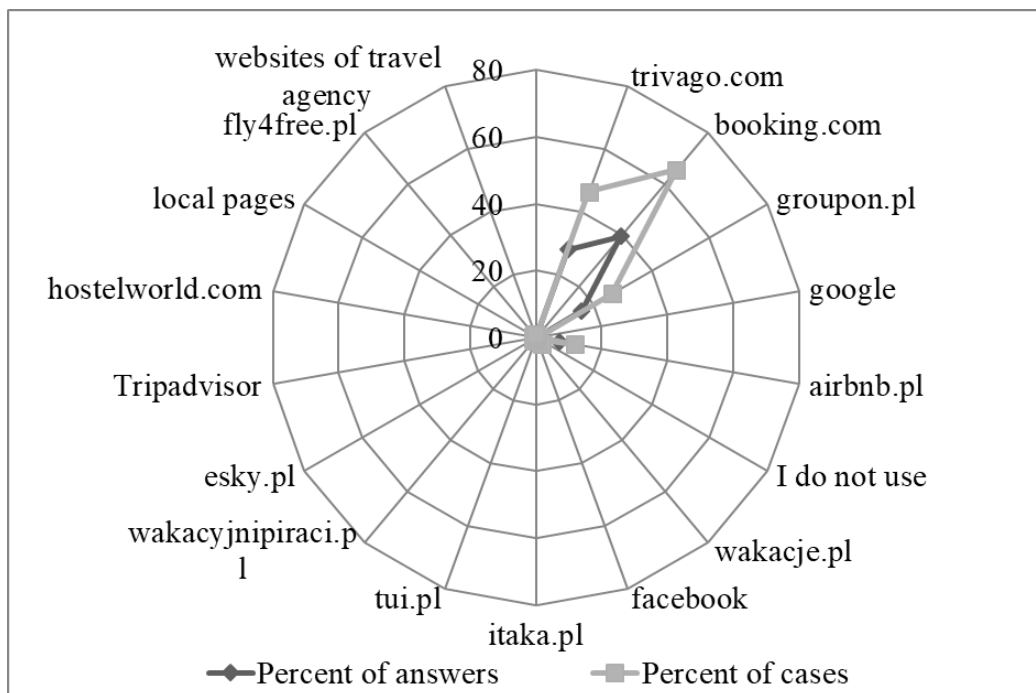*Figure 2* **Website use for choosing a tourist service 2015 & 2018**
(own study)

A wider range of different payment options is noted. In 2015 respondents answering the question "what payment channel you choose for the services and products ordered on the Internet exchanged on average 1.44 and in 2018 per person fell 1.8 of the preferred options. There are differences in the preferences

of individual channels. If in 2015, half of all responses focused on a traditional bank transfer, already in 2018 this channel accounts for only 27.8% of responses. About one-third of the responses are a fast online transfer option (33.3% in 2015 and 33.0% in 2018). This makes this channel the most popular way to pay online this year. However, other ways are also becoming more and more popular. The payment card from 11.7 increased to 17.6% of the response, PayPal from 3.2 to 7.8% as well as the payment by mobile phone increased to 8.1%. Payment on delivery can be said to be the most reliable payment method 7.8% (see fig. 3).
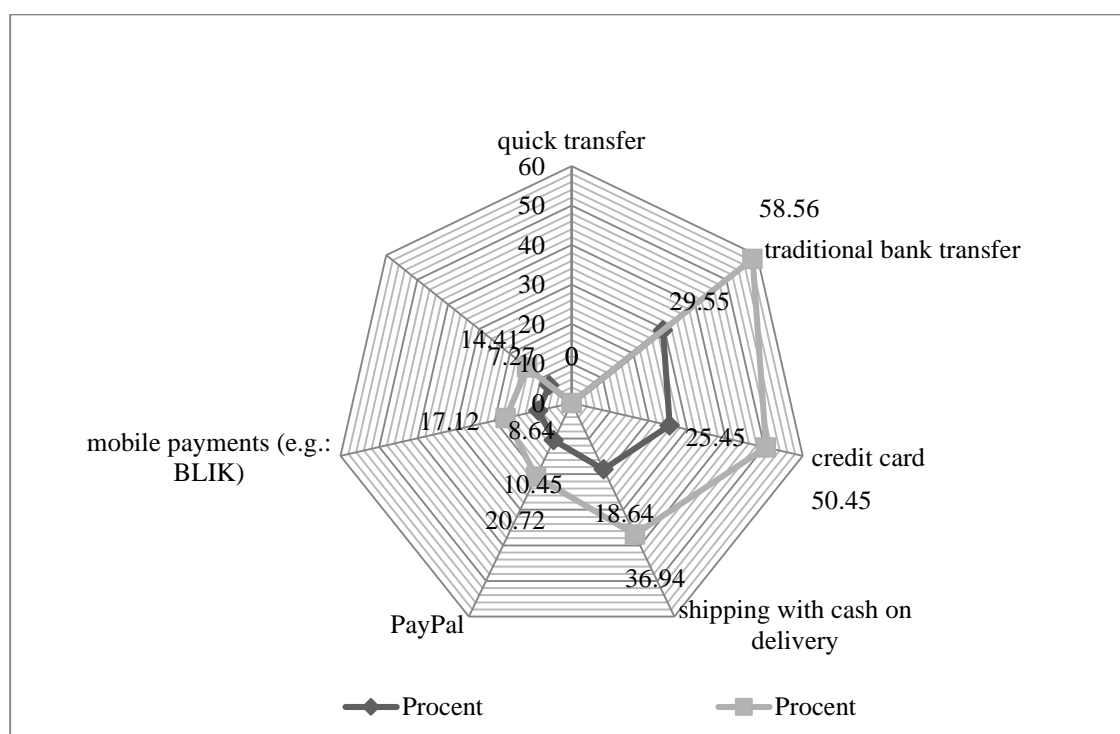
*Figure 3 **Type of payment for the ordered online tourism services 2015 & 2018***
(own study)

Depending on the gender, we can see some differences in the preferences of payment methods. The traditional bank transfer is more popular among women (31.3% of responses) than in men (25.5% of responses). In turn, more men chose a payment on delivery (10.5%) in relation to women (4.0%). Perhaps this is related to different types of shopping among men and women. An in-depth questionnaire analysis would be needed to establish the above.

In the last question, students were asked to answer how often they receive tourist advertisements by mail. Considering that usually such e-mails are not welcomed and treated as spam it is comforting that over the years the frequency of receiving such ones decreases. In 2015, exactly 21% of respondents stated that

they receive such mail every day or even several times a day. This percentage fell to 11.4 in 2018.e

Conclusion

Despite the limitations of our sample, a few interesting elements emerged from our study. For instance, there are differences in the preferences of payment methods that appear related to gender. The traditional bank transfer is more popular among women (31.3% of responses) than in men (25.5% of responses). In turn, more men chose a payment on delivery (10.5%) in relation to women (4.0%). Perhaps this is related to different types of shopping among men and women. An in-depth questionnaire analysis would be needed to establish the above.

For the answer, how often do they receive tourist advertisements by mail. Considering that usually such e-mails are not welcomed and treated as spam it is comforting that over the years the frequency of receiving such ones decreases. In 2015, exactly 21% of respondents stated that they receive such mail every day or even several times a day. This percentage fell to 11.4 in 2018.

Our research will continue focusing on young people travel lifestyle, investigating their preferences on destinations. We would like to investigate the relationship between their intention to travel and their travel chooses. On this purpose, we are planning to analyze the data available on the most popular tourism platforms, such as booking.com and expedia.com. The results of our research will provide suggestions for designing proposals that meet young people expectations and desires. Our research will continue focusing on young people travel lifestyle, investigating their preferences on destinations. We would like to investigate the relationship between their intention to travel and their travel chooses. On this purpose, we are planning to analyze the data available on the most popular tourism platforms, such as booking.com and expedia.com. The results of our research will provide suggestions for designing proposals that meet young people expectations and desires.

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ВОЗМОЖНОСТИ ТЕХНОЛОГИИ ЭЛЕКТРОННОГО ОБУЧЕНИЯ ПРИ ИЗУЧЕНИИ МАТЕМАТИЧЕСКОГО АНАЛИЗА

The Possibilities of E-Learning Technology in the Study of Mathematical Analysis

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Abstract. *The course of mathematical analysis is important in the subject preparation of computer science students. The article deals with the issues of improving the level of mathematical competence of students in the study of mathematical analysis using e – learning technology based on the learning environment of the European system of distance learning (Learning Management System-LMS) Moodle. The principles of selection of theoretical and practical content of the electronic course in mathematical analysis are described. The efficiency of the use of the developed training course as an auxiliary didactic tools. The experimental work was attended by students of the 1st course of the direction "Applied Informatics". The article presents some results of the use in the educational process of the electronic course in the process of mastering the discipline "Mathematical analysis".*
Keywords: *applied Informatics, e-learning, mathematical competence, mathematical analysis, Moodle.*

Введение
Introduction

На современном этапе развития высшей школы качественное образование представляется как оптимальное сочетание так называемых традиционных методов обучения (лекции, практические и семинарские занятия, курсовые проекты, консультации и др.) и средств e-learning (использование электронных учебников, компьютерных тренажеров, тестов и т.п.).

Спрос на образовательные услуги и развитие информационных технологий привело к появлению дистанционного обучения. Дистанционное обучение по своим характеристикам сильно отличается от традиционного. Использование дистанционных технологий в образовании повышает возможность вариативности способов получения образования,

облегчает доступ к информации преподавателей и студентов, позволяет по-новому организовать их взаимодействие, способствует развитию познавательной самостоятельности студента.

В настоящее время широкое распространение получила новая модель учебного процесса – электронное обучение. В определении данного термина акцент делается на средства (инструменты) обучения, при этом обучаемый и преподаватель могут находиться как в образовательном учреждении, так и в разных местах. Электронное обучение – это одно из направлений более широкого класса информационно-телекоммуникационных технологий и практикуется в виде различных моделей, главными его компонентами являются виртуальные учебные материалы и коммуникации (Гюльбякова & Масловская, 2018).

Технологии электронного и дистанционного обучения успешно интегрируются в учебный процесс образовательных учреждений. Сочетание традиционного очного обучения с электронным обучением и дистанционными образовательными технологиями принято называть смешанным или гибридным обучением *(blended/hybrid learning)*.

С одной стороны, смешанное обучение сохраняет в учебном процессе непосредственное взаимодействие преподавателя и студента. С другой стороны, за счет применяемых в нем технологий, дает возможность студентам изучать материал самостоятельно, в любое удобное для них время, ликвидировать пробелы в знаниях по материалам пропущенных занятий. Проведенные исследования показывают, что смешанное обучение позволяет повысить эффективность и качество образовательного процесса (Bailey, 2013; Козлова et al., 2011; Захарова & Макашова, 2018).

Целью данной статьи является анализ опыта использования технологии электронного обучения на основе учебной среды европейской системы дистанционного обучения (Learning Management System – LMS) Moodle при изучении математического анализа студентами направления «Прикладная информатика».

В ходе исследования были использованы следующие методы: анализ научно-методической литературы по проблеме исследования, анкети-рование.

Материалы и методы
Materials and methods

Математическое образование в вузе играет особую роль, т.к. во многих отраслях человеческой деятельности наблюдается потребность в специалис-тах, владеющих современными, универсальными математическими методами моделирования и исследования реальных процессов и явлений.

На удовлетворение таких запросов ориентированы актуальные математико-информационные направления подготовки будущих специалистов (например, «Прикладная информатика», «Математика и компьютерные науки» и т. п.), сочетающие традиционную фундаментальность математического образования с областями информационных технологий и программирования (Соколова, 2014).

Фундаментальная математическая подготовка выпускника является одной из важных составляющих его будущей профессиональной деятельности. От качества математической подготовки зависит уровень компетентности будущего специалиста. В настоящее время преподавателями накоплен немалый потенциал использования в учебном процессе различных инновационных технологий и интерактивных методов обучения, электронных образовательных ресурсов, новых современных компьютерных тестов-тренажеров математических задач (Дьячук, 2001).

Опыт преподавания математического анализа на младших курсах университета показал, что имеются серьезные проблемы, как с точки зрения преподавателя, так и с точки зрения студента. Курс математического анализа студенты направления «Прикладная информатика» изучают в течение первого года обучения. Сравнение фундаментальных понятий математических дисциплин с точки зрения преемственности средней школы и вуза показало, что большинство понятий, сформированных в школе на разном уровне строгости, в вузовском курсе трактуются с тех же позиций, только углубляются, и расширяется спектр их приложения. Анкетный опрос первокурсников показал, что математический анализ является самым трудным предметом среди математических дисциплин.

Особенность усвоения математического анализа студентами 1 курса сопряжена с определенными трудностями. Идейное богатство содержания, большое количество новых сложных понятий, новизна идей, методов предъявляют высокие требования к общности рассуждений и безупречности логических рассуждений. Причина трудностей понимания этой дисциплины кроется в исследовательском характере, который диктует аналитический вид деятельности. Уметь анализировать, как известно, значит обладать высоким уровнем математической компетентности.

Среди основных недостатков математической подготовки выпускников школ, которые влияют на изучение математического анализа в вузе, можно отметить:

- неумение связывать теоретический материал с решением задач;
- неподготовленность к самостоятельной деятельности при изучении математических дисциплин;

– сложности в восприятии лекций (проявляются трудности в выделении главного).

В ходе исследования мы попытались определить степень готовности первокурсников к активной самостоятельной деятельности при изучении математического анализа. Для этого были выделены некоторые учебные действия, которые должны быть сформированы в школе и необходимы для усвоения математического анализа. Результаты эксперимента показали, что в среднем среди студентов 1 курса направления «Прикладная информатика»:

– переводят с языка математических символов на естественный язык - 67%

– умеют анализировать и сравнивать объекты - 17%;

– умеют перенести аналитические рассуждения в план геометрических представлений – 5%;

– по заданной задаче могут формулировать аналогичную, обратную, обобщенную задачу - 85%, 7%, 0%;

– умеют работать с математическим текстом и восстанавливать недостающие ссылки - 5%;

– умеют составлять алгоритм и работать с алгоритмом – 27%.

Таким образом, отмеченные недостатки математической подготовки первокурсников и низкий уровень готовности их к самостоятельной деятельности при изучении математического анализа ведут к формальному восприятию математики и, как следствие, к плохой профессиональной подготовке. Поэтому при обучении математике необходима продуманная целенаправленная и систематическая работа с привлечением современных обучающих средств и технологий.

В Псковском государственном университете разработана система дистанционного обучения на базе модульной объектно-ориентированной динамической учебной среды – Moodle. Эта среда дает преподавателю обширный инструментарий для представления учебно-методических материалов курса, проведения теоретических и практических занятий, организации учебной деятельности студентов как индивидуальной, так и групповой (Garrison, 2011; Lopes, 2011; Skorniakova, 2012; Watanabe, 2005).

Традиционная форма обучения (аудиторные занятия) студентов 1 курса направления «Прикладная информатика» дополняется разработанным на базе Moodle электронным обучающим курсом (ЭОК) по математическому анализу.

Основными задачами ЭОК по математическому анализу являются:

– систематизация содержания дисциплины;

– улучшение методического обеспечения дисциплины;

- повышение эффективности и качества учебного процесса на основе использования различных форм его организации;
- оказание студентам методической помощи в усвоении учебного материала и развития навыков его использования на практике;
- правильное планирование и организация самостоятельной работы и контроля знаний студентов.

При разработке курса осуществлялось его методическое проектирование: определялось, в какой форме будет представлен теоретический материал; как будут отрабатываться практические навыки; создавались различные виды контроля знаний и сформированности компетенций студентов (тесты и т.д.); проектировалась модульно-рейтинговая технология оценки знаний (Екимова, 2015; Белозёрова & Чуйко, 2019).

Образовательный контент ЭОК по математическому анализу содержит: конспекты лекций, методические указания к изучению теоретического материала, глоссарий, типовые задачи с указаниями к решению, с решениями и ответы, практические задачи для самостоятельной работы, тесты, вопросы к экзамену, дополнительные материалы по курсу, ссылки на полезные интернет-ресурсы и сервисы.

Лекции сопровождаются контрольными вопросами по каждой теме. Для того, чтобы перейти к следующей теме студенту надо обязательно ответить на вопросы по изученному теоретическому материалу и освоить решение типовых практических задач. В зависимости от вида задания преподаватель или система Moodle проверяет ответы и выставляет оценку, показывая, какие ответы правильные и задачи решены верно, а какие – нет. При этом к задачам, предназначенным для самостоятельного решения, в случае неправильного ответа, можно позже вернуться и дать верное решение.

Разработанный ЭОК по математическому анализу представляет собой вспомогательное учебное дидактическое средство обучения и позволяет студенту формировать и оценивать знания по математическому анализу в рамках самостоятельной работы дома, а преподавателю осуществлять мониторинг учебно-познавательной деятельности каждого студента.

Результаты и их обсуждение
Results and discussion

Опыт использования ЭОК по математическому анализу студентами направления «Прикладная информатика» показал свою эффективность. Такая форма учебного процесса позволяет сочетать педагогическое общение, при котором происходит обмен опытом и знаниями, с глубокой

самостоятельной работой студента. Преподаватель более детально рассматривает математический материал и указывает на ошибки студентов. Студент, в свою очередь, может самостоятельно изучить тему, разобраться в практических задачах, если занятие было пропущено. Кроме того, студенты в одной группе могут иметь разный уровень математической подготовки, поэтому ЭОК позволяет индивидуализировать обучение. При такой организации учебного процесса возможно обучение студентов с ограниченными физическими возможностями.

Нами было проведено исследование о выявлении роли ЭОК и эффективности его использования в процессе изучения математического анализа. В качестве метода исследования выбран анкетный опрос, для чего была разработана анкета. В опросе приняли участие студенты около 60 студентов 1 курса направления «Прикладная информатика». Анкета содержала вопросы:

1. Считаете ли необходимым использование ЭОК по математическому анализу?
2. Знакомы ли с условиями работы и структурой ЭОК?
3. Какие разделы ЭОК чаще всего используете при изучении дисциплины?
4. Как часто используете ЭОК при освоении дисциплины?
5. Назовите преимущества и недостатки ЭОК при изучении дисциплины?
6. Помогает ли данный ЭОК при изучении дисциплины?

Анализ ответов показал, что 64% студентов считают необходимым использование электронного обучающего курса по математическому анализу, 26% на данный момент не определились, а 10% полагают, что можно его не использовать.

Анкетирование показало, что в первом семестре студенты испытывают трудности при освоении содержания электронного обучающего курса, так как у них нет достаточного опыта работы с электронными ресурсами. Более 95% опрошенных студентов ознакомились со структурой и условиями работы в ЭОК по дисциплине, а 73% из них регулярно просматривают информацию о темах лекционных и практических занятий, о сроках контрольных работ. Студенты отмечают, что используют ЭОК по математическому анализу при освоении дисциплины, причем 10% опрошенных используют каждый день, 55 % – раз в неделю, 35% – раз в месяц.

На вопрос: «Какие разделы ЭОК чаще всего используете при изучении дисциплины?» были получены следующие ответы: на первом месте – практические разделы, их используют 65% студентов, на втором – лекционные (29%), другие разделы (список основной и дополнительной

литературы, интернет-ресурсы, перечень вопросов, экзамену, тестовые задания и т. д.) используют 6% опрошенных студентов.

Основные преимущества ЭОК, по мнению студентов, в том, что весь материал по дисциплине, как теоретический, так и практический находится в одном месте; доступен для изучения в любой момент времени; быстро можно проверить ответы при решении задач; есть полезные методические указания преподавателя; удобная электронная форма работы.

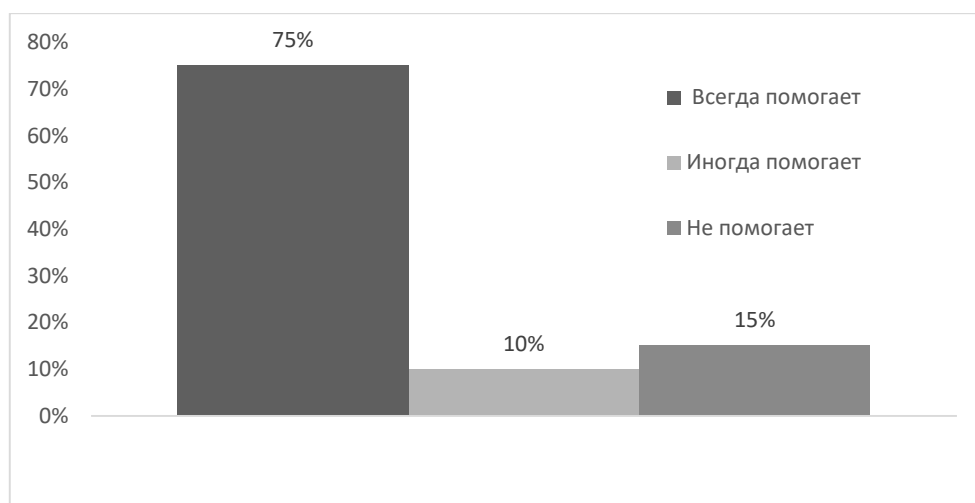Результаты анкетирования о роли ЭОК при изучении математического анализа представлены на диаграмме 1.

Диаграмма 1. **Роль ЭОК по математическому анализу**
Figure 1 ***The role of e-learning course in mathematical analysis***

Из диаграммы видно, что 75% студентов считают, что данный ЭОК помогает им с пониманием изучать математический анализ, 10% опрошенных ответили, что иногда помогает, 15% - ЭОК не помогает в изучении дисциплины.

Анализ проведенного исследования показал, что большинство первокурсников физико-математического факультета направления «Прикладная информатика» высоко оценивают потенциал электронного обучающего курса по математическому анализу и эффективность его использования при освоении математического анализа, что указывает на необходимость развития существующих технологий в электронном обучении. Более того, открытость и доступность курса помогает студентам осуществлять учебную деятельность в удобное время, а преподавателям – в режиме удаленного доступа обеспечивать контроль за работой студентов.

Выводы
Conclusions

Организация процесса обучения математике и самостоятельной деятельности студентов сегодня предполагает наличие гибкой системы, позволяющей приобретать знания там и тогда, где и когда это удобно обучаемому. Большинство студентов считают, что аудиторная работа является основой для изучения учебных дисциплин, а электронные обучающие курсы играют вспомогательную роль (облегчение усвоения аудиторного материала, оптимизация самостоятельной работы).

Исследование показало, что на качество обучения математическому анализу влияет оптимальное сочетание так называемых традиционных методов (чтения лекций, проведения практических и семинарских занятий, и т.д.) и использование ресурсов электронного обучения.

Среди преимуществ использования смешанного обучения (традиционного и электронного) можно отметить следующие:

- студенты мотивированы на своевременное и регулярное изучение учебного материала, сдачу контрольных и индивидуальных заданий;
- результаты обучения доступны для мониторинга;
- объективность итоговой оценки;
- студенты быстрее адаптируются к системе вузовского обучения, если есть электронный обучающий курс по дисциплине;
- студент активен в отношении выбора сложности задания, степени проработанности материала, использования дополнительных источников информации;
- происходит повышение культуры учебной деятельности студента;
- перевод учебного процесса на качественно более высокий уровень.

Таким образом, предлагаемая технология организации обучения математическому анализу направлена на повышение уровня математической подготовки студентов и выработку индивидуальной траектории обучения.

Summary

Currently, the organization of the process of teaching mathematics and independent activity of students assumes the presence of a flexible system that allows you to acquire knowledge where and when it is convenient for the student.

The article contains an analysis of the experience of using e-learning technology based on the learning environment of distance learning system LMS Moodle in the study of mathematical analysis by students of the direction "Applied Informatics".

Electronic educational course on mathematical analysis, developed in the Moodle system, is an auxiliary educational didactic means of learning. The course helps the student to form and evaluate knowledge of mathematical analysis in the framework of independent work at home, to raise the level of mathematical culture, and the teacher to monitor the educational and cognitive activity of each student.

The study showed that the majority of first-year students appreciate the potential of the e-learning course and the effectiveness of its use in the development of mathematical analysis. Students believe that classroom work is the basis for the study of academic disciplines, and e-learning courses play an auxiliary role (facilitating the assimilation of classroom material, optimization of independent work).

The experience of effective use of e-learning course in mathematical analysis allows the authors to conclude about the need for the development of e-learning technologies and their implementation in the educational process.

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COGNITIVE ACTIVITY IN THE RESPECT OF QEEG RESEARCH - PRESENTATION OF LABORATORY TESTS

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Abstract. *The article presents the methodology of laboratory tests carried out in the Laboratory of Experimental Research Biofeedback of the Jan Dlugosz University in Czestochowa (Poland) regarding the evaluation of education effectiveness by registering brain wave activity using electroencephalographic research (EEG method). The research results indicate that, depending on the form of the computer program visualization, a change in the activity of SMR, Beta1, Beta2 and Gamma waves was observed. The results are presented in the form of graphs and 2D brain activity images using the equipment Mitsar EEG 202 and WinEEG software.*
Keywords: *teaching, effectiveness of education, modern teaching aids, cognitive process, EEG.*

Introduction

The use of measuring equipment for registering activity of the human brain can be a source of highly important data for determining the level of engagement and motivation in the process of learning. Results obtained in research conducted within cognitive science provide useful input for the domain of neurodidactics. For example, promising results were obtained in previous studies (Prauzner, 2016-18). This paper presents findings concerning the effectiveness of learning using deterministic computer simulations in technical university education.

Discussion

QEEG tests are time consuming and because of that the number of testees is usually limited. However, in the interest of statistical validity of the results, efforts were made to make the groups representative enough and all students who volunteered to participate in laboratory tests were included (Prauzner, 2018b). In this way, 86 students participated in the study conducted in the academic year 2018/19, recruited from various academic disciplines represented at Jan Długosz University in Częstochowa and Częstochowa University of Technology (Ptak, 2015, 2016). For each group computer programs were prepared corresponding to the academic interests of the testees. Besides, for the sake of the study the programs were divided into categories (stages) with similar elements. The main criteria for distinguishing the categories (stages) were independent variables corresponding to the general complication and specific difficulties in their use, such as advanced command panel and tools (Tab.1). Cognitive activity is understood here as a process comprising such components as thoughts, sensory processes and perception. Examining cognitive activity by means of the QEEG method tests general engagement of the whole cognitive system in a number of processes enumerated in the literature. Recording signals by the EEG equipment provides information on how an individual is engaged in the process of task solving.

Methodology

The objective of the study is to find out if, and possibly to what extent, the organization and functionality of user's interface in simulation programs affects the user's cognitive activity. Examining the cognitive activity, in turn, will make it possible to assess a student's motivation and engagement in the process of learning, which translates into the effectiveness of educational tasks based on deterministic computer simulations. The main hypothesis to be verified is the claim that the presentation format, visualization, and ease of use of the interface significantly affect the user's cognitive activity.

The independent variable in the study is computer software of various characteristics, following from the construction algorithm applied, such as type of communication by means of menu written in Polish or in English, intuitiveness of the interface related to the number of graphic icons (simple or complex graphic menu), the format of the presentation of the model depending on the assumed method of solving the task (e.g. construct, correct, modify the model, find error in the simulation model) (Fig.1). The dependent variable is the cognitive activity determined by means of quantitative indicators obtained on the basis of QEEG tests in the consecutive stages of work and overt observation of the student's

work. The study was conducted in a biofeedback lab and they involved recording the brain activity by means of the equipment Mitsar EEG 202 and software WinEEG (Tab.1).
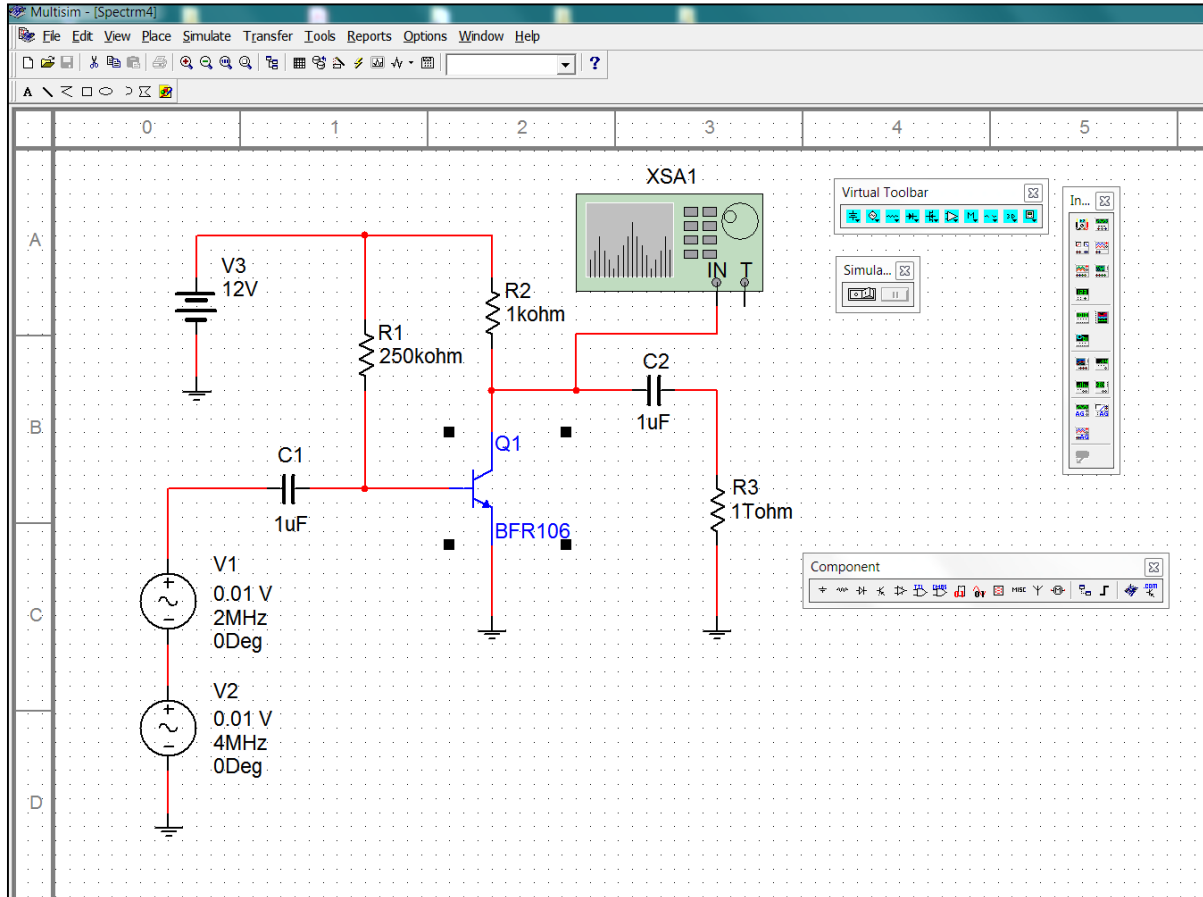

Figure 1 ***The example of UI in software***

Table 1 ***Stages of QEEG testing***

Stage	Description
I	Recording of an artifact caused by moving a mouse with a hand. This artifact was recorded for each participant and subsequently removed from the recording at every stage. Each participant's characteristic behavior with the computer was monitored.
II	Recording of the brain activity during the work with the simulation software, in which the menu is visualized as graphic icons, the meaning and functions of which are not easy to comprehend, with the menu and submenu written in English.
III	Working with software with an advanced graphic interface the interpretation of which is not intuitive, the submenu written in Polish.
IV	Working with software with an advanced graphic interface, the interpretation of which is not intuitive; the submenu written in English. To solve the task, it is necessary to read messages displayed in English, which provide clues how to use the menu icons, but these clues do not fully inform the user about the icons'

	functionality and purpose. Because of this, to be able to work with the software effectively, the user has to have good command of English and prior knowledge of the graphic menu. Due to their ample functionality and potential uses, this group of programs can be classified as professional software, yet they pose the greatest difficulties for users.
V	Working with software with an advanced graphic interface, the interpretation of which is user-friendly and intuitive; the submenu written in English.
VI	Working with software with an interesting 3D animation; the graphic is simple and shows prompts as complete formulas, the operating principle involves matching elements of a logical system. The user has to intuitively match elements of the 3D image, every step performed correctly is signaled as correct and every error is returned together with an explanation in Polish why this error was made and what it involved.
VII	Working with software characterized by a limited functional graphic menu. Solving a task requires using visualizations of real elements of the system (i.e. photographs of objects), the work is intuitive and the task fairly uncomplicated thanks to the visualization, which helps the user to choose the next step, and a limited number of graphic elements. The menu is limited to providing clues, obtained by pressing the right arrow key, even though the menu is in English, it is practically not necessary. A correct execution of a command is signaled by simulation of the system's correct operation and a short message.
VIII	Working with a simulation program showing a complete advanced complex model; the operation is however flawed by an unidentified error intentionally planted by the author. The aim of the work is to identify the error and to introduce modifications by changing some parameters of the program. Correct steps are signaled by a verbal message, simulation of the work and possibility to move to the next stage of the task. Solving gradable difficulties by proceeding from general to detailed elements encourages the user to analyze the system's operation in depth. The program is in English, with a very simple menu, using only basic vocabulary characteristic of most computer software.

Results of Research

The QEEG method is not precise in establishing the location of the source of a signal, since the waves are detected by a finite number of electrodes. Besides, other factors such as differences in brain structure, differences in skin impedance or stochastic factors can also affect measurements. A sensor detects a signal from a given area but this signal may result from the activity of various parts of the nervous system (Fig.2). Despite several disadvantages, one important advantage of the EEG method is that it is not-invasive. Besides, important study materials were obtained from direct observation. Due to a relatively large number of testees, the results obtained were systematized on the basis of similarities and differences between groups of participants.
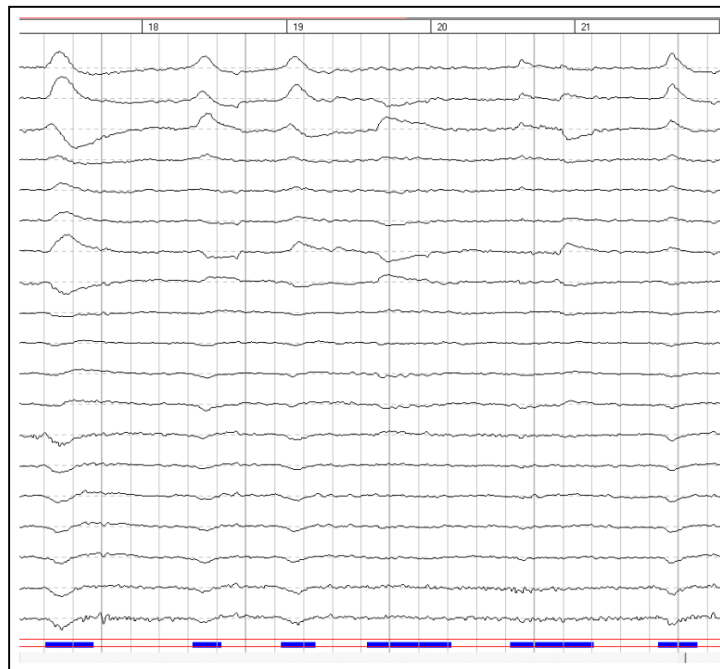
Figure 2 **Artefacts removed from the recording (the blue colour) induced by the movement of the hand with a mouse**

In accordance with previous research (Prauzner, 2018b) the following cerebral wave frequencies were the subject of the study: SMR, Beta1, Beta2 and Gamma.
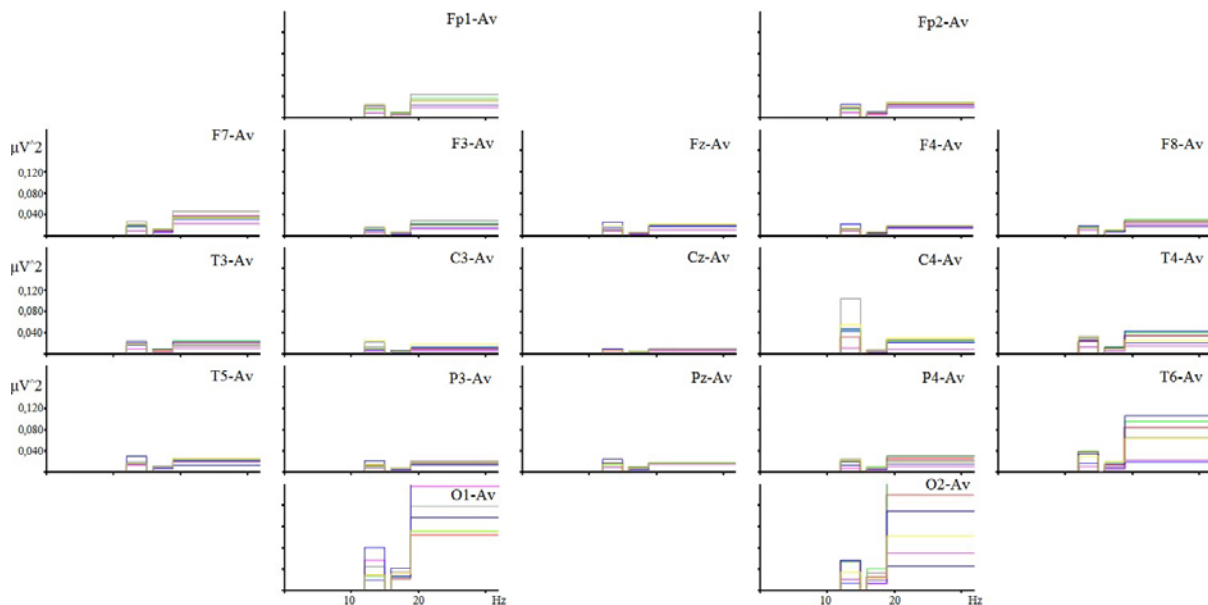
Figure 3 **Power of the signal for the above-mentioned waves** *(the red line stage II, the green line stage III, the blue line stage IV, the pink line stage V, the grey line stage VI, the dark blue line stage VII, the yellow line stage VIII)*
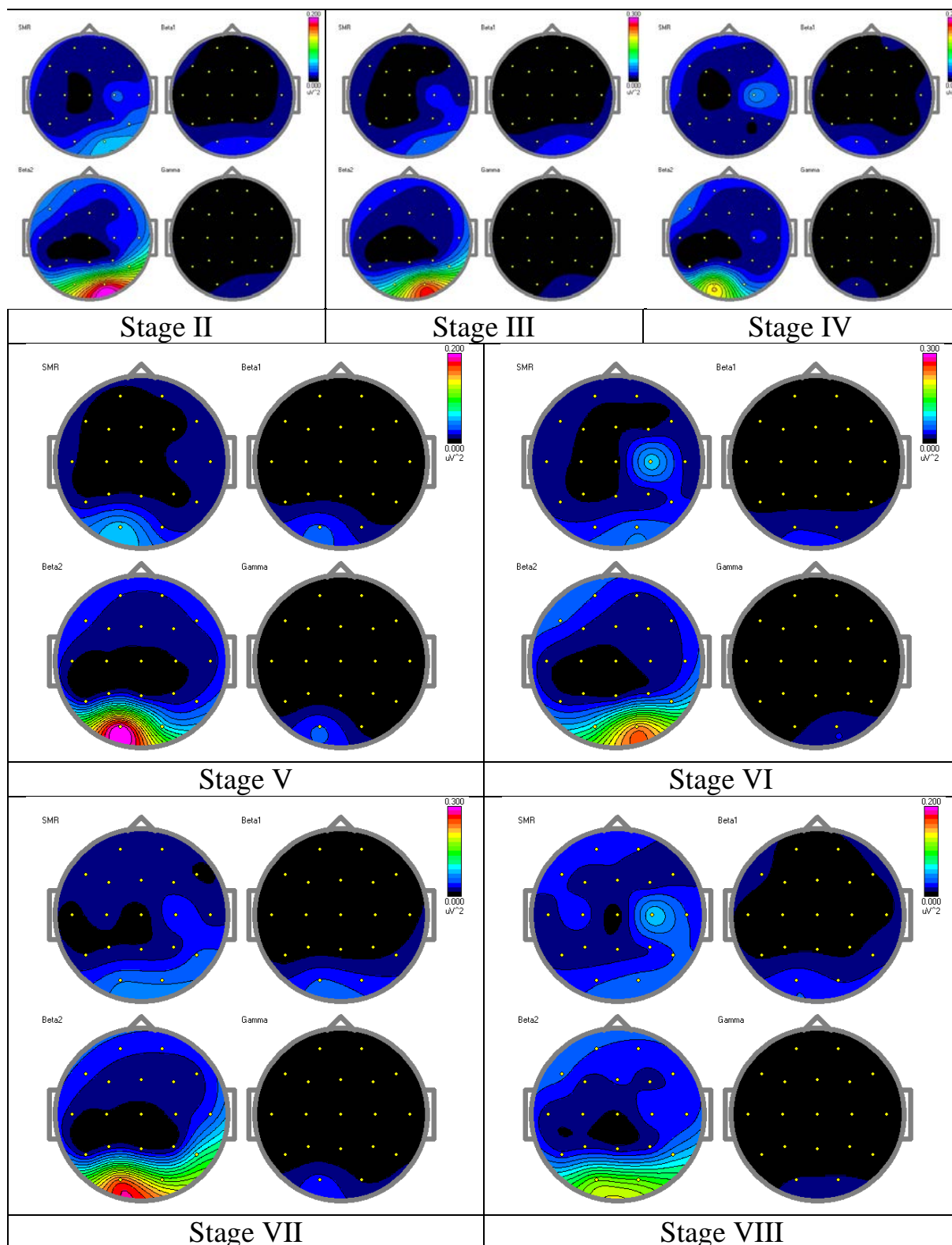
*Figure 4 **Graphic interpretation of identifying a source area of cerebral waves by means of the QEEG technique (an example),** (upper left - SMR wave; upper right - Beta1 wave; down left - Beta2 wave; down right - Gamma wave).*

Concluding remarks

The visualization of the brain activity indicates that the most active cerebral part were the areas of the occipital lobe and the parietal lobe and also, to a lesser extent, the temporal lobe (Fig.4). A change in the activity of cerebral waves, visible as frequency of oscillations, accompanies a change of the brain activity. According to previous studies, it is the brain areas mentioned above that are mainly responsible for processing visual stimuli. The occipital lobe analyzes such elements of images as color, movement, shape, depth, visual sensations and associations; it also interprets visual stimuli and makes inferences about them. The activity of the occipital lobe manifests itself in tasks requiring imagination and retrieving visual objects from memory and in tasks involving visual attention and visual associations. The right lower part of the parietal lobe is responsible for working memory, spatial orientation, imagination and visual sensations. The middle part takes part in processing symbolic representations, as well as abstract and geometrical concepts. When no activity is recorded in this area of the brain, it may be evidence of difficulties with drawing or with creating visual representations of objects. Processing a number of bits of information simultaneously, the right hemisphere of the parietal lobe is responsible for imagination, complex thought processes, and intuition. It is therefore dominant in intellectual activities. As neuroimaging tests indicate, the parietal lobe is active in tasks requiring not only attention, perception, spatial imagination, retrieval of information from memory, but also training skills connected with procedural memory (Wójcik, 2018).

All the results obtained in tests were grouped according to similarity. Fig. 3 presents a typical example of brain activity recording, obtained for the majority of testees. As the analysis of the results indicates, at each stage of the test all the Beta waves were recorded, with the wave Beta2 (or High Beta) being dominant in the occipital lobe. The highest values of this wave occurred at the second and fifth stage of the experiment and the lowest at the eight stage. SMR appeared in the right hemisphere in the parietal lobe and in the frontal lobe. The results obtained for a given observation may not be however sufficient to interpret unambiguously the character of the brain activity. For instance, analyzing the graphic results of the recording it is difficult to establish whether the recorded activity results from getting engaged in creative task solving or it merely results from coping with problems with using the software. It is possible to arrive at a more accurate interpretation by analyzing changes in the particular wave frequencies during the whole experiment. The dominant wave Beta2 occurs continuously during the experiment, but it is known to accompany intensive mental work. It is connected with high emotional stress, as it is responsible for adrenaline secretion when an organism gets ready to perform an action. It may

also be a symptom of nervous and emotional excitation, fear or anxiety. In this experiment, the presence of this wave seems to be a natural sign of cerebral activity, since each of the computer programs is a new working environment, possibly perceived as a challenge by a user. Getting to know the application without a prior instruction or practice naturally leads to the user's anxiety. Detailed analyses carried out for particular stages of the experiment shed more light on the results (Fig. 5, 6). As can be observed, for instance during the fourth stage of the experiment, the wave Beta1 appears, which indicates engagement in task solving.
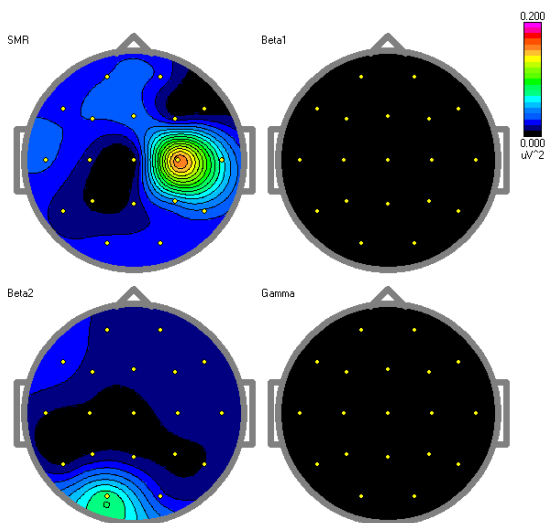

| *Figure 5* **Beginning of Stage IV** | *Figure 6* **End of Stage IV** |
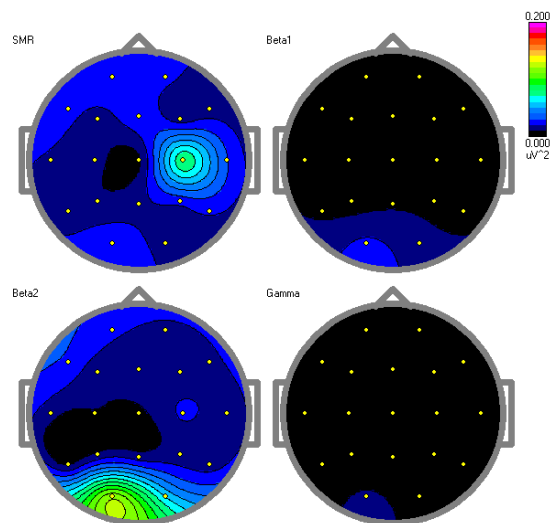
A similar effect was observed during the other stages of the experiment. The wave Beta1 appears with varying intensity, but the differences are not sufficiently significant to support any specific conclusions on effectiveness of a given type of application. Here direct observation provides more accurate additional data. It can be thus stated that non-intuitive graphic interface and using a foreign language are a serious obstacle in using the program. The main problem to be solved is to master the ability to use the software and the working environment can become a discouraging factor for undertaking any further activities. The tests carried out by means of the QEEG technique indicate that simulation software is an environment in which human beings display high-level mental engagement. Even though it was of comparable magnitude at all the stages of the experiment, the reasons behind its occurrence were different. The testees tried to familiarize themselves with new tools as fast as they could, but depending on the software and its interface, the task was more or less demanding, especially at the initial stage of work. The simpler and more intuitive programs, in which the interpretation of graphic and verbal messages was faster, took much less time to master. This is especially

important considering the fact that the classroom time is limited. Computer programs which are very complex or expanded are therefore less useful for didactic purposes, as they extend the time of work spent on a task. They may have advantages from the standpoint of their computational potential, indispensable to perform scientific tasks, but they are not always the optimum choice for teaching. A QEEG can identify not only brainwaves, their amplitude, location and whether these patterns are typical or anomalous, but also coherence (quality of communication between regions), phase (thinking speed), and network integration. The EEG and the derived QEEG information can be interpreted and used by experts as a clinical tool to evaluate brain function, and to track the changes in brain function. Research results indicate complex brain activity during learning. It is an extremely complex and dynamic process, because learning using a computer is associated not only with the continuous observation of the computer screen (simple cognitive processes), but also with constantly complex cognitive processes adequate to the difficulty of solving the task. Therefore, the obtained results are only preliminary research, which in the future will be used for further detailed research. The maximum volume of the article limits precise considerations on a given subject, nevertheless it sets a new direction of research on the use of modern teaching aids in education.

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THE USE OF MODERN INFORMATION TECHNOLOGY IN TEACHING ELECTRONICS

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Abstract. *The paper presents systems created in the software environment are tested in terms of operation and the operating parameters. The testing also includes the faithfulness of representing the actual circuit operation. Students work with these circuits during laboratory classes of Introduction to Electronics. The results of measurements obtained during the classes are compared with the results obtained by students when working with simulated electronic circuits. The results of students' work carried out with the two methods were assessed.*
Keywords: *electronics laboratory didactics, problem task, simulation.*

Introduction

In the course of the development of information technology, new tools have been created to support and model analogue and digital electronic circuits (Ptak, 2014b). The tools are designed to check the correct operation of an electronic circuit at the design stage, when it is possible to control the operation of individual blocks of a circuit and to eliminate any errors and imperfections in advance before the testing of actual electronic circuits begins (Winiecki, 2001; Prauzner, 2012a). In this way, by testing virtual systems it is possible to prevent damaging components of the actual circuit (Migo & Noga, 2015; Ptak & Prauzner, 2013). Besides, functional blocks that have not met the expectations can be redesigned or replaced directly in the software environment (Zloto, Ptak, & Prauzner, 2012; Ptak & Prauzner, 2014a).

To achieve the above-mentioned goals, many software environments are available. One of them is the Multisim software package manufactured by National Instruments company. Using this package, it is possible to design a data flow diagram compatible with the flow of data in actual electronic circuits (Prauzner, 2016; Ptak, 2015). The individual elements of the electronic circuit are depicted by icons representing actual electronic components and devices (Noga, 2009; Depesova, Vargova, & Noga, 2008). By combining these icons

with one another, a data flow sheet is created (Ptak, 2018a). Fig. 1 shows an example of the Multisim software simulation screen. The testing stage begins once the circuit has been created with the appropriate icons and pictograms. At this stage, it is possible to check the functioning of individual components and to implement possible changes (Noga, Piaskowska-Silarska, Depešová, Pytel, & Migo, 2014; Prauzner, 2017).
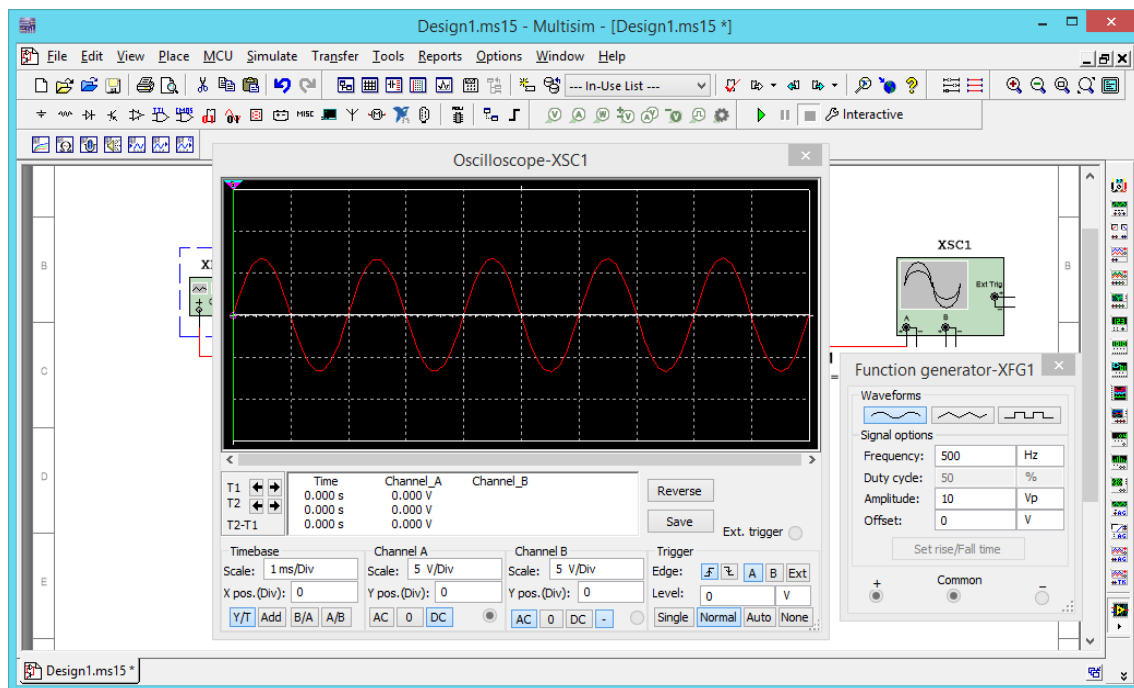
Figure 1 **Simulation screen of an electronic circuit designed in Multisim software**

Real and simulated electronic circuit

Two electronic circuits were designed in Multisim software in order to test a MOS transistor. Figs. 2 and 3 show the diagram of measurement circuits with a transistor, designed in the software.

Once all the necessary modifications and additions were implemented, the circuit was tested in terms of stability of performance of all the designed functions. On the basis of the analysis of the circuit operation, measurement curves showing its functioning and specifications were plotted.
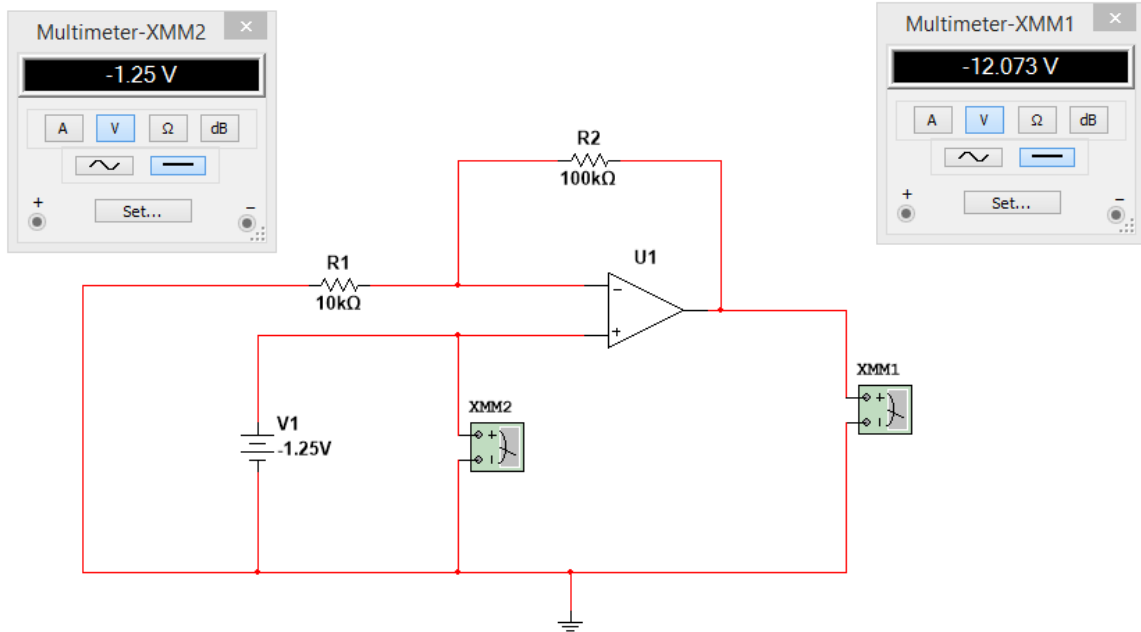
Figure 2 **Diagram presenting the first circuit for testing a MOS transistor designed in Multisim software**
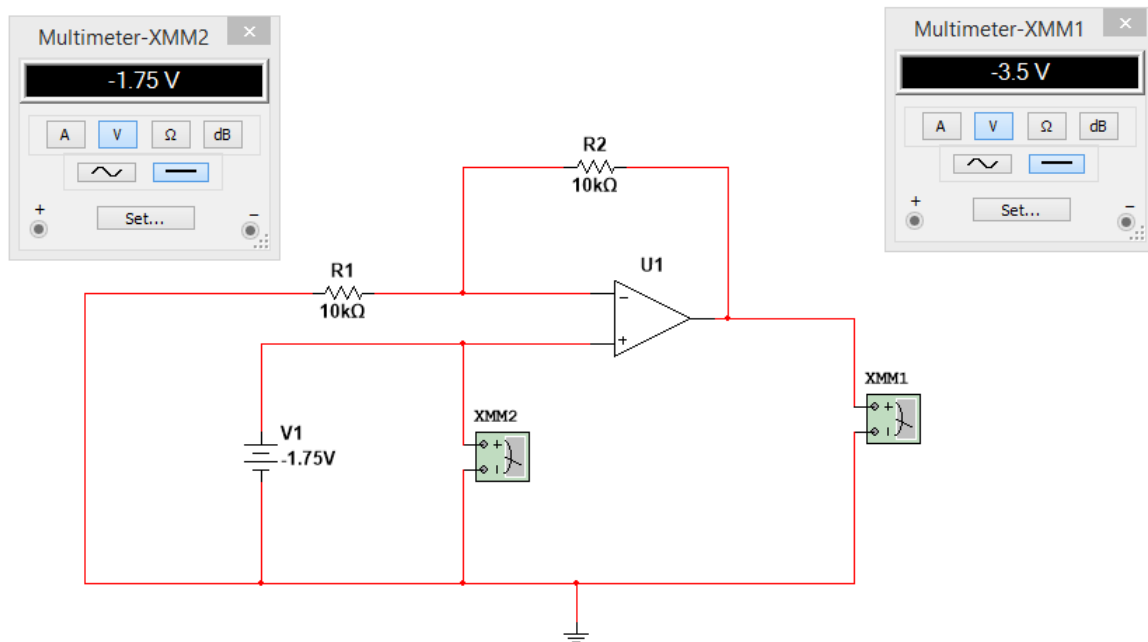
Figure 3 **Diagram presenting the second circuit for testing a MOS transistor designed in Multisim software**

Figs. 4 and 5 present the characteristics of electronic circuits designed in the Multisim software.
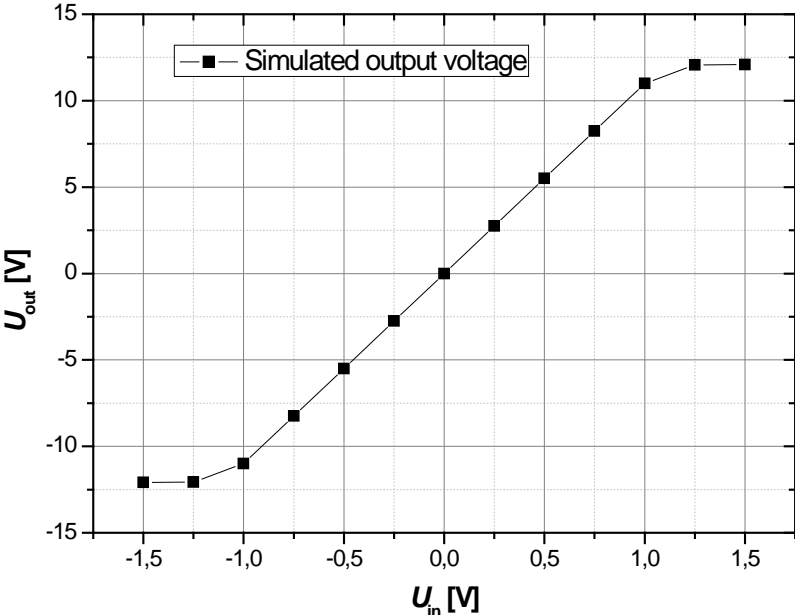
Figure 4 **Characteristics of the first electronic circuits for testing a MOS transistor designed in the Multisim software**
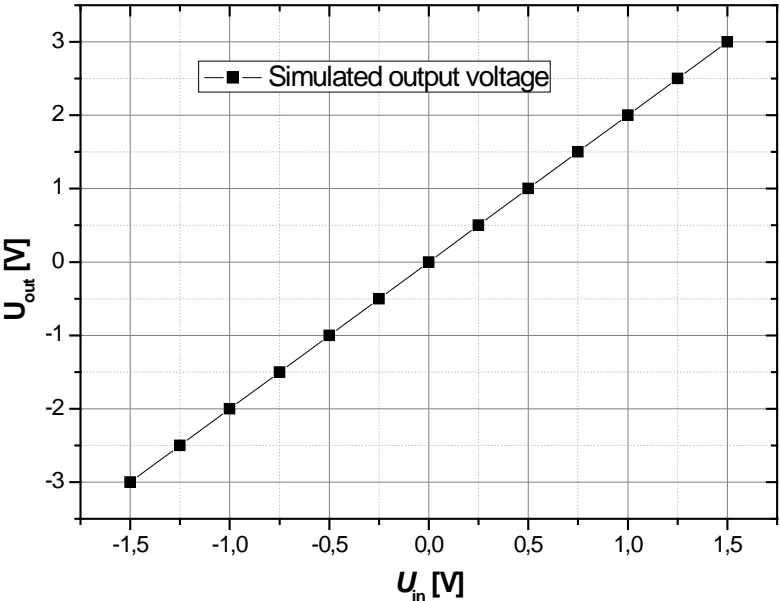
Figure 5 **Characteristics of the second electronic circuit for testing a MOS transistor designed in the Multisim software**

Next, the circuit designed in the software environment was created from real components and its functioning was verified during laboratory classes. Fig. 4 shows a diagram of this electronic circuit. Measurements of its basic parameters and electrical quantities were carried out by means of measuring instruments, recording, displaying and power supplying devices available in the laboratory. The measurement results were then entered into the appropriate

tables on the basis of which the characteristics of the electronic circuit operation were developed, as shown in Figs. 6 and 7.
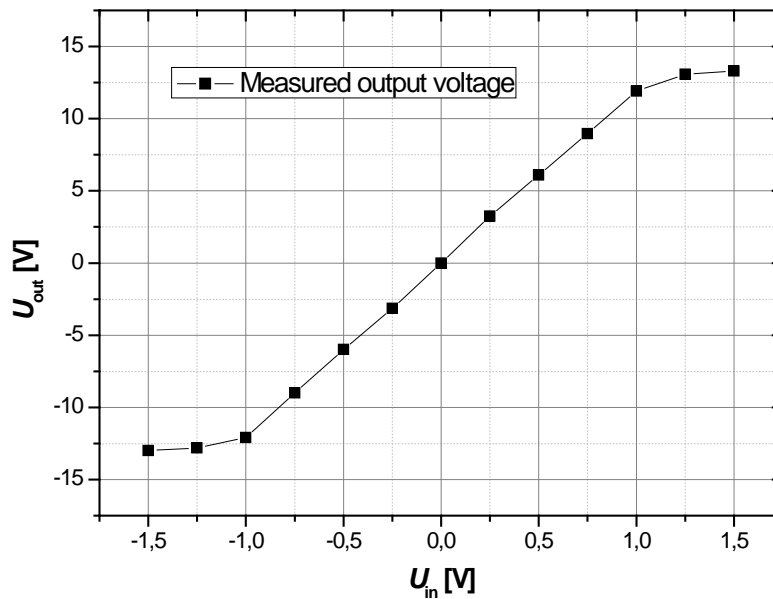
Figure 6 **Characteristics of the first real electronic circuit for testing the MOS transistor**
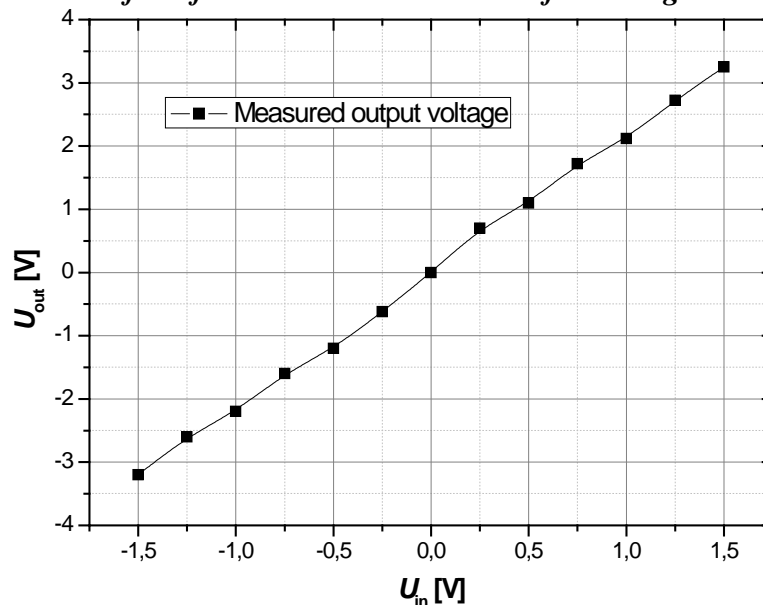
Figure 7 **Characteristics of the second real electronic circuit for testing the MOS transistor**

Figs. 8 and 9 present the characteristics of the circuit simulated in the Multisim software environment together with with the characteristics developed on the basis of the actual laboratory measurements. It can be noticed that the curves are of highly similar shape, being separated from each other by a certain constant value. The distance between the curves may result from measuring errors of measuring devices or inaccurate data readout during lab classes. Besides, errors resulting from the operation of the simulated circuit in the

Multisim software environment can be caused by incorrect or oversimplified simulation rules prescribed in the software settings.
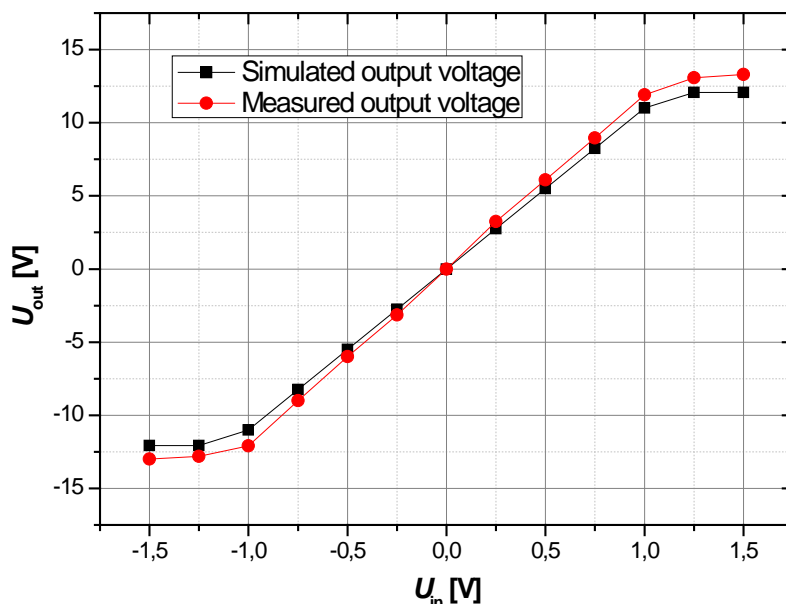
*Figure 8 **Performance characteristics of the real and simulated first circuit for testing the MOS transistor***
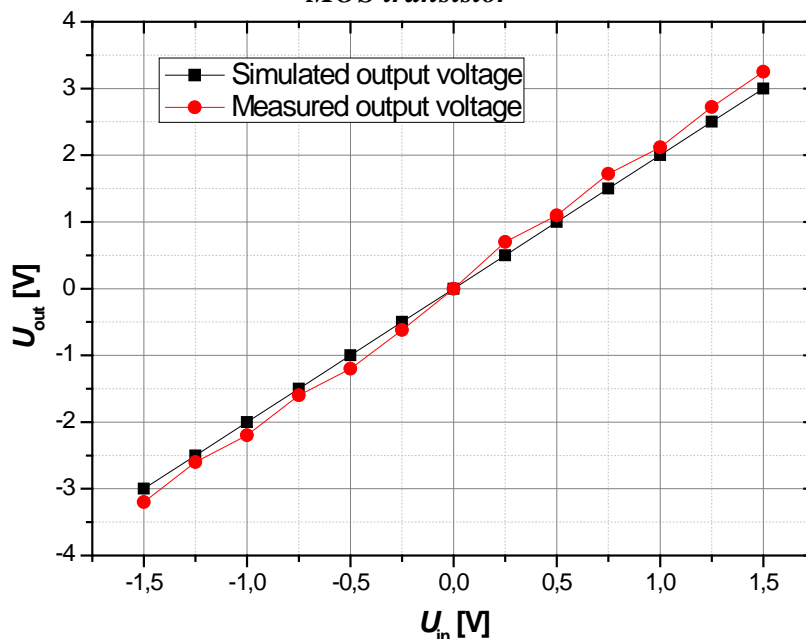
*Figure 9 **Performance characteristics of the real and simulated second circuit for testing the MOS transistor***

All too often, we think of laboratory classes as of tedious work, involving connecting various systems and measuring devices by means of cables. Such tasks are also useful from the didactic viewpoint, by providing students with direct familiarity with devices and enabling them to learn how to use them in

practice. It was observed that the classes with virtual electronic equipment were met with great interest on the part of students, whose involvement grew significantly.

The direction of innovations is clearly indicated by the research on new educational forms. It has to be noted that the role of information technology is not confined to being only a medium of information transmission but it is supposed to provide a means for creating new teaching methods taking into account an individual student's abilities. A well designed lesson should evoke emotions and interest as well as offer a means of experiencing the world. These objectives are difficult to meet with students sitting at desks and studying course books and exercise books. The idea that a lesson should be attractive and offer some relevant experience to a student was known in classical didactics too, but it has become especially important in the light of ICT. The innovations in didactic methods are to be aided by the recent research on the structure and functioning of the brain.

Conclusions

The experiment carried out during the classes indicates that the Multisim software environment is a useful didactic tool:

- It can be used for designing and testing an electronic circuit and it can to some extent replace a real electronic circuit. In this way it is possible to prevent errors, which could otherwise result in costly failures or damages of electronic components.
- The optimal way to make use of the Multisim software is to combine all of the above-mentioned functions. First, an instructor can design and verify an electronic circuit virtually as part of preparation for laboratory classes. After conducting laboratory exercises, the initial circuit simulation in the Multisim software can serve as the baseline for comparing the results obtained in real measurements with the those of a simulated electronic circuit.
- Such a combination of all the functions of the software offers many advantages in teaching electronics and thus makes the teaching process more attractive.

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РАЗВИТИЕ МЕТОДИЧЕСКОЙ КОМПЕТЕНТНОСТИ БУДУЩИХ УЧИТЕЛЕЙ НАЧАЛЬНОЙ ШКОЛЫ ПРИ ИЗУЧЕНИИ ИНТЕГРИРОВАННЫХ КУРСОВ В СЕТЕВЫХ СООБЩЕСТВАХ

The Development of Future Teachers' Methodological Competence in Primary School when Learning Integrated Courses in the Network Communities

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Abstract. *The purpose of the article is to describe a study of the possibilities of network communities for the development of students' methodological competence in studying integrated courses. The article substantiates the advantages of using the integrated approach for the formation future primary school teachers' methodological competence. It's revealed the didactic potential of network communities in the formation and development of students' methodological competence. There are tools and methods that ensure the development of the methodological competence in the integrated courses study. The research allowed establishing the positive impact of the selected methods and tools implementation when studying integrated courses using the network communities to develop students' methodological competence.*
Keywords: *competencies, methodological competence, network communities, students - future teachers, integrative courses.*

Введение
Introduction

Актуальность задачи повышения качества подготовки педагогических кадров для школы определяется требованиями общества к учителю, который будет способен эффективно осуществлять образовательный и воспитательный процесс в современном информационном и поликультурном пространстве.

Стратегия модернизации образования на современном этапе, возможности дистанционное обучение, появление образовательных Web-сайтов, зачастую несущих недостоверную информацию, требуют от педагога владения профессиональными компетенциями в области

использования глобальной сети Интернет и Web-технологий в образовательной деятельности. С этим связана проблема образования в вузе - проблема обновления форм, методов и средств обучения в процессе формирования методической компетентности будущих учителей в условиях сети Интернет. Характерным признаком современной образовательной среды университета является использование глобальных сетевых технологий, обеспечивающих доступ к Интернет-ресурсам с любого устройства; их доступность, определяемая возможностью обратиться к ним в любое время из любой географической точки. Формирование профессиональной компетентности студентов на современном этапе развития интернет-технологий предполагает не только обновление содержания педагогических и методических дисциплин на педагогических направлениях вуза, но и нацеленность на реализацию в образовательной деятельности вуза дидактических возможностей сетевых образовательных сообществ в изучении как методических, так и фундаментальных дисциплин, в частности, математики.

Актуальность обусловливает необходимость теоретического и экспериментального исследования процесса развития методической компетентности будущего педагога в современном информационном пространстве при изучении фундаментальных дисциплин, в частности, математики, с целью определения средств и методов организации образовательной деятельности в условиях сети Интернет.

В данной статье раскрываются некоторые аспекты профессионально ориентированной методики организации деятельности студентов, нацеленной на понимание ими интегративного характера образования, направленной на использование сетевых сообществ при освоении будущими педагогами математического содержания как основы формирования методической компетенции студентов - будущих учителей начальной школы.

Теоретическая основа темы
The theoretical background

Методологической основой исследования являются следующие теоретико-методологические положения:
- компетентностный подход в образовании (Хуторской, 2003);
- концепция фундирования опыта личности педагога Смирнова Е.И. и Шадрикова В.Д. (Смирнов, 2012, 2013; Подготовка учителя математики: инновационные подходы, 2002);

– концепция учебной деятельности в сетевых сообществах при обучении алгебраическим структурам (Концепция учебной деятельности в сетевых сообществах, 2017; Кузнецова, 2015);
– культурологический подход в математической подготовке учителей (Данилюк, 2008; Перминов, 2013; Каплунович, 1999).

Основное положение компетентностного подхода в образовании заключается в признании современного выпускника высшей школы не только как носителя системы фундаментальных знаний и прикладных умений, но, прежде всего, как специалиста, умеющего общаться в информационном и поликультурном мире, решать проблемы социальные и профессиональные (Зимняя, 2003; Хуторской, 2003). В качестве приоритетной составляющей профессиональной компетентности будущего учителя мы считаем его методическую компетентность.

В рамках проблематики исследования под методической компетентностью будущего педагога будем понимать «интегративную многоуровневую профессионально значимую характеристику его личности, выражающуюся в наличии ценностного отношения к педагогической профессии, профессиональных знаний и умений, взятых в единстве» (Сясина, 2005). Следует подчеркнуть, что методическая компетентность специалиста предполагает желание и готовность педагога использовать свои знания, умения, личностные качества для творческой самореализации в учебно-методической деятельности, творческое использование педагогом всей совокупности приемов и методов организации познавательной деятельности школьников.

В педагогических исследованиях методическая подготовка учителя анализируется в основном с позиции деятельностного подхода, что приводит к тому, что процесс формирования методической компетентности нередко сводится к освоению структуры педагогической деятельности, к формированию методических умений.

В условиях современного информационного и поликультурного пространства для формирования методической компетентности будущего учителя недостаточно лишь овладение студентами приемами, методами и формами педагогической деятельности, содержанием будущего преподаваемого предмета. Для перехода от репродуктивной модели обучения к модели, способствующей знакомству с новой информацией и формированию творческого подхода в работе с ней, наполнение форм методической деятельности новым, профессионально и личностно значимым содержанием приоритетна идея интеграции предметной, профессионально-педагогической и культурологической составляющих с использованием образовательных преимуществ сетевых сообществ и сети Интернет.

Позицию в организации процесса формирования методической компетенции будущего учителя при изучении математического содержания представим следующими положениями.

1. Интеграция содержания педагогических дисциплин, дисциплин предметной и общекультурной подготовки в целях осуществления образовательной деятельности по обнаружению ценностных аспектов учебного знания и информации, обеспечению его понимания и переживания обучающимися, использованию ценностных аспектов в проектировании и создании учебных ситуаций, развивающих эмоционально-ценностную сферу ученика. В свете концепции фундирования влияние гуманитарных наук и математики на формирование методической компетентности будущего педагога будет более интенсивным, если процесс освоения соответствующего предметного (математического) содержания будет взаимоувязан на уровне диалога культур.

2. Создание условий в ходе изучения математического содержания для углубления и расширения школьных знаний с целью формирования у студентов методических умений. В соответствии с концепцией фундирования, изучение предметного математического содержания в вузе должно быть направлено на систематизацию, обобщение школьных знаний и включение их в структуру профессиональной деятельности будущего учителя начальной школы (Смирнов, 2013).

3. Приоритет продуктивной учебной деятельности будущего педагога, предоставление условий для развития творческих способностей студентов в процессе обучения, для индивидуального осмысления всей совокупности предметных, психолого-педагогических знаний при решении конкретных методических задач.

4. Формирование сетевой культуры студента – будущего учителя как важного компонента методической подготовки педагога в современном вузе.

Под сетевой культурой педагога понимается интегративное качество личности, органично сочетающее общую культуру работы с информацией и умение использовать Web-технологии для создания образовательной среды, сетевого образовательного сообщества и проявляющееся в диалоговом взаимодействии со всеми участниками образовательного процесса (Зыкова & Кузнецова, 2017). Сетевая культура педагога предполагает оптимальную формулировку информационного запроса, выбор корректного списка информационных ресурсов по заданной тематике, адекватную оценку достоверности найденной информации, умение выбирать необходимые источники информации, работать с ней для достижения поставленных ранее учебных задач.

5. Самостоятельность студентов в формировании и реализации своей образовательной траектории на основе сетевого образовательного сообщества, которое предоставляет обучающимся интерактивный доступ к общим информационным ресурсам, возможность совместной продуктивной деятельности и неформального общения, формирования личной позиции обучающегося.

Методы и организация исследования
Methodology and organization of the research

Проведенное исследование включало
- поисковый этап, цель которого – выявление проблем в формировании методической компетентности студентов – будущих учителей начальной школы при работе с математическим содержанием; определение условий и средств формирования методических компетенций у студентов педагогических направлений вуза;
- формирующий этап, цель которого – формирование у студентов методических компетенций при изучении ими математического материала.

Базой исследования являлись студенты 1 и 4 курсов факультета образовательных технологий и дизайна Псковского государственного университета, изучающие курс «Теоретические основы и технология начального математического образования» (43 человека), «Математика и архитектура» (36 человек). Исследование проводилось с использованием таких методов как
- анализ студенческих работ (моделирование образовательной деятельности младших школьников при изучении математики) с целью определения затруднений методического характера выпускников – будущих учителей начальной школы при работе с математическим содержанием;
- теоретический анализ научно-методической литературы с целью выделения перечня методических компетенций, которые могут быть сформированы при изучении математического содержания на 1 курсе вуза; определения условий, средств формирования у студентов методических компетенций;
- эксперимент, направленный на формирование методической компетентности студентов при изучении ими математических дисциплин;

– технология ассессмент-центр для диагностики сформированности методических компетенций у студентов.

Анализ практики подготовки учителей на педагогических факультетах Псковского государственного университета свидетельствует, что предметная (математическая, направленная на формирование предметных знаний и умений) и методическая (формирование профессиональных умений моделировать процесс обучения математике) составляющие профессиональной подготовки будущего учителя разделены во времени, преподавание этих дисциплин осуществляется разными преподавателями, которые предпочитают не «вмешиваться» в профессиональную деятельность своего коллеги.

С целью выявления проблем в формировании методических компетенций студентов – будущих учителей начальной школы использовался метод регистрации при анализе работ выпускников факультета образовательных технологий и дизайна направления «Начальное образование» (2014, 2015гг, 43 студента). Для анализа сформированности методических компетенций студентам в конце изучения курса «Теоретические основы и технологии начального математического образования» было предложено отобрать содержание и разработать конспект интегрированного урока по одной из тем курса математики начальной школы. Оценивались мобильность, сознательность и действенность методических знаний и умений студентов. Сформированность методических компетенций оценивалась по следующим критериям: способность студентов отобрать математическое содержание для моделирования интегрированного урока с учетом возрастных и интеллектуальных особенностей школьников; способность отобрать факты, примеры из других учебных областей для иллюстрации математических понятий младшим школьникам; обоснованность необходимости и целесообразности использования отобранного учебного материала; способность находить информацию на различных образовательных сайтах сети Интернет, учитывая ее достоверность; степень участия студента в обсуждениях и планировании работы группы; сформированность математической речи; умение грамотно, логично и наглядно презентовать свой урок.

Проведенный анализ результатов моделирования студентами образовательной деятельности по изучению математического содержания с учащимися начальной школы позволил выявить основные затруднения методического характера выпускников: неумение отбирать дополнительный материал для интегрированных уроков математики; конструировать задания для формирования предметных знаний и умений младших

школьников с использованием фактов различных учебных дисциплин в соответствии с заданной целью обучения; устанавливать межпредметные связи математики с другими науками и связь между отдельными разделами математики; организовывать продуктивную, творческую учебную деятельность младших школьников при изучении математического содержания. Для отбора содержания образовательной деятельности школьников студенты предпочитают использовать только хорошо знакомые сайты, содержащие рефераты, курсовые, дипломные работы, готовые конспекты уроков, не оценивая их достоверность, корректность представленной на сайте информации. На данном этапе, исходя из выявленных у студентов затруднений методического характера, был выделен перечень компетенций, которые могут быть сформированы при изучении математического содержания на 1 курсе вуза - организационные (умение работать в коллективе), информационные (умение отобрать, оценить достоверность найденной информации, составить список используемых Интернет – источников, способность работать с информацией в компьютерных сетях), коммуникативные (умение строить высказывания на родном и математическом языке, конструировать задания с учетом возрастных особенностей слушателей, умение комментировать сообщения студентов).

Базой исследования процесса формирования методической компетентности студентов – будущих учителей при изучении математического содержания являлись студенты 1 курса факультета образовательных технологий и дизайна Псковского государственного университета, направление «Начальное образование». Исследование проводится с 2016 года, всего 36 студентов.

В соответствии с концепцией фундирования опыта студентов как основы формирования методической компетентности будущего учителя был проведен анализ содержания базового школьного и вузовского курса математики и выявлена преемственность изучения геометрического материала школа-вуз.

В целях реализации сформулированных положений развития методической компетентности будущих учителей при изучении математического содержания было разработано содержание и методическая составляющая интегрированного курса «Математика и архитектура» и проведена его апробация.

Изучение данной дисциплины кроме задач обобщения и расширения представлений студентов о геометрических объектах и о симметрии в математике; расширения представления о сферах применения математики (на примерах проникновения симметрии и золотой пропорции в искусство, в частности, в архитектуру); усиления прикладной, практической

направленности содержания подготовки будущего учителя к педагогической деятельности; расширения общекультурного кругозора студентов посредством знакомства их с лучшими образцами искусства, в частности, с шедеврами древнерусского зодчества, расположенными в современном Пскове, имеет цель формирования методической компетентности студентов- будущих учителей начальной школы.

Для реализации дисциплины в рамках исследования используется сетевое сообщество студентов – будущих учителей начальной школы, которое выполняет не только обучающую роль, предоставляя студентам интерактивный допуск к обучающим текстам, но и служит средством коммуникации по обмену знаниями, опытом, идеями, дает возможность неформального обсуждения представляемой информации.

В качестве средства формирования методической компетентности будущего учителя особое место в данном курсе занимают учебные задачи методического характера: 1) работа с практико-ориентированными кейсами в сетевых сообществах; 2) разработка сетевых проектов, веб-квестов по изучению геометрических понятий в начальной школе с использованием сведений об архитектуре Пскова; 3) составление веб-конспекта по предметному содержанию курса; 4) составление глоссария основных математических и архитектурных понятий; создание фотоколлекций; 5) составление аннотированного списка Web-ресурсов по предлагаемой проблеме; 6) моделирование образовательной деятельности школьников по изучению геометрических понятий с использованием Web-ресурсов с последующем обсуждением в сетевом сообществе.

Содержательной составляющей курса «Математика и архитектура» стали кейсы по систематизации и обобщению геометрического содержания школьного курса математики. Кейс представлен в данном междисциплинарном курсе совокупностью компетентностно-ориентированных учебно-методических материалов для самостоятельной работы студентов и вопросами, заданиями по тексту кейса. Каждая математическая тема в отдельном кейс-проспекте связана с особенностями архитектуры Пскова (Сергеева & Крылова, 2014).

Кейсы выкладывались для работы над ними на страницу сетевого сообщества, что давало возможность студентам самостоятельно организовывать свою познавательную деятельность в удобное для них время, неформально общаться в комментариях. Практическую часть кейса составляли разработки макетов башен Псковского Кремля, чертежей фасадов средневековых палат Пскова (по реконструкции Ю.П. Спегальского), создание фотоколлекций. Результаты выполнения практических работ также были доступны на сайте для обсуждения студентам.

Основной методической составляющей курса стали учебные сетевые проекты студентов. Учебный сетевой проект предполагает совместную деятельность студентов и преподавателя в сети Интернет, направленную на решение конкретной проблемы или практико-ориентированной задачи, содержание которых нацелено на творческую самореализацию студентов. Проекты в данном учебном курсе связаны с разработкой реальных и виртуальных экскурсий по Пскову, с моделированием внеклассных занятий, интегрированных уроков для младших школьников, альманахов, устных журналов, носящих междисциплинарный характер. Выполнение такого рода проектов показывает практическую значимость и возможность использования математического содержания в воспитании у учащихся личностных качеств и метапредметных умений.

Рассмотрим пример сетевого проекта, предлагаемого в виде web квеста «Симметрия на страницах учебника и на улицах города».

Цель проекта: изучить математическое содержание темы, показать студентам творческий процесс создания урока (занятия кружка, тема-тического вечера), отвечающего современным требованиям достижения младшими школьниками предметных, личностных и метапредметных результатов обучения. В рамках веб-квеста студентам предлагается взглянуть на культуру Пскова с позиции учителя начальных классов, выявить гуманитарные аспекты обучения младших школьников, использовать полученную информацию для разработки нестандартных уроков и внеклассных мероприятий, развивающих эмоционально-ценностную сферу ученика.

Проект состоит из трех этапов. На первом этапе студенты выбирают себе роли, изучают возможные интернет – ресурсы. В отличие от образовательного web квеста, в котором преподаватель предоставляет обучающимся список Интернет-ресурсов, в данном проекте с целью формирования сетевой культуры будущих учителей студентам предлагалось самостоятельно составить и скорректировать списки информационных сайтов по выбранной тематике, провести адекватную оценку достоверности найденной информации, выбрать необходимые источники информации, найти ответы на поставленные вопросы. Кроме того, оценивают и комментируют выполнение заданий сами студенты.

Роли участников (Сергеева, 2018).

Теоретик - выделяет математические основы симметрии. Результат работы – «Научный трактат».

Практик – разрабатывает задания для студентов по теме «Виды симметрии». Результат работы – «Цепочка квестов для студентов».

Методист – анализирует содержание темы «Виды симметрии» по разным программам обучения в начальной школе, в 5-6 классах. Результат работы – презентация.

Архитекторы - анализируют проявление симметрии в архитектуре (церковной, гражданской) Пскова соответствующей эпохи, знакомятся с работами реставраторов, архитекторов, составляют словарик архитектурных терминов, иллюстрируют его примерами псковской архитектуры. Результат работы — словарик архитектурных терминов.

Картографы - отмечают на карте объекты – церкви, гимназии, доходные дома и т.д., с их кратким описанием. Результат работы – интерактивная карта по теме проекта.

Архивариусы – работают с архивными материалами, документами, доступными в сети Интернет. Результат работы – краткая историческая справка по выбранным архитектурным объектам.

Краеведы - подбирают материал о наиболее интересных событиях, историях и легендах, связанных с рассматриваемым архитектурными объектами, находят фотографии или видеоматериалы.

Лирики - приводят цитаты из художественных произведений об архитектурных объектах Пскова.

Фотографы - создают фотогалерею по теме проекта (Псков на старых открытках – современные фотографии Пскова).

Художники – составляют галерею репродукций картин художников по теме проекта.

Литераторы – создают зарисовку в стиле фэнтези (альтернативная история) о пребывании в Пскове соответствующей эпохи, в которой описываются выбранные архитектурные объекты.

Творец – создает кроссворд и викторину для младших школьников (студентов) на тему «Симметрия в архитектуре». Результат работы – газета.

Сказочник – сочиняет сказку «Симметрия» и оформляет ее иллюстрациями. Результат работы – театральная постановка.

Выполнение предлагаемых ролей студентами невозможно без обсуждения ими стратегии своей работы и, в частности, выбора тех архитектурных объектов, которые станут основой для поисковой деятельности всех обучающихся.

Работы студентов в рамках своей роли выставляются для изучения и дальнейшего использования на следующих этапах всеми участниками квеста.

Второй этап проекта предполагает выполнение студентам домашних заданий по разделу «Симметрия. Виды симметрии» с использованием цепочки квестов, разработанных Практиком, с премодерацией задач преподавателем.

Третий этап организуется на практических занятиях, проводимых в форме анализа конкретных педагогических ситуаций: используя информацию, полученную на первом этапе проекта всеми студентами группы, необходимо разработать сценарий урока обобщения и систематизации знаний по теме «Симметрия. Виды симметрии» (внеклассного мероприятия, заседания кружка), виртуальную или реальную экскурсию для младших школьников.

Результаты исследования
Results of the research

Диагностика сформированности методических компетенций студентов (организационных, информационных, коммуникативных) осуществлялась на третьем этапе организации сетевого проекта с применением технологии ассессмент-центр (Assessment Centre), которая предполагает наблюдение экспертов, в данном случае – студентов выпускного курса, преподавателя, за организацией деятельности испытуемых при выполнении ими заданий.

Для исследуемых компетенций были определены критерии сформированности по трём уровням: высокий, средней, удовлетворительный. Например, для информационных компетенций были описаны критерии высокого уровня сформированности – используется информация из различных источников, оценивается достоверность информации, указывается источник информации, информация структурирована, используется достаточный иллюстративный материал. Средний уровень – выполняется 3-4 критерия, удовлетворительный уровень – 2 критерия. Для организационных компетенций критерии высокого уровня – спланированы совместные действия в группе, распределены роли, при выполнении работы студенты взаимодействуют в группе, студенты несут ответственность за результат совместной работы. По окончании работы студенты представляли результаты своей деятельности – презентовали сценарии уроков или внеклассных занятий, экскурсии для младших школьников, которые также оценивались экспертами.

С точки зрения экспертов, выделенные методические компетенции в основном сформированы у первокурсников на удовлетворительном и среднем уровнях. Выводы экспертов говорят о том, что успешнее всего сформированы у студентов информационные компетенции - средний уровень - 77,8% студентов, высокий уровень - 22,2% студентов. В качестве замечаний эксперты называли недостаточное количество источников при выполнении задания (один – два источника), не всегда студенты оценивали достоверность найденной информации. По данным экспертов организационные компетентности сформированы у студентов в основном

на среднем уровне – 83,3% студентов, 16,7% студентов – на низком уровне. Данные результаты можно объяснить несформированным в достаточной мере коллективом группы (1 курс), наличием в группе иностранных студентов, которые держатся изолированно. Менее успешно сформированы коммуникативные компетенции – низкий уровень сформированности компетенций – 36,1% студентов, 63,9% - средний уровень сформированности компетенций. Причина этого озвучена самими студентами - ограничение времени «живого» общения участниками образовательного процесса, отсутствие на 1 курсе дисциплин методического цикла и, как следствие, несформированность «методической» речи, необходимой для разработки конспекта урока и грамотной формулировки заданий учащимся.

Обобщение
Conclusions

Результаты проведенного исследования показали положительное влияние на формирование методической компетентности студентов-будущих учителей начальной школы сетевых сообществ при изучении интегрированных курсов. При организации лекционных и практических занятий по дисциплине «Математика и архитектура» акцентировалось внимание студентов на интеграцию содержания педагогических дисциплин, дисциплин предметной и общекультурной подготовки; математическое содержание включалось в структуру профессиональной деятельности будущего учителя; предоставлялись условия для развития творческих способностей студентов в процессе обучения и реализации студентами своей образовательной траектории на основе сетевого образовательного сообщества.

Проведенное эмпирическое исследование на лекционных и практических занятиях по курсу «Математика и архитектура» позволило сделать выводы о том, что проводимая со студентами работа способствовала формированию у студентов – будущих учителей методических компетенций, связанных с анализом, обработкой и отбором информации для уроков математики; с использованием образовательной среды при формировании предметных знаний и умений младших школьников, с коммуникацией на родном языке, способствовала формированию организационных умений будущих учителей.

На основании результатов исследования выявилась необходимость более целенаправленного развития коммуникативных компетенций студентов, в частности, развития их математической и методической речи на занятиях по курсу «Математические основы профессиональной подготовки педагога».

Выводы по итогам исследования дают основание говорить о целесообразности формирования методической компетентности студентов – будущих учителей начальной школы при изучении интегрированных курсов с использованием сетевых сообществ.

Summary

The modernization education strategy in the modern information and multicultural space conditions requires the new approaches to the process of forming the methodological competencies' future teachers students.

The theoretical understanding of the psychological, pedagogical and scientific and methodological literature allowed us to formulate our position in the process organization forming the future primary school teacher's methodological competence when studying the mathematical content.

– The integration of the pedagogical disciplines, disciplines of subject and general cultural training content in order to achieve students' understanding of the integrative nature of education.

– The orientation on the systematization, school knowledge synthesis and inclusion in the professional activities structure of the future teacher in the mathematical content study.

– The priority of the future teacher's productive educational activities, providing conditions for the development of students' creative abilities in the learning process.

– The formation of the student network culture as an important component of the teachers methodological training in the modern university.

– The students' independence in the educational trajectory formation and implementation based on the network educational community.

The conducted empirical research at the lectures and practical classes on the course "Mathematics and Architecture" on the implementation of these provisions allowed us to draw the following conclusions.

1. The work carried out with the students contributed to the future teachers' formation of the methodological recommendations related to the analysis, processing and selection of the information for the integrated mathematics lessons; using the educational environment in the formation of the subject knowledge and skills of primary pupils, communication in their native language, the organizational skills.

2. The implementation of the methodology contributed to the more successful formation of the future teachers' network culture.

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УСЛОВИЯ ФОРМИРОВАНИЯ ТВОРЧЕСКОЙ АКТИВНОСТИ СТУДЕНТОВ СРЕДСТВАМИ ИНФОРМАЦИОННО–КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ

Conditions of Formation of Creative Activity of Students by Means of Information – Communication Technologies

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Abstract. *The article deals with the problem of formation of creative activity among students in the process of using information and communication technologies (ICT) in the educational process of a higher educational establishment: features, prospects and conditions for effective formation of creative activity. The article describes an empirical study of the current level of formation of students' creative activity, gives examples of creative tasks developed by using ICT and recommendations for optimizing of the process of forming students' creative activity by means of ICT tools.*
Keywords: *creative activity of students, information and communication technologies.*

Введение
Introduction

Образовательная политика Российской Федерации: реализация компетентностного подхода, содержание Профессиональных стандартов, переход на ФГОС ВО 3++ (www.fgosvo.ru), – обусловливают необходимость нового подхода к организации обучения в системе высшего образования. Преподаватель высшей школы должен выполнять не только функцию модератора, фасилитатора, транслятора научных знаний, но и использовать современные образовательные технологии, направленные на создание

творческой атмосферы образовательного процесса. Согласно требованиям компетентностного подхода, основой учения в вузе является активная познавательная деятельность самого студента, приводящая к формированию умений нестандартно мыслить, инициировать способы познания, используя приобретаемые в ходе обучения компетенции (Активные и интерактивные образовательные технологии (формы проведения занятий) в высшей школе: учебное пособие, 2013).

Особенности проявления и условия формирования творческой активности личности являются актуальным предметом научных исследований (Балобанова, 1999; Мартинович, 2005; Черниковская, 2015). При этом многие исследователи в своих трудах указывают на такие элементы проявления творческой активности, как потребность (интерес, склонность) к преобразующей деятельности, готовность к поиску рациональных путей решения нестандартных задач, что предполагает наличие определенного уровня самостоятельности, аналитических умений, целеполагания, дивергентного мышления. Как отмечает М. В. Черниковская (Черниковская, 2015), при несомненной значимости исследований, проводимых в данном направлении, до сих пор не решена проблема разработки условий формирования творческой активности личности в системе личностно–ориентированного подхода.

Модернизация образования ориентирует на исследования, которые направлены на совершенствование педагогического процесса средствами ИКТ, на формирование информационной культуры субъектов образования, на применение ИКТ в творческой деятельности обучающихся через различные формы и методы организации учебной деятельности, например, проектную деятельность, систему творческих заданий (Дендев Б., 2013; Канянина Т.И., 2005; Полат, Бухаркина, Моисеева, & Петров, 2008; Петров & Сабитова, 2015). Однако следует подчеркнуть, что недостаточно научных исследований, посвященных организации творческой деятельности студентов с применением ИКТ с учетом направления и профиля обучения. В связи с этим, в исследование было введено ограничение, обусловленное спецификой содержания обучения по направлениям «Педагогическое образование» (профилю «Технология»), «Конструирование изделий легкой промышленности» (профилю «Конструирование швейных изделий»), «Дизайн».

Преподавание ИКТ, согласно учебному плану указанных профилей, сводится, как правило, к обучению пользованию программой: Auto CAD, Компас, САПР Грация, Corel Draw, Adobe Photoshop. Такой подход не развивает творческую активность, а зачастую имеет обратный эффект, так как в основе лежит репродуктивный метод обучения.

Таким образом, целью проводимого исследования является теоретическое обоснование и практическая апробация организационно–педагогических условий формирования у студентов творческой активности в процессе использования в образовательном процессе вуза ИКТ.

Теоретическая основа темы
The theoretical background

Информационно–коммуникационных технологии – это программные, программно–аппаратные и технические средства и устройства, функционирующие на базе средств микропроцессорной вычислительной техники, а также современных средств и систем транслирования информации, информационного обмена, обеспечивающие операции по сбору, накоплению, хранению, передаче, использованию информации, возможность доступа к информационным ресурсам компьютерных сетей, в том числе и глобальных (Роберт, Панюкова, Кузнецов, & Кравцова, 2008).

Использование ИКТ в процессе подготовки бакалавров и магистров по педагогическим направлениям рассмотрено в трудах М.П. Лапчика (Лапчик, 2012), Т.А. Лавиной (Лавина, 2012) и др. Организация учебной деятельности с использованием средств ИКТ в образовательном процессе стала предметом исследования П.К. Петрова, Н.Г. Сабитовой (Петров & Сабитова, 2015), Е.С. Полат (Полат, Бухаркина, Моисеева, & Петров, 2008). Структура творческой активности личности (Рис. 1), анализ идей педагогической инженерии (Зинченко, 1997; Чошанов, 2015), педагогической практики и концепции Т.И. Дмитриенко (Дмитриенко, 2006), Е.Р. Стаценко (Стаценко, 2016) позволили подойти с позиций системного подхода к организации творческой деятельности студентов средствами ИКТ.

*Рисунок 1. **Модель структуры творческой активности личности***
*Figure 1 **Model of structure of creative activity of the person***

Эффективность процесса формирования творческой активности будет обеспечиваться интеграцией ресурсов ИКТ и активных форм и методов обучения: ТРИЗ–технологий, проблемных ситуаций, кейс–технологии, игровым проектированием, webquest–технологий, арт–технологий (креативными техниками), – и многими другими инновационным и привлекательными для обучающихся технологиями, так как именно они развивают базовые компетентности и профессиональные метапредметные умения и качества будущего специалиста (Активные и интерактивные образовательные технологии (формы проведения занятий) в высшей школе: учебное пособие / сост. Т.Г. Мухина, 2013; Грибан, 2014). В частности, в швейной промышленности появились множественные системы автоматизированного проектирования, благодаря которым можно быстро создавать, проектировать, редактировать изделия легкой промышленности.

Как показывает образовательная практика, студенты хотели бы иметь возможность изучать учебные материалы на одном ресурсе, выполнять учебные задания online, имея к ним доступ в любое время, используя для этого девайсы. При этом выбор преподавателем метода или формы обучения необходимо осуществлять с учетом особенностей содержания предмета, требований к методике преподавания дисциплины, специфики ее освоения. Также на выбор педагогической стратегии, направленной на формирование творческой активности, влияет время, выделенное на изучение дисциплины, уровень подготовленности студентов, техническое оснащение образовательного процесса (Петрова & Петров, 2007).

Очевидно, что, если создать определенные организационно–педагогические условия учебной деятельности студентов, их творческая активность повысится. По мнению авторов, это следующие условия:

1. Использование в образовательном процессе заданий, направленных на индивидуализацию процесса обучения выражается в предоставлении студенту возможности создавать собственный творческий продукт: разработка базовых конструкций одежды на свой размер, конструирование эскизов одежды с индивидуально выбранной комбинацией элементов, наличие возможности формирования личного взгляда для оригинального дизайнерского решения при создании интерьера. «В данном смысле творческая активность выступает как свойство личности, в котором проявляется индивидуальность студента и которое всегда связано со склонностями, интересами и определяется потребностями обучаемого в том или ином виде деятельности» (Строков, 2010, 69). При реализации данного условия развиваются такие компоненты творческой активности, как дивергентное мышление, инициативность.

2. Реализация принципа «антиципации искомого» (О. Зельц (Зельц, 2008); Т.С. Анисимова, А.А. Маслак, М.А. Лукьяненко (Анисимова,

Маслак, & Лукьяненко, 2016): в процессе организации системного освоения ИКТ студенты применяют освоенные компетенции, позволяющие им успешно осваивать новые программные среды в учебной и самостоятельной творческой деятельности в рамках целостного педагогического процесса «школа→вуз (1 курс→2 курс→3, 4 курс)».

Выполнение разнообразных творческих работ может выражаться в создании виртуальных статических и динамических моделей средствами графических пакетов (Adobe Photoshop, Adobe Light Wafe, Adobe Illustrator, Paint, Corel Draw, Auto CAD, "Компас"); в построении моделей объектов и явлений (Microsoft Excel, Visual Basic, Delphi); в создании творческих работ с использованием различных средств представления информации: текст, графика, коллаж, анимация, звук, видео (Microsoft Power Point, HTML, Web–редакторы); в моделировании макета издания (газеты, буклета) на основе текстовых процессоров (Microsoft Word, Microsoft Publisher, Page Marker). На базе знаний выше указанных программ студенты могут осваивать САПР Грация, Comtense, Corel Drow, PE–Design.

3. Использование идей интегративного подхода в освоении содержания учебного предмета, обеспечивающих междисциплинарные связи, что позволяет рассматривать процессы и явления с разных точек зрения, видеть их взаимосвязь. Данное условие направлено на развитие познавательного интереса студентов, на актуализацию желания активно и самостоятельно изучать и использовать новую информацию, что, в свою очередь, подтверждается выводами Е.Р. Стаценко (Стаценко, 2016, 196).

4. Соотнесение качества творческой деятельности, выраженное в продуктах деятельности обучающихся, с уровнем сформированности базовых подструктур личности: мотивационными установками (интересом к деятельности), имеющимися знаниями и умениями (в том числе, аналитическими), готовностью к взаимодействию в деятельности. Данное условие не противоречит выводам Т.И. Каняниной (Канянина, 2005), которая считает, что мотивационные установки влияют на усвоение базы знаний, умений и на формирование опыта творческой деятельности обучающихся; благодаря развитию когнитивного компонента, студенты получают возможность работать с разными видами информации, обеспечивая тем самым свободу выбора содержания и информационных средств; деятельностный и коммуникативный компоненты выражают качество умений работы на компьютере, являются показателями стремления обучающихся к конструктивному взаимодействию.

Методы, организация и результаты исследования
Methods, organization and results of the research

Для экспериментального обоснования цели исследования проводился анализ учебных планов, анализ продуктов деятельности обучающихся использовался метод проблемных ситуаций и проводились методики: тест «Диагностика уровня творческой активности учащихся» (авторы – М.И. Рожков, Ю.С. Тюнников, Б.С. Алишеев, Л.А. Волович), тренировочные тестовые задания из сборника ЕГЭ (2008) по теме «Технология обработки информации в электронных таблицах и технология хранения, поиска и сортировки информации в базах данных».

Эмпирическая часть исследования выполнялась в рамках бакалаврской научной работы (Иванова, 2017). В пилотажном экспериментальном исследовании приняли участие студенты I – IV курсов.

Анализ учебных планов программ (2013–2018 гг.), реализуемых на кафедре дизайна и обработки материалов, показал, что с каждым годом количество дисциплин, включающих ИКТ, увеличивается (Рис. 2). Результаты эксперимента свидетельствуют о том, что остаточные знания школьной программы в области информатики у испытуемых I курса выше, чем знания студентов старших курсов. Это указывает на необходимость использования заданий для закрепления знаний школьного курса.

Диагностика творческой активности студентов на констатирующем этапе эксперимента показала преобладание среднего уровня показателей, при этом факторами, сдерживающими проявление творческой активности, являлись: шаблонное мышление, недостаток знаний в области ИКТ, непонимание сути задания, отсутствие опыта работы в команде.
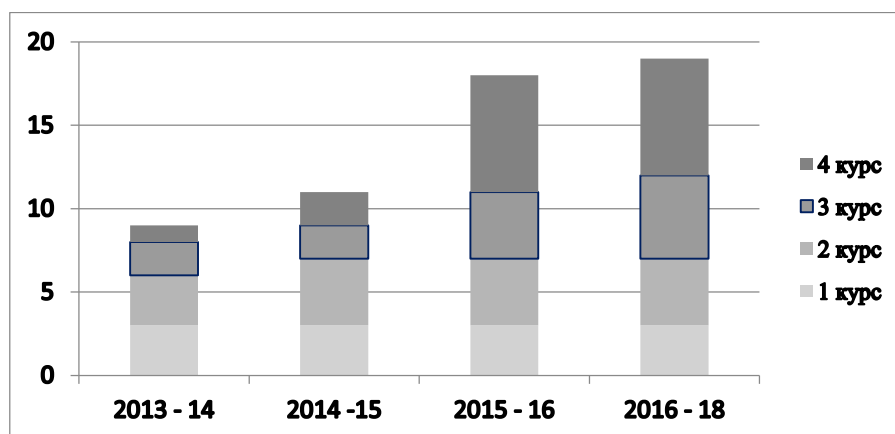

*Рисунок 2. **Изменение количества предметов, использующих ИКТ с 2013 по 2018 гг.***
*Figure 2 **Change in the number of subjects using information and communication technology from 2013 to 2018***

В рамках дисциплины «Графические редакторы в швейной промышленности» были созданы организационно–педагогические условия для актуализации студентами своего творческого потенциала:

1. Задания для изучения работы в программах Photoshop, Corel draw, Pe–design. Pe–designe: 1) разработать вышивку с использованием кнопки автовышивка – найти ряд проблем в разработке дизайна при таком способе; 2) разработать рельефную вышивку – эффект дерево, шерсть, кирпичный домик (программирующее застилание); 3) разработать кружевную вышивку; 4) разработать вышивку–аппликацию; 5) сделать дизайн вышивки фотопортрета; 6) разработать вышивку «крестиком»; 7) конвертировать готовый дизайн в формат PES. Photoshop: 1) отредактировать фотографию для разработки фотовышивки; 2) создать макет изделия; 3) упражнение «Дорисуй». Corel draw: 1) в программе сделать трассировку картинки; 2) сохранить картинку в формате WMF.

2. Групповые задания: 1) разработать логотип мастерской университета векторную картинку в Xara, скопировать в Corel, сохранить в формате WMF. Загрузить в программу Pe–designe; 2) разработать детскую игрушку для развития мелкой моторики с помощью машинной вышивки; 3) разработать коллекцию одежды; 4) соединить части изделия с помощью машинной вышивки; 5) предложить идею для вдохновения (сфотографировать, представить в графическом или вышитом виде).

Приведем примеры заданий. Задание «Работа с фотографией в программе Xara». Инструкция: найти испорченную одежду (пятна, дырки), сфотографировать и сохранить на компьютер, найти способ исправления проблемы с помощью программы Xara (рисунок макета) (Рис. 3).

Групповое задание «Поиск идеи для вдохновения». Инструкция: студентам предлагается взять телефоны или фотоаппараты, выйти на улицу, найти идею для вдохновения, сфотографировать, создать рисунок, представить выполненное задания в графическом виде (Рис. 4).

Для статистической обработки результатов проведенного исследования был применён метод непараметрического критерия знаков (Сидоренко, 2010, 72–109).

Результаты тестирования студентов были обработаны с использованием ранжирования (шаг ранга = 0,4) (Табл. 1).

Соотнесение полученных данных с таблицей критических значений G–критерия знаков (при уровне статистической значимости Р=0,01) свидетельствует об их достоверности.

Рисунок 3. **Пример исправления пятна на одежде**
Figure 3 **An example of abolishing stains on clothes**

Рисунок 4. **Пример группового задания**
Figure 4 **An example of a group task**

Таблица 1. **Ранжирование результатов тестирования студентов по методике
«Диагностика уровня творческой активности учащихся»**
Table 1 **The ranking of the results of testing students on the method of "Diagnostics of the
level of creative activity of students"**

Ранги	Количество баллов
I	1,6 – 2
II	1,2 – 1,6
III	0,8 – 1,2
IV	0,4 – 0,8
V	0 – 0,4

На рисунке 5 проиллюстрировано смещение полигона частот: на констатирующем этапе преобладал III ранг, на контрольном – II ранг, что доказывает эффективность организационно–педагогических условий формирования у студентов творческой активности средствами ИКТ.
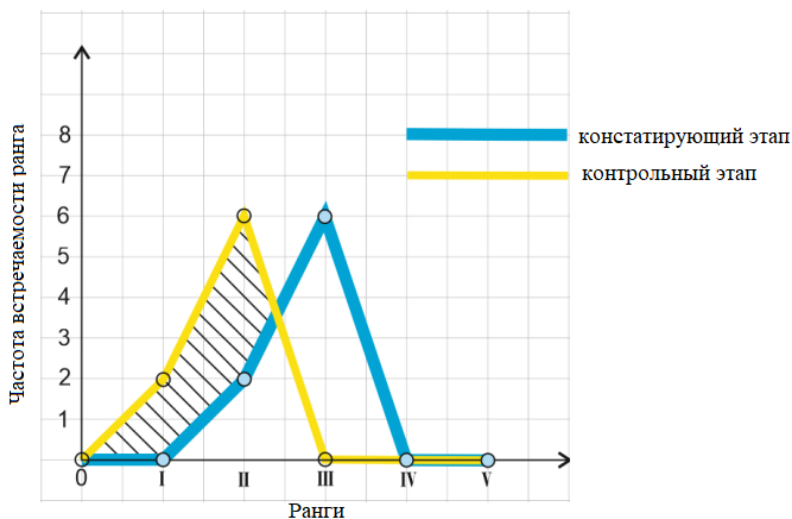
*Рисунок 5. **Полигон распределения частот встречаемости ранга по методике «Диагностика уровня творческой активности учащихся» на констатирующем и контрольном этапах***
*Figure 5 **The range of distribution of frequencies of occurrence of rank by the method of "Diagnostics of the level of creative activity of students" at the ascertaining and control stages***

Выводы
Conclusions

Предварительные результаты исследования позволили сделать следующие выводы. Современные вузы ориентированы на развитие у студентов творческой активности, необходимой им для успешной самореализации в социуме. Компонентами творческой активности являются: интерес к преобразующей деятельности, готовность к поиску рациональных путей решения задач (наличие определенного уровня самостоятельности, аналитических умений, дивергентного мышления).

Согласно цели исследования, были выявлены и апробированы следующие организационно–педагогические условия формирования у студентов творческой активности в процессе использования в образовательном процессе вуза ИКТ: использование заданий, направленных на индивидуализацию процесса обучения; реализация принципа «антиципации искомого» знания; использование идей интегративного подхода в освоении содержания учебного предмета, обеспечивающего междисциплинарные связи; соотнесение качества творческой деятельности,

выраженное в продуктах деятельности студентов, с уровнем сформированности базовых подструктур личности.

Необходимо подчеркнуть, что при выборе активных средств обучения с использованием ИКТ, разработки новых форм проведения занятий и авторской интерпретации понимания сущности и развивающего влияния образования на формирование творческой активности студентов нужно учитывать направление их подготовки, интересы и творческий потенциал.

Summary

Modern multimedia technologies provide students with access to a wide range of information sources, increase the effectiveness of independent work, they provide completely new opportunities for creativity, gaining and consolidating various professional skills, allow you to implement fundamentally new forms and methods of teaching using the means of conceptual and mathematical modeling of phenomena and processes.

Thus, the purpose of the study is the theoretical substantiation and practical approbation of the organizational and pedagogical conditions for the formation of creative activity among students in the process of using information and communication technologies in the educational process of the university.

Obviously, if you create certain organizational and pedagogical conditions for students' learning activities, their creative activity will increase. According to the authors, these conditions are the following: the use in the educational process of tasks aimed at individualizing the learning process; the implementation of the principle of "anticipation of the desired"; the use of ideas of an integrative approach in the development of the content of the school subject, providing interdisciplinary communication; correlation of the quality of creative activity, expressed in the products of students' activities, with the level of formation of the basic personality substructures.

Analysis of the results of the pilot experiment showed the effectiveness of creating these conditions. It should be emphasized that it is important to take into account the direction of training of students, their interests and creativity.

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PEDAGOGU DIGITĀLĀS KOMPETENCES PILNVEIDES AKTUALITĀTE

The Topicality of Educators' Digital competence Development

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Abstract. *Information and communication technologies (ICT) rapidly continue advancement in educational contexts. The influence of ICT, variety of digital learning materials and opportunities has enlarged especially in the last decade followed by the topicality of educators' digital competence improvement. One of the key competences of educators to harness the potential of digital learning sphere is continuous development of digital competence. Authors of this research explore scientific literature on the formation, further development and assessment of teachers' digital competence. Based on research findings the authors indicate facts that due to the lack of digital competence the potential of digital learning is not fully used, educators need to update competence on development of interactive training materials, assessment of digital competence should be more reliable and rigorous. On the basis of the research the authors put forward suggestions on the ways to develop educators' digital competence.*
Keywords: *digital competence, development, ICT potential, lifelong learning, assessment.*

Ievads
Introduction

Informācijas un komunikāciju tehnoloģijām (turpmāk-IKT) attīstoties, arvien vairāk tiek akcentēts un pētīts to potenciāls izglītībā, stratēģiskajos plānošanas dokumentos un zinātniskajos pētījumos, arvien biežāk aktualizējas pedagogu digitālās kompetences pilnveide. IKT potenciāls izglītības kontekstā un pedagogu digitālās kompetences pilnveides vīzija ir ieskicēta Eiropas Komisijas Digitālās izglītības rīcības plānā (2018), kuras mērķis ir veicināt labāku digitālo tehnoloģiju izmantošanu mācīšanas un mācīšanās mērķiem. Rīcības plāns uzsver jauninājumu izglītības sistēmās, kas ietver tehnoloģiju un kompetenču ieviešanu izglītības organizācijās, palīdzot uzlabot mācīšanās rezultātus, ja to īstenos labi sagatavoti skolotāji un digitālos līdzekļus izmantos izglītības mērķu sasniegšanai. Gan augstākminētais plāns, gan citu izglītības plānošanas un pētījumu galvenie virzieni tendēti uz tagadnes un nākotnes aicinājumiem pedagogiem pārzināt un

efektīvi izmantot IKT potenciālu izglītībā, nepārtraukti sekojot līdzi straujajam tehnoloģiju progresam un regulāri paaugstinot digitālo kompetenci. Latvijā pedagogu kompetenču pilnveides aktualitāte tika detalizēti analizēta Izglītības un zinātnes ministrijas darba grupas ietvaros, kā rezultātā, Latvijas augstskolu un nozaru eksperti izstrādāja informatīvo ziņojumu "Priekšlikumi konceptuāli jaunas kompetencēs balstītas izglītības prasībām atbilstošas skolotāju izglītības nodrošināšanai Latvijā" (2017), norādot, ka pāreja uz mūsdienīgas lietpratības izglītību izvirza konceptuāli citas prasības "jauno pedagogu" sagatavošanā, kā arī esošo pedagogu profesionālajai pilnveidei darbam ar jauno izglītības saturu. Ziņojums akcentē mūsdienīgas lietpratības izglītību, kas vērsta uz cilvēka rīcībspējai nepieciešamo pamatkompetenču un caurviju kompetenču attīstību, nodrošinot kvalitatīvu izglītību visās izglītības pakāpēs.

Šī pētījuma mērķis ir izanalizēt pedagogu digitālās kompetences pilnveidi saistošo zinātnisko literatūru un tiesisko regulējumu un uz pētījuma pamata izstrādāt priekšlikumus pedagogu digitālās kompetences pilnveidei.

Rakstā atspoguļotajā pētījumā ir veikta zinātniskās literatūras un saistošo dokumentu analīze, analītiskie spriedumi balstīti uz iepriekš veikto pētījumu bāzes, kā arī, izmantojot autoru personisko pedagoģisko pieredzi.

Pedagogu digitālā kompetence izglītības attīstības plānošanas kontekstā
Educators' digital competence the context of planning education development

Pedagogu digitālās kompetences aktualitāte mūsdienu un nākotnes izglītības procesu attīstības kontekstā atspoguļojas dažādos Eiropas Savienības un Latvijas plānošanas dokumentos. Latvijas ilgtspējīgas attīstības stratēģijā līdz 2030. gadam (2008), secināts, ka informācijas tehnoloģijas ir kļuvušas par skolēnu ikdienu un interešu objektu, tādēļ nepieciešama to lietpratīga integrēšana mācību procesā, tādējādi palīdzot piesaistīt jauniešu uzmanību mācību saturam un mainīt tehnoloģiju kompetences vispārējo līmeni Latvijā gan skolēniem, gan skolotājiem.

R. Andersone savā pētījumā akcentē, ka skolotājs mūsdienās nav vienīgais zināšanu avots, kas kontrolē zināšanas, kuras apgūst skolēns. Daudzveidīga informācija ir atrodama ne tikai mācību grāmatās, bet arī informācijas tehnoloģiju vidē. Šī iemesla dēļ skolotāja loma būtiski mainās: viņš kļūst par palīgu, partneri un ceļvedi zināšanu atlasē un mācību procesā (Andersone, 2010). Eiropas Komisijas, Eiropas Inovāciju un tehnoloģiju institūta vidusposma novērtējumā (2017) ir secināts, ka inovāciju kontekstā ieinteresētās personas nevis gaida izmaiņas, bet aktīvi izmanto digitālās iespējas, lai uzlabotu mācīšanu un mācīšanos. Digitālās kompetences jēdziens tiek atsevišķi definēts ES Padomes ieteikumos par pamatkompetencēm mūžizglītībā (2018) šādā redakcijā: "Digitālā kompetence ietver sevī digitālo tehnoloģiju pārliecinātu, kritisku un atbildīgu

izmantošanu un darbošanos ar šīm tehnoloģijām mācību un darba vajadzībām un nolūkā piedalīties sabiedrības dzīvē. Tā ietver informācijas un datu izmantošanas pratību, komunikāciju un sadarbību, medijpratību, digitālā satura radīšanu (tostarp, programmēšanu), drošību (tostarp, digitālu labbūtību un ar kiberdrošību saistītas kompetences), ar intelektuālo īpašumu saistītus jautājumus, problēmu risināšanu un kritisko domāšanu. Ar šo kompetenci saistītās būtiskās zināšanas, prasmes un attieksmes indivīdiem būtu jāsaprot, kā digitālās tehnoloģijas var veicināt komunikāciju, radošumu un inovāciju, un jāapzinās to iespējas, ierobežojumi, ietekme un riski". Detalizētāks formulējums digitālās kompetences jēdziena izpratnei pieejams A. Ferari izstrādātajā ietvarā digitālās kompetences attīstīšanai un sapratnei Eiropā, kur tiek izdalītas šādas digitālās kompetences jomas un attiecīgas pedagogu spējas:

1. Informācija: identificēt, atrast, iegūt, uzglabāt, organizēt un analizēt digitālo informāciju, novērtējot tās atbilstību un mērķi.

2. Saziņa: sazināšanās digitālā vidē, dalīšanās resursos izmantojot tiešsaistes rīkus, sazināšanās un sadarbošanās ar citiem, digitālo rīku izmantošana, mijiedarbošanās un piedalīšanās kopienās un tīklojumos, starpkultūru izpratne.

3. Satura izveide: jauna satura izveide un rediģēšana (no teksta apstrādes līdz attēliem un video), iepriekšējo zināšanu un satura integrēšana un pārstrāde, radošas izpausmes, mediju un programmnodrošinājuma izstrāde, intelektuālo īpašumtiesību jautājumu risināšana un piemērošana.

4. Drošība: personas datu aizsardzība, digitālās identitātes aizsardzība, drošības pasākumi, droša un ilgtspējīga IKT izmantošana.

5. Problēmu risināšana: identificēt digitālās vajadzības un resursus, pieņemt apzinātus lēmumus par to, kas ir vispiemērotākie digitālie rīki atbilstoši mērķim vai vajadzībām, atrisināt konceptuālas problēmas, izmantojot digitālos līdzekļus, radoši izmantot tehnoloģijas, risināt tehniskās problēmas, pilnveidot savas un citu kompetences (Ferrari, 2013).

Digitālās kompetences jēdziena izpētes ietvaros zinātnieku grupa (Spante, Sofkova, Lundin, & Algers, 2018) secina, ka jēdziens tiek aktīvi izmantots izglītības politikas plānošanas dokumentos un kopš 2010. gada publikāciju skaits par šo tēmu ir pieaudzis par 17%. Zinātnieki (Ilomäki, Kantosalo, & Lakkala, 2011) pētot digitālās kompetences jēdziena pirmsākumus secina, ka šī definīcija ir nepārtrauktā attīstībā, to apraksta politikas dokumentos, taču pētījumu kontekstos nav standartizētas definīcijas.

R. Vuorikari apgalvo, ka svarīgi ņemt vērā to, ka "digitālā kompetence kā transversālā kompetence palīdz izkopt arī citas būtiskas prasmes, piemēram, komunikāciju, valodas prasmes vai pamata zināšanas matemātikā vai zinātnē"

(Vuorikari, 2018). Savukārt D. Namsone uzsver, ka kompetence ir kompleksa, tās attīstīšana saistās ar pārnesuma veidošanu rīcībai jaunā situācijā, jaunā kontekstā, to nevar reducēt uz kādu atsevišķu prasmi vai izolētu zināšanu kopu (Namsone, 2018).

Ņemot vērā IKT attīstību 90. gadu beigās, kopumā var secināt, ka mūsdienās augstākās izglītības iestādēs, digitālās kompetences apguve jau ir integrēta topošo pedagogu sagatavošanas programmās. Izglītības un zinātnes ministrijas dati profesionālajā izglītībā par 2017./2018. gadu liecina, ka kopumā Latvijā 27% no visiem strādājošajiem skolotājiem ir pirmspensijas vecumā. Šai sakarā pastāv augsts risks, ka šiem pedagogiem IKT tēmas studiju procesā vēl nebija integrētas un digitālās kompetences pilnveide ir notikusi tikai kvalifikācijas pilnveides ietvaros. Arī Eiropas Komisijas 2017. gada pētījuma secinājumos minēts, ka kopumā visi mūsdienu pedagogi ir "digitāli kompetenti", tomēr viņu zināšanas un pieredze digitālo tehnoloģiju izmantošanā mācību procesa iespējošanai un uzlabošanai ir atšķirīga. Pētījumi liecina, ka ne visiem pedagogiem ir atbilstoša kompetence un pārliecība izmantot digitālos rīkus mācīšanas procesa atbalstam.

Pedagogu kvalifikācijas pilnveides regularitāte Latvijā ir noteikta ar Ministru Kabineta noteikumiem Nr. 569 "Noteikumi par pedagogiem nepieciešamo izglītību un profesionālo kvalifikāciju un pedagogu profesionālās kompetences pilnveides kārtību", kur III sadaļā "Pedagoga profesionālās kompetences pilnveide" ir noteikts, ka vispārējās, profesionālās un interešu izglītības pedagogs ir atbildīgs par savas profesionālās kompetences pilnveidi. Profesionālo kompetenci pilnveido, triju gadu laikā apgūstot programmu vismaz 36 stundu apjomā, un to plāno sadarbībā ar tās izglītības iestādes vadītāju, kurā persona veic pedagoģisko darbību. Savukārt augstskolu un koledžu akadēmiskais personāls līdz ievēlēšanas termiņa beigām apgūst profesionālās pilnveides programmas par inovācijām augstākās izglītības sistēmā, augstskolu didaktikā vai izglītības darba vadībā 160 akadēmisko stundu apjomā (tai skaitā vismaz 60 kontaktstundas). Profesionālā pilnveide šo noteikumu izpratnē var ietvert atbilstošu starptautisko mobilitāti, kā arī dalību konferencēs un semināros, ko apliecina akadēmiskā personāla iesniegtie dokumenti. Attiecībā uz IKT pilnveidi šie noteikumi paredz kvalifikācijas pilnveides programmas izvēles tēmu "jauninājumi mācību priekšmetā un mācību jomas saturā un metodikā, informācijas un komunikācijas tehnoloģiju prasmes kvalitatīvi modernā izglītības vidē" (LR MK noteikumi Nr. 569). Saskaņā ar G. Taddeo, M. E. Cigognini, L. Parigi, R. Blamire pētījumu par pašreizējām pieejām pedagogu digitālās kompetences sertifikācijā un nākotnes perspektīvām (2016), kvalifikācijas pilnveides regularitāte ES dalībvalstīs un apjoms profesionālās pilnveides kursiem ir atšķirīgi, piemēram, 12 dienas gadā Čehijā, Skotijā 35, Somijā un Kiprā 3 dienas, Lietuvā 5 dienas, Portugālē 50 stundas reizi divos gados, savukārt Itālijā 50 stundas reizi gadā. Pētījuma secinājumos minēts, ka lielākā daļa digitālās

kompetences novērtēšanas modeļu nepievērš lielu uzmanību didaktiskajai digitālajai kompetencei - definīcijas nav vispārēji standartizētas, tādējādi tiek ietekmēta digitālās kompetences vērtēšanas validitāte, uzticamība un stingrība (Taddeo et al., 2016).

Pēc izglītības attīstības plānošanas dokumentu analīzes var secināt, ka pedagogu digitālās kompetences pilnveidei nākotnē, ES mērogā ir paredzēta prioritāra loma, piemēram, EK digitālās izglītības rīcības plānā (2018) definētas vairākas iniciatīvas, lai atbalstītu cilvēkus un organizācijas, kas risina jautājumus saistībā ar digitalizācijas radītajām straujajām pārmaiņām kad uzmanība tiek vērsta uz darbam un līdzdalībai sabiedrībā kopumā noderīgu digitālo prasmju attīstību (prasmes, zināšanas un attieksme), efektīvu tehnoloģiju izmantošanu izglītībā un datu un prognožu izmantošanu izglītības sistēmu uzlabošanai, kur dažādi pasākumi ietvers atbalstu skolām labāk izmantot tehnoloģijas mācīšanas un mācīšanās procesā.

Eiropas Padomes secinājumos (2009) minēts, ka digitālās izglītības rīcības plāns tiek īstenots stratēģiskās sistēmas Eiropas sadarbībai izglītības un apmācības jomā " Izglītība un mācības 2020" procesa kontekstā, kur noteikts, ka galveno uzmanību jāpievērš jaunu skolotāju sākotnējās izglītības kvalitātei un agrīnam karjeras atbalstam, jāvairo profesionālās izaugsmes iespēju kvalitāti skolotājiem, instruktoriem un citiem izglītības darbiniekiem, jāsekmē augstākās izglītības (tostarp izglītības programmu) modernizācijas programmu un kvalitātes nodrošināšanas pamatprincipu struktūru profesionālajai izglītībai un apmācībai, jāizstrādā nodrošinājuma kvalitāti, tostarp darbiniekus, pieaugušo izglītības nozarē, jāveicina jaunradi un novatorismu, izveidojot īpašas apmācību un mācību metodes, tostarp jaunus IKT instrumentus un skolotāju apmācību.

Saskaņā ar Eiropas ietvarstruktūru pedagogu digitālajai kompetencei (2017), spēja veicināt studējošo digitālo kompetenci ir izglītotāju digitālās kompetences neatņemama sastāvdaļa. Ietvarstruktūrā norādīts, ka pedagogi pašlaik saskaras ar daudziem vērtīgiem digitāliem (izglītojošiem) resursiem, kurus viņi var izmantot mācīšanai. C. Redecker uzsver, ka viena no pamatkompetencēm, ko vajadzētu attīstīt katram pedagogam, ir spēja efektīvi identificēt resursus, kas vislabāk atbilst viņu mācību mērķiem, skolēnu grupai un mācību stilam, spēja strukturēt noderīgus materiālus, konstatēt sakarības starp tiem, spēt pievienot, rediģēt un izstrādāt digitālos resursus, lai atbalstītu mācību procesu. Digitālās tehnoloģijas var uzlabot mācīšanas un mācīšanās stratēģijas daudzos un dažādos veidos. Tomēr, neatkarīgi no izvēlētās pedagoģiskās stratēģijas vai pieejas, pedagoga īpašā digitālā kompetence ir efektīva digitālo tehnoloģiju izmantošanas organizēšanā dažādos mācību procesa posmos un vidēs (Redecker, 2017). Izglītības un zinātnes ministrijas prakses rokasgrāmatā uzsvērts, ka nenoliedzami IKT izmantošana un integrēšana mācību procesā skolotājiem ir liels izaicinājums. Inovatīvās pedagoģiskās metodes izglītībā ir

pilnveidojamas, izmantojot IKT. Labās prakses piemēru demonstrēšana, kur ir aktīva un empīriska mācīšanās uzlabo skolēnu rezultātus un palielina to iesaistīšanos. Metodēm un procesam jābūt mērķtiecīgam, vispusīgam un virzītam uz individuālās pieejas īstenošanu. Visam ir jābūt līdzsvarotam: digitālie mācību līdzekļi ir izmantojami paralēli tradicionālajiem mācību līdzekļiem (IZM, 2017).

OECD veiktajos pētījumos "Creating Effective Teaching and Learning Environments" gan 2013., gan 2018. gadā digitālās kompetences pilnveide atrodas pedagogu mācību vajadzību prioritāšu otrajā vietā aiz mācīšanas procesa skolēniem ar īpašām vajadzībām. Valsts izglītības satura centra 2017. gada publiskajā pārskatā ir atrodama informācija par kvalifikācijas pilnveides aktivitātēm pedagogiem, kuru mērķis ir iepazīstināt tos ar mediju darbības pamatprincipiem, ļaut apzināties medijpratības vietu sabiedrības izglītošanas procesā, kā arī palīdzēt saprast viņu lomu un iespējas mediju izglītībā, taču nav publiskota informācija cik pedagogi kopumā piedalījās šajos kursos.

Pedagogu profesionālās darbības kvalitātes novērtēšanas organizēšanas kārtība Latvijā ir noteikta Ministru Kabineta noteikumos Nr.501, kuros noteikta pedagogu profesionālās darbības kvalitātes novērtēšanas organizēšanas kārtība, novērtēšanas virzieni un pedagogu profesionālās darbības kvalitātes pakāpju apraksti. Šo noteikumu izpratnē pedagogu e-kompetences vērtēšana noteikta novērtējuma veidlapu paraugos, kas attiecas uz vispārējās izglītības, t. sk. pirmsskolas izglītības vai profesionālās izglītības pedagogiem. Mācību stundas vērošanas un novērtējuma lapā 2. punktā "Mācību procesa norises mērķtiecīgums un rezultativitāte" ir jānorāda vai un cik lielā mērā pedagogs efektīvi izmanto viņa rīcībā esošos resursus (mācību materiālus, materiāltehniskos līdzekļus un globālā tīmekļa resursus). Savukārt 3.punkta "Mācību procesa produktivitāte/efektivitāte" 3.1. apakšpunktā noteikts, ka pedagogs izglītojamiem attīsta mācīšanās prasmes - organizēt savu darbu, plānot laiku, sadarboties ar citiem, izvēlēties efektīvāko paņēmienu rezultāta sasniegšanai, meklēt uzziņas avotus, izmantot IT, svešvalodas u. c. (MK noteikumi Nr.501, 2017).

Norvēģu IKT centra zinātnieki Ottestad G. Kelentrić M., Guðmundsdótti G.B. (2014) darba grupas ietvaros, ar mērķi veicināt pedagogu digitālās kompetences izpratni un korektu pedagogu digitālo prasmju novērtēšanu 2014. gadā izstrādāja priekšlikumu, pedagogu digitālo kompetenci iedalīt trijās dimensijās:

1. Vispārējā digitālā kompetence, kur definētas pedagogu vispārējās prasmes un iemaņas;
2. Didaktiskā digitālā kompetence, kur definētas konkrētam mācību priekšmetam paredzētās individuālās prasmes, piemēram matemātikas, valodu mācīšanai izmantojot IKT;

3. Profesionāli orientēta digitālā kompetence, kur aprakstītas paplašinātas prasmes ārpus priekšmeta jomām, piemēram, zināšanu vērtēšana, saziņa ar vecākiem un citām grupām.

Saskaņā ar IZM 2018. gada pētījumu "Datu apkopojums un ārvalstu un Latvijas pieredzes analīze par digitālo mācību līdzekļu pieejamību un izmantošanu vispārējās izglītības mācību satura nodrošināšanai" L. Daniela, Z. Rubene, L. Goba secina, ka skolotāji Latvijā izmanto pieejamos materiālus, lai uz ekrāna rādītu atraktīvu informāciju, taču skolēniem būtu nepieciešams arī pašiem aktīvi darboties ar dažādām tehnoloģijām, lai piekļūtu informācijai, analizētu to, konstruētu jaunas zināšanas, radītu jaunus un inovatīvus risinājumus. Pētījumā atklāts, ka salīdzinot ar citu valstu analizēto pieredzi, Latvijā izstrādātajiem mācību materiāliem ir vāja interaktivitāte un tie vairāk ir atbilstoši frontālai mācīšanai, nav ņemti vērā Latvijas Informācijas un komunikācijas tehnoloģijas asociācijas 2015. gadā izstrādātie ieteikumi par digitālo mācību līdzekļu interaktivitāti un nepieciešamību sekmēt izglītojamo iesaisti, sasniedzot savu zināšanu novērtēšanas un jaunu zināšanu radīšanas līmeni. Pētījuma secinājumu daļā ir uzsvērts, ka Latvijā nav visaptverošas vīzijas par pedagogu sagatavošanu darbam digitalizētā mācību vidē, kas rada riskus, kā, piemēram, pedagoģiskā procesa sadrumstalotība un tādu digitālo mācību līdzekļu izmantošana, kas neveicina skolēnu attīstību, bet gan tikai sekmē uzmanības nenoturības attīstību. Kā priekšlikums tiek izvirzīta nepieciešamība pedagogiem organizēt tālākizglītības kursus par brīvpieejas materiālu izmantošanas iespējām, kā arī veikt informācijas apkopojumu par pieejamo saturu viedierīcēs, organizēt tālākizglītības kursus pedagogiem par izglītojamo personisko viedierīču izmantošanas iespējām mācību satura apguvei (Daniela et al., 2018).

Lai attīstītu pedagogu digitālo kompetenci un veicinātu tās attīstīšanu un inovācijas izglītībā ir lietderīgi izmantot C. Redecker, Y. Punie izstrādātos Eiropas ietvarstruktūras kritērijus un pedagogu digitālās kompetences aprakstus. Šī ietvarstruktūra piedāvā konkrētus kritērijus pedagogu digitālās kompetences novērtēšanai, izdalot sešas digitālās kompetences attīstības pakāpes uz Blūma taksonomijas pamata, tādējādi, palīdzot pedagogiem un vērtētājiem novērtēt esošo pakāpi un noteikt turpmāko kompetences pilnveides stratēģiju:

1. Iesācējs (A1): Iesācējs, apzinās digitālo tehnoloģiju potenciālu pedagoģiskās un profesionālās prakses veicināšanai. Tomēr viņiem ir bijis ļoti mazs kontakts ar digitālajām tehnoloģijām un tās galvenokārt izmanto, lai sagatavotos nodarbībām, administrēšanas vai organizatoriskās komunikācijas aktivitātēs. Iesācējam ir nepieciešami padomi un iedrošinājums paplašināt savas prasmes, pielietojot digitālo kompetenci pedagoģiskajā jomā.

2. Pētnieks (A2): pētnieki apzinās digitālo tehnoloģiju potenciālu un ir ieinteresēti izpētīt to, lai uzlabotu pedagoģisko un profesionālo jomu.

Viņi ir sākuši izmantot digitālās tehnoloģijas dažās digitālās kompetences jomās, tomēr, bez visaptverošas vai konsekventas pieejas. Pētniekiem ir nepieciešams iedrošinājums, ieinteresēšana un iedvesma, piem., no kolēģu puses, kopīgi pieredzes apmaiņas pasākumi.

3. Integrators (B1): Integratori eksperimentē ar digitālajām tehnoloģijām dažādos kontekstos un dažādiem mērķiem, integrē praksē. Viņi tos radoši izmanto uzlabojot profesionālo darbību dažādos aspektos. Viņi dedzīgi vēlas paplašināt savas zināšanas un prasmes, tomēr joprojām strādā pie tā, lai saprastu, kuri rīki darbojas vislabāk konkrētajās situācijās un piemērojami pedagoģiskajās stratēģijās un metodēs. Integratoriem vajadzīgs laiks eksperimentiem un refleksijai, kolektīvais iedrošinājums, papildzināšanas, lai kļūtu par ekspertiem.

4. Eksperts (B2): Eksperti, izmanto virkni digitālo tehnoloģiju profesionālajā darbībā, pārliecinoši, radoši un kritiski. Mērķtiecīgi izvēlas digitālās tehnoloģijas konkrētām situācijām un mēģina izprast dažādu digitālo stratēģiju priekšrocības un trūkumus. Ir ziņkārīgi un atvērti jaunām idejām, zinot, ka ir daudzas lietas, kuras vēl nav izmēģinājušas. Viņi izmanto eksperimentus kā līdzekli, lai paplašinātu, strukturētu un nostiprinātu digitālo kompetenci. Eksperti ir jebkuras izglītības organizācijas pamats, ja runa ir par inovāciju ieviešanu.

5. Līderis (C1): Līderiem ir konsekventa un visaptveroša pieeja izmantot digitālās tehnoloģijas, lai uzlabotu pedagoģisko un profesionālo praksi. Viņiem ir plašas kompetence digitālajās stratēģijas, no kurām viņi zina, kā izvēlēties piemērotāko jebkurai konkrētai situācijai. Viņi nepārtraukti pārdomāt un tālāk attīstīt savu kompetenci, atjauno un nodod savas zināšanas kolēģiem

6. Pionieris (C2): Pionieri izvērtē mūsdienu digitālo tehnoloģiju, kuri paši ieviesuši praksē atbilstību pedagoģiskajā kontekstā. Viņiem rūp ieviesto pieeju ierobežojumiem vai trūkumi. Tos stimulē impulsi ieviest jauninājumus izglītībā. Pionieri eksperimentē ar ļoti novatoriskām un sarežģītām digitālajām tehnoloģijām un /vai izstrādā jaunas pedagoģiskās pieejas. Pionieri ir unikālas personības, kuras noved pie inovācijām un ir paraugi jaunajiem pedagogiem (Redecker & Punie, 2017).

Pētījumā par pašreizējām pieejām, pedagogu digitālās kompetences sertifikāciju un nākotnes perspektīvām G. Taddeo secina, ka motivācijai pilnveidot digitālo kompetenci ir jānāk no pedagogiem, pamatojoties uz novērtējumu, kurš mudina augt un veicina pedagogu novērtēšanu. Vērtēšanai jābūt objektīvai gan ārēji gan pašvērtējumā, piemēram, izmantojot tiešsaistes pašvērtējuma rīkus tādus kā "TET-SAT", kā arī tiešsaistes digitālās kompetences

pilnveides un vērtēšanas resursus ACTIC, CERTIPASS, CERTIPORT, ECDL/ ICDL for Teachers, EIPASS Teacher un NAACE ICT Mark (Taddeo et al., 2016).

Kopumā var secināt, ka IKT jomai attīstoties arvien lielāka būs to ietekme izglītības sfērā, līdz ar to gan esošajiem, gan topošajiem pedagogiem kļūs aktuālāka digitālās kompetences pilnveide. Plānveidīgi un īstenojot ilgtermiņa izglītības projektus IKT jomā pedagogiem pavērsies plašākas iespējas digitālās kompetences pilnveidei, līdz ar to arvien aktīvāk izmantojot IKT potenciālu izglītības sektorā.

Secinājumi
Conclusions

1. Pēc pētījumā veiktās zinātniskās literatūras un saistošo dokumentu analīzes var secināt, ka digitālās kompetences pilnveide ir kļuvusi īpaši aktuāla pēdējā desmitgadē. Aktualitāte atspoguļojas, ES un Latvijas izglītības stratēģiskās attīstības plānošanas dokumentos, pētījumu skaits pakāpeniski pieaug. Turpmāk notiks vēl aktīvāka pedagogu digitālās kompetences pilnveide, tiks pievērsta lielāka uzmanība jauno pedagogu studiju programmās digitālās pratības un medijpratības apguvei, attīstot digitālās prasmes caur tiešo pieredzi mācību procesā, nevis kā atsevišķu kursu studiju programmas ietvaros.

2. Balstoties uz ES plānošanas dokumentu secinājumiem un pieaugošajām pasaules digitālās mācīšanās un mācīšanas globālajām tendencēm pedagogu digitālās izglītības attīstības uzlabošanā, turpmāk topošo pedagogu sagatavošanas programmās un kvalifikācijas pilnveides programmās jāpievērš lielāka uzmanība interaktīvu mācību līdzekļu izstrādes un izmantošanas praktiskajiem aspektiem.

3. Esošajā Ministru Kabineta regulējumā par pedagogiem nepieciešamo izglītību, profesionālo kvalifikāciju un pedagogu profesionālās kompetences pilnveides kārtību ir noteikts, ka kvalifikācijas pilnveide jāveic vismaz reizi trijos gados, taču, ņemot vērā informācijas tehnoloģiju straujo attīstību (turpmāk iespējama vēl straujāka attīstība) un citu valstu pieredzi, digitālās kompetences pilnveidei būtu jānotiek regulārāk, nekā vismaz reizi trijos gados, piemēram vismaz reizi gadā piedaloties klātienes un tālmācības kvalifikācijas pilnveides kursos, kur ir iespēja uzzināt par aktualitātēm digitālo mācību līdzekļu izstrādē un pielietošanā pedagoga profesionālajā darbībā.

4. Latvijā pedagogu digitālās kompetences novērtēšanai atbilstoši esošo MK noteikumu regulējumam tiek izmantoti pārāk nekonkrēti un vispārināti kritēriji. Lai pedagogi apzinātos savu digitālās kompetences līmeni, motivētu pedagogus izmantot interaktīvus digitālos mācību līdzekļus un regulārāk

paaugstinātu digitālo kompetenci, būtu lietderīgi pedagogu vērtēšanā izmantot Eiropas ietvarstruktūras kritērijus pedagogu digitālās kompetences novērtēšanai un lietot tiešsaistes novērtēšanas rīkus.

Summary

Development of educators' digital competence is highlighted as one of priorities in education context several strategies and action plans e.g. European Framework for the Digital Competence of Educators, digital education action plan, collaboration projects and other initiatives prepared by European Commission and Council of Europe. Priorities of the EU have been adopted and integrated in national education contexts within national educators' development and sustainability plans. The research performed highlights the need to constantly update educators' digital competence. In the context of the development of digital education, existing educator training programs should pay more attention to improvement of digital competence, paying particular attention to the practical aspects of developing and using interactive teaching aids. The research performed concludes that existing regulations in Latvia on development and assessment of educators' digital competence are rather broad and need to be revisited based on European Framework for the Digital Competence of Educators. Regularity and assessment of digital competence is different among the countries of the EU, hence taking into account the rapid development of information technologies digital competence development activities should take place more regularly, criteria for assessment of educator's digital competence should be unified, and educators should be encouraged to take part in online digital competence development courses.

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TOWARDS EXTENDING THE ORIGINAL TECHNOLOGY ACCEPTANCE MODEL (TAM) FOR A BETTER UNDERSTANDING OF EDUCATIONAL TECHNOLOGY ADOPTION

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Abstract. *Technology acceptance model (TAM) is arguably the most widely used intention theory that explains the individual's acceptance of a certain technology. Since Davis introduced TAM in 1986, it has been applied and validated in a variety of disciplines, including educational sciences. However, scholars note that depending on a specific context, the original TAM needs to be extended, which has been done by introducing external variables and other theories. Despite the existent TAM2 and TAM3, numerous scholars still opt for the original TAM, extending it with the variables and theories that are relevant to the specific context of their study. The aim of the present paper is to provide an overview of validated TAM extensions, which might later help to further the understanding of educational technology acceptance, which is a prerequisite of its adoption. Since interdisciplinarity in various contexts is becoming more and more common, the overview presents TAM extensions that come from a number of different disciplines. The overview is based on 108 papers that were retrieved from the Web of Science (Clarivate Analytics) by searching for the keywords 'extended Technology Acceptance Model', 'extended TAM', and 'TAM extension'.*
Keywords: *Technology acceptance model, TAM, extended TAM, technological innovations in education.*

Introduction

Technologies are omnipresent and are constantly being developed or upgraded to improve different walks of life. Despite their innovativeness, some Information and Communication Technologies (ICTs) have a very short span of popularity and soon become obsolete. In other words, they are not accepted by the users in a way that they would adopt them, or continue using them in the future. Over the last five decades, such processes have increasingly attracted the attention of numerous scholars. There have been various attempts to propose a model that would explain users' acceptance and sustained use of a particular ICT. One of the most widely used intention theories is Technology Acceptance Model devised by Davis in 1986 (Lai, 2017; Bhatiasevi & Naglis, 2016). The purpose of the model is to explain a user's acceptance of computer technology.

According to Newell (2014), changes in technology as well as socio-economics, politics, human potential, and paradigms also influence the way the society learns. The living conditions of the current society are greatly influenced by the Industry 4.0, which is presently shifting into Industry 5.0 (Schwab, 2016). Therefore, it becomes evident that educators need to create educational environments which would prepare learners for operating in dynamic contexts that are powered by technological innovation (Janiūnaitė, 2004). It is only natural that such educational environments are inseparable from technology. However, technology itself as well as the process of its adoption often becomes an innovation to the different stakeholders that might be involved in the teaching and learning processes. In Diffusion of Innovation Theory, Rogers (1962) explains that in terms of implementing innovation, innovation adopters can be classified into innovators, early adopters, early majority, late majority, and laggards (Rogers, 2010). It can be claimed that TAM is closely related to the very first stages of innovation adoption. More precisely, it can be stated that acceptance is one of the prerequisites of innovation adoption and sustained use of, for instance, educational technology.

It is important to note that the first version of TAM was not infallible, thus there have been several different editions introduced in 1989 (TAM, by Davis, Bogozzi, & Warshaw), 2000 (TAM2, Venkatesh, & Davis), 2003 (UTAUT, Venkatesh, Morris, Davis, & Davis), and 2008 (TAM3, Venkatesh, & Bala). The aforementioned versions of TAM were validated and tested longitudinally in different contexts (e.g. education, business, medicine, etc.) and by focusing on different technology users (e.g. educators, learners, customers, etc.). Nevertheless, there are scholars who believe that the list of important variables might be inexhaustible depending on the specific research area and context. Due to its relative simplicity, TAM as a model on its own has received considerable criticism (Teo, Dolek, & Bozelais, 2018; Rigopoulou, Chaniotakis, & Kehiagias, 2017; Bhatiasevi & Naglis; 2016; Muthitcharoen, Palvia, & Grover, 2011). As ICTs permeate and indubitably influence other existent scientific fields and research is becoming more and more interdisciplinary, the original TAM becomes too limited, thus scholars combine it with additional variables, models, and theories.

There exist numerous overviews of TAM as well as its comparison to other intention theories. However, the novelty of the present paper lies in providing an overview of the extensions to the original TAM that were validated in different contexts by scientists who represent a variety of disciplines. The overview is carried out by analyzing research papers from various disciplines that were published in the span of 1997 to 2018 and are available on the Web of Science (Clarivate Analytics). The results that are described in the present paper can serve

as a basis for developing an extended TAM for a better understanding of educational technology adoption.

The aim and scope. The present paper aims to provide a concise overview of the means to extend the original TAM, which might later help to further the understanding of educational technology acceptance, it being a prerequisite of its adoption. The aim is achieved by analyzing empirical research papers. To meet the abovementioned end, several objectives were formulated. They are the following: (i) to reveal what variables are introduced to extend the original TAM, and (ii) to indicate what other intention theories and models are used to extend the original TAM.

Methods

The current overview is based on a total of 108 scientific papers that were published between 1997 and 2018. The papers were retrieved in November 2018 from Web of Science (Clarivate Analytics) by searching for the following keywords: 'extended Technology Acceptance Model', 'extended TAM', and 'TAM extension'. The platform was chosen because it is highly valued in various scientific communities and gives access to "world-class research literature linked to a rigorously selected core of journals" (clarivate.com). The search results of the aforementioned keywords returned 120 scientific papers. However, twelve of them were excluded from the present overview as they were literature reviews or theoretical papers with no empirical data to support and validate the proposed model extensions. Later, the collected papers were categorized according to the date of publication, scientific field, TAM extension, and results.

The structure of the paper

The following section briefly introduces the different editions of TAM and explains what key variables are present in each version. After that, the results of the analysis are presented. The analysis section is followed by conclusions.

Historical Development of Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was first proposed by Davis (1986) in his PhD thesis. Davis mostly based TAM on Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) as well as previous research and models that originate in intention theories and, for instance, marketing literature with the aim to

> *improve our understanding of user acceptance processes, providing new theoretical insights into the successful design and implementation of information systems. . . TAM should provide the theoretical basis for a practical "user acceptance testing"*

methodology that would enable system designers and implementors to evaluate proposed new systems prior to their implementation. (1985, 7).

Figure 1 depicts the original TAM. As one can see, Davis (1986) suggested testing the relationship between the variables related to (i) design features as well as (ii) cognitive, and (iii) affective response in order to predict the behavioural response. As Davis (1986) explains, the first set of variables refer to *alternative systems* (p. 24). The second set of variables contain *perceived usefulness* and *perceived ease of use*. Both of them are conceptualized by using Ajzen and Fishbein's (1977) definitions. The former is said to refer to "the degree to which an individual believes that using a particular system would enhance his or her job performance," whereas the latter is explained as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Ajzen & Fishbein, 1977, as cited in Davis, 1986, 26).
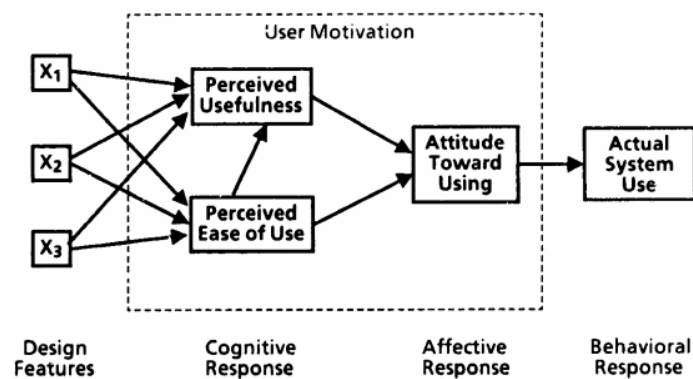
Figure 1 **The original Technology Acceptance Model** *(Davis, 1986, 24)*

In a paper published in 1989 and co-authored by Davis, Bogozzi, and Warshaw, TAM is slightly modified. Firstly, instead of *unspecified design features*, it includes *external variables*. Secondly, it introduces *behavioural intention to use*, which is directly influenced by *perceived usefulness* and *attitude toward using*. However, these are not the final changes that were made to the original TAM model.
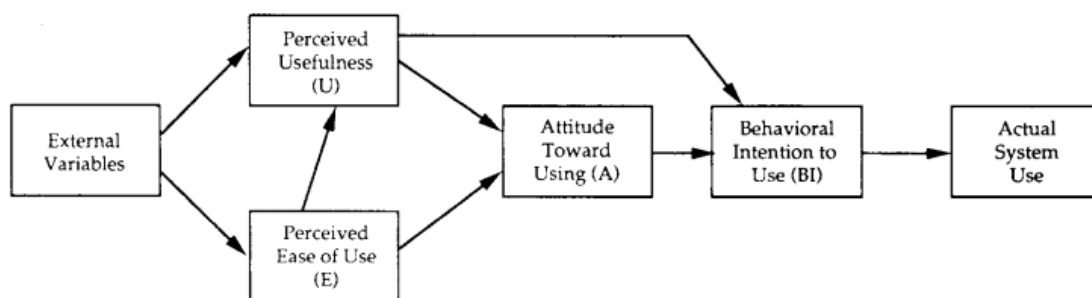
Figure 2 **The improved Technology Acceptance Model**
(Davis, Bogozzi, & Warshaw, 1989, 985)

The final version of the original TAM was presented by Venkatesh and Davis in 1986. In the model, the factor of *attitude toward using* was removed. Venkatesh (2000, 343) explains that the latter was done because the link between *attitude* and other variables was deemed to be too weak. It should also be noted that the finalized model that can be seen in Figure 3 below precisely indicates the *external variables*, which are the following: *system characteristics*, *training*, *user involvement in design*, and *the nature of the implementation process* (Venkatesh & Davis, 1996, 453).

*Figure 3 **The finalized Technology Acceptance Model** (Venkatesh & Davis, 1986, p. 453) Source: Venkatesh, V., & Davis, F.D. (1996). A model of the antecedents of perceived ease of use: Development and test. Decision Sciences, 27(3), 451-481.*

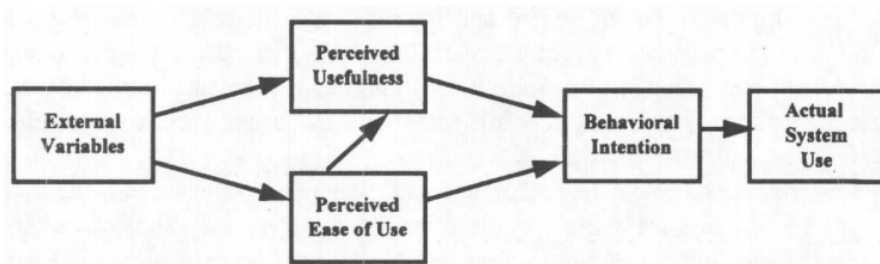In 2000, Venkatesh and Davis proposed an entirely new version of TAM, namely TAM2. As can be seen in Figure 4, TAM2 includes the finalized version of TAM. However, instead of the aforementioned *external variables* present in the finalized original TAM, TAM2 opts for such constructs as *subjective norm, image, job relevance, output quality,* and *result demonstrability; voluntariness* and *experience* are added as the moderating drivers (Venkatesh & Davis, 2000, 188). In other words, to explain the usage of a particular piece of technology, TAM2 takes into account the influence of the social and cognitive instrumental processes (ibid.). As Venkatesh and Davis (2000, 187) note, the constructs come from TRA (Fishbein & Ajzen, 1975) and Theory of Planned Behavior (TPB) (Ajzen, 1991). Moreover, they are defined along the same lines as in TRA and TPB. Due to the limiting format of the paper, the reader is kindly encouraged to explore the definitions that are provided in the original papers by Fishbein and Ajzen (1975), Ajzen (1991) or Venkatesh, Morris, Davis, and Davis (2003).

Several years later, in 2003, Venkatesh, Morris, Davis, and Davis presented the scientific community with one more edition of Technology Acceptance Model. It is called the Unified Theory of Acceptance and Use of Technology (UTAUT). The main aim of proposing such a framework was to combine the existent models into one that can explain an individual's intention to use and the actual usage of information technologies (Venkatesh et al., 2003, 467). As is evident from Figure 5, the two central concepts of TAM, namely, *perceived usefulness* and *ease of use* are removed, and so are *system characteristics,*

training, user involvement in design, the nature of the implementation process, subjective norm, image, job relevance, output quality, and *result demonstrability.* The new introduced variables are *performance* and *effort expectancy, social influence,* and *facilitating conditions*; two new moderating drivers are added, namely, *gender* and *age.*
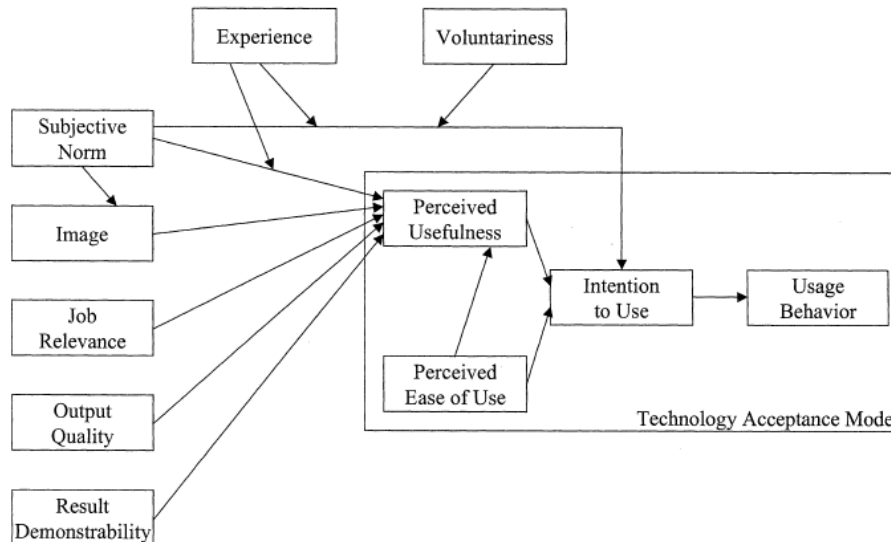
*Figure 4 **Technology Acceptance Model 2 (TAM2)** (Venkatesh & Davis, 2000, 188)*
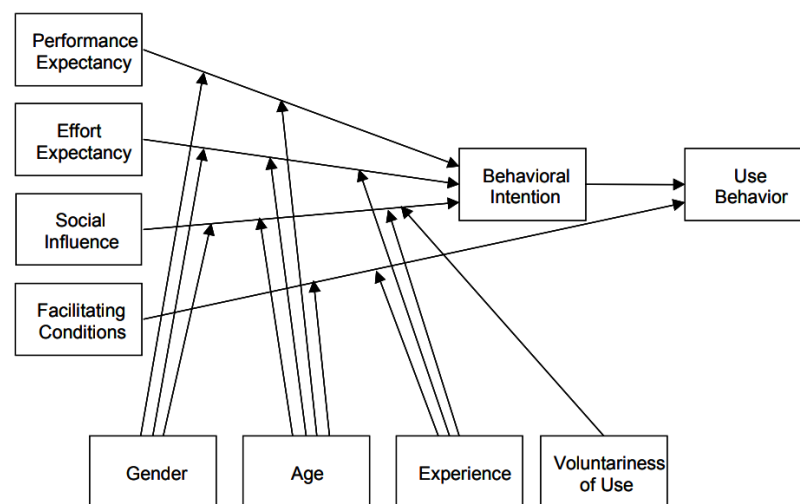
*Figure 5 **The scheme of the Unified Theory of Acceptance and Use of Technology (UTAUT)** (Venkatesh, Morris, Davis, & Davis, 2003, 447)*

The most recent update of TAM2 ir referred to as TAM3. It is comprised of the earlier explained TAM2 and the model of the Determinants of perceived ease of use that was developed by Venkatesh in 2000. The six determinants are the following: *computer self-efficacy, perception of external control, computer anxiety, computer playfulness, perceived enjoyment,* and *objective usability* (Venkatesh, 2000, 279). Venkatesh and Bala (2008, 280) note that the thick lines

in Figure 6 signify the new proposed relationships that are present in TAM3. In other words, "experience. . .[moderates] the relationships between (i) *perceived ease of use* and *perceived usefulness*; (ii) *computer anxiety* and *perceived ease of use*; and (iii) *perceived ease of use* and *behavioral intention*" (Benkatesh & Bala, 2008, 281).

*Figure 6 **Technology Acceptance Model 3 (TAM3)** (Venkatesh & Bala, 2008, 280)*

Table 1 provides a concise view of the variables that are present in all of the discussed editions of Technology Acceptance Model and are said to influence an individual's intention to use an ICT and its actual usage. The constructs that overlap and those that are unique to each proposed model are marked in different colours.

Table 1 **The variables present in all of the editions of TAM. The overlapping variables are marked in different colours** *(produced by the author of the paper)*

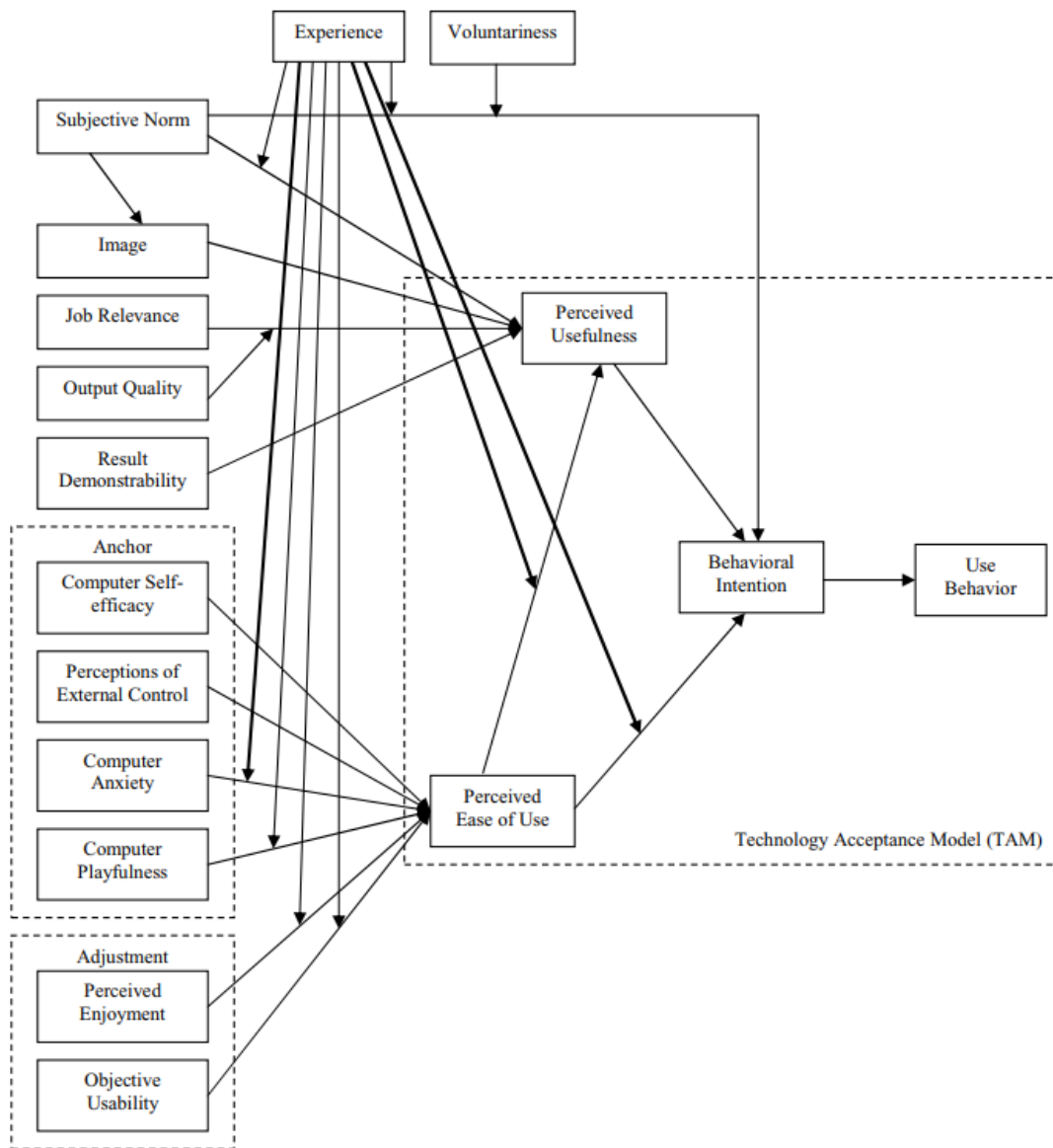| Edition	Variables							
TAM (1986)	Perceived usefulness	Perceived ease of use	Attitude toward using	Design features				
TAM (1989)	Perceived usefulness	Perceived ease of use	Attitude toward using	External variables				
TAM (1996)	Perceived usefulness	Perceived ease of use	External variables					
			System characteristics	Training	User involvement in design	The nature of the implementation process		
TAM2 (2000)	Perceived usefulness	Perceived ease of use	Voluntariness	Subjective norm	Image	Job relevance	Output quality	Result demonstrability
TAM3 (2008)	Perceived usefulness	Perceived ease of use	Voluntariness	Subjective norm	Image	Job relevance	Output quality	Result demonstrability
	Experience	Computer self-efficacy	Perceptions of external control	Computer anxiety	Computer playfulness	Perceived enjoyment	Objective usability	
UTAUT (2003)	Performance expectancy	Effort expectancy	Social influence	Facilitating conditions	Gender	Age	Experience	Voluntariness of use

Results

As can be seen from Figure 7, the largest share of the papers come from 2017, 2013, 2018, 2009, and 2015. This is an interesting result that indicates the potential limitations of the updated versions of TAM, namely TAM2, TAM3, and UTAUT or any other existent intention theories that might be used in measuring technology acceptance. Since the saturation of the publications during each year is not of prime importance in the present overview, it will not be discussed in further detail. However, one can extrapolate that the steady increase in extended TAM papers signals a call for reconsidering the original TAM as well its previous upgrades.

Figure 7 **The date and number of publications of the retrieved TAM papers**

The collected papers come from a variety of fields (see Table 2). The three top areas in which extended TAM was applied are education, IT, and business. It should be noted that in many cases, the three areas could be seen as overlapping.

For instance, there exists research that is conducted on the acceptance of a tool meant for training (future) employees of a business entity. However, it was decided to ascribe the collected papers to the field categories according to the focus of the journal in which they were published.

*Table 2 **The distribution of the papers representing different scientific fields***

Field	Number of papers
Education	34
IT	27
Business	17
Medicine	8
Marketing	6
Management	5
Telecommunication	4
Automation	2
Sustainability	1
Tourism	1
Library studies	1
Engineering	1
Agriculture	1

After a careful inspection of TAM extensions that were indicated in the collected papers, the author of the present paper noticed several unanticipated tendencies. Firstly, even though the finalized version of TAM (1996) excluded the construct of attitude that was present in the previous versions of the model, a large share of the collected papers reintroduced it. Moreover, different aspects and levels of attitude were indicated, for instance, *attitude (toward use / toward service / strength)* (Altanopoulou & Tselios, 2017; Lee et al., 2017; Alnajjar, 2017; Teo, 2016; Govender & Rootman le Grange, 2015; Chin & Lin, 2015; Lin et al., 2015; Kitchen et al., 2015; Rawashdeh, 2015; Shim & Oh, 2015; Cegarra-Navaroo et al., 2013; Rackers et al., 2013; Bere & Rambe, 2013; Chang et al., 2012; Lee et al., 2012; Ghazizadeh et al., 2012; Lee et al., 2012; Egea et al., 2011; Sternad et al., 2011; Alenezi et al., 2010; Liu et al., 2009; Al-Harby et al., 2009; Kim et al., 2009; Qi et al., 2009; Alshare et al., 2009; Shin, 2008; Ha et al., 2007; Di Bendetto et al, 2003; Chen et al., 2002; Jackson et al., 1997). It can be suggested that attitude can be related to the constructs of perception / consciousness / awareness, which were found in the papers of Dutta et al., 2018; Naspetti et al., 2017; Govender et al., 2015; Nasir & Yurder, 2015; Bao et al., 2013, Salajan et al., 2011; Egea et al., 2011; Liu et al., 2009; Al-Khateeb, 2007; Gefen & Keil, 1997; and Jackson et al., 1997.

*Table 3 **TAM2 and TAM3 variables found in the collected papers***

Shared TAM2 and TAM3 variables		Purely TAM3 variables	
Variable	Sources	Variable	Sources
job relevance	Bhatiasevi and Krairit, 2013; Son et al., 2012; Zhang et al., 2008	*(perceived) playfulness*	Dumpit and Fernandez, 2017; Shim and Oh, 2015
output quality	Bhatiasevi and Krairit, 2013; Shan et al., 2008	*(perceived) enjoyment / joy / arousal / satisfaction*	Nagy, 2018; Alalwana et al., 2018; Chang and Chen, 2018; Balouchi et al., 2017; Abdullah et al., 2016; Barhoumi, 2016; Chin and Lin, 2016; Lowry et al., 2013; Lee at al., 2012
result demonstrability	Bhatiasevi and Krairit, 2013; Son et al., 2012	*Corporate / social image*	Chang and Chen, 2018; Guardia er al., 2011; Stern et al., 2008
		(perceived) (technology / computer / online/system / service) self-efficacy	Dutta et al., 2018; Huang, 2016; Barhoumi, 2016; Bhatiasevi and Naglis, 2016; Abdullah et al., 2016; Govender and Rootman le Grange, 2015; Al-Azawei and Lundqvist, 2015; Tarhini et al., 2014; Al-Mushasha, 2013; Bao et al., 2013; Tarhini et al., 2013; Sternad et al., 2011; Ahmad et al., 2010; Alenezi et al., 2010; Irani et al., 2009; Lau and Woods, 2009; Cho et al., 2009; Hernandez et al., 2009; Al-Harby et al., 2009; Shih and Huang, 2009; Tseng and Hsia, 2008; Lee, 2006
		(technology / computer) anxiety	Oh et al., 2016; Abdullah et al., 2016; Calisir et al., 2014; Sternad et al., 2011; Al-Ammary, 2010; Alenezi et al., 2010; Shih et al., 2009; Shan et al., 2008

Secondly, as was mentioned in the previous sections, the papers for the analysis were retrieved by looking for the following keywords: 'extended Technology Acceptance Model', 'extended TAM', and 'TAM extension'. TAM2 and TAM3 were purposefully not included as the aim of the present paper is to reveal the means to extend the original TAM so they can be used to build a model that would help to better comprehend the adoption of educational technology. However, after having determined the additional variables, it was evident that a number of papers included variables from TAM2 and TAM3 (see Table 3) as well as UTAUT without acknowledging that they are actually conducting research by already using the existent extended TAMs.

The following UTAUT variables were also found:

- *social norms / social influence / social context* (Chang & Chen, 2018; Patel & Patel, 2018; Altanopoulou & Tselios, 2017; Lwoga & Lwoga, 2017; Rigopoulou et al., 2017; Tarhini et al., 2014; Tan et al., 2014; Tarhini et al., 2013; Son et al., 2012; Sternad et al., 2011; Irani et al., 2009), and

- *facilitating conditions* (Altanopoulou & Tselios, 2017; Alnajjar, 2017; Kabir et al., 2017; Tarhini et al., 2013; Asua et al., 2012; Zhang et al., 2008).

Finally, such moderating TAM2, TAM3, and UTAUT drivers as

- *age* (Werber et al., 2018; Gupta & Jain, 2015; Tarhini et al., 2014; Ahmad et al., 2010; Cho et al., 2009; Ha et al., 2007),

- *gender* (Dutta et al., 2018; Lwoga & Lwoga, 2017; Gupta & Jain, 2015; Al-Azawei & Lundqvist, 2015; Tarhini et al., 2014; Tan et al., 2014; Bao et al., 2013; Ahmad et al., 2010; Cho et al., 2009; Al-Harby et al., 2009; Saed & Abdinnour-Helm, 2008; Gefen & Straub, 1997), and
- *(previous / computer/tool / Internet / online flow / service) experience* and *usage* (Teo et al., 2017; Abdullah et al., 2016; Tarhini et al., 2014; Shin et al., 2013; Cha, 2013; Rackers et al., 2013; Sternad et al., 2011; al-Ammary, 2010; Alenezi et al., 2010; Lau & Woods, 2009; Hernandez et al., 2009; Qi et al., 2009; Saeed & Abdinnour-Helm, 2008; Ha et al., 2007; Dishaw & Strong, 1999; Jackson et al., 1997) were also discovered.

Having acknowledged the abovementioned, the remaining of the section will present the different categories of variables that do not belong to TAM2, TAM3 or UTAUT as well as theories and frameworks that were used to extend the original TAM.

Perceived characteristics

As can be seen in Table 1, in the first three TAM frameworks (incl. the first editions of the original TAM), there are two key perceived characteristics, namely *perceived usefulness* and *perceived ease of use*. The review of the collected papers reveals that depending on the field and context of the research, scholars introduced additional perceived characteristics to extend the original TAM.

*Table 4 **A classification of the perceived characteristics***

Affordances	Trust-related	Technology-related	Quality-related	Accessibility-related
Resources (Irani et al., 2009)	Trust (Werber et al., 2018)	Attractiveness (Chiang and Chen, 2018)	Quality of expert system (Alshare et al., 2009)	Financial cost (Tan et al., 2014)
Internet content (Al-Khateeb, 2007)	Risk (Balouchi et al., 2017; Karavasilis et al., 2016; Zeba and Ganguli, 2016; Nasir and Yurder, 2015; Karjaluoto et al., 2014; Tan et al., 2014; Rackers et al., 2013; Egea et al., 2011; Shin, 2008)	Service level (Liu and Ma, 2004)	Content quality (Calisir et al., 2014)	Reachability (Karjaluoto et al., 2014)
Convenience (Bhatiasevi and Naglis, 2016; Bere and Rambe, 2013; Chang et al., 2012)	Security (Patel and Patel, 2018)	Complexity (Ramkumar and Jemani, 2015)	Substitutability (Cha, 2013)	
Compatibility (Rigopoulou et al., 2017)	Web privacy (Rawashdeh, 2015)	Processing speed (Kitchen et al., 2015)	Quality of teaching (Salajan et al., 2011)	
Network externality (Lee, 2006) / network effects (Kitchen et al., 2015)	(Source) credibility (Balouchi et al., 2017; Lin et al., 2015; Lin et al., 2013)	Developer responsiveness (Gefen and Keil, 1998)		
Behavioural control (Karavasilis et al., 2016; Lin et al., 2015; Cha, 2013; Lin et al., 2013)	Reliability (Alshare et al., 2009)			

The provided classification of the perceived characteristics can be subdivided into five categories (see Table 4), namely, (i) affordances, (ii) trust-related, (iii) technology-related, (iv) quality-related, and (v) accessibility-related features.

User / consumer characteristics

It can be noted that different editions of TAM include variables that are related to the individual. However, the review of the collected papers reveals that the original TAM lacks more variables that are related to personal characteristics. Scholars from diverse research areas extended TAM with such features as (i) user / consumer learning and cognitive factors as well as (ii) personality-related elements, (iii) values and beliefs, (iv) habitual behaviour, and additional elements related to (v) demographics.

Table 5 ***A classification of user / consumer characteristics***

Learning-related and cognitive	Personality-related	Values and beliefs	Habitual behaviour	Demographics
Learning styles (Al-azawei et al., 2016; Al-Azawei and Lundqvist, 2015)	Extraversion (Altanopoulou and Tselios, 2017)	Social values (Rigopolou et al., 2017)	Habit (Asua et al., 2013)	Region (Gupta and Jain, 2015)
Learning performance (Nagy, 2018)	Agreeableness (Altanopoulou and Tselios, 2017)	Materialistic values (Rigopolou et al., 2017)	User preferences (Kowalewski et al., 2013)	Education / educational level / educational background (Tarhini et al., 2014; Al-Ammary, 2010; Cho et al., 2009; Al-Khateeb, 2007)
(ICT/computer) Knowledge (Lwoga and Lwoga, 2017; Melas et al., 2011; AL-Khateeb, 2011)	Personal innovativeness (Lwoga and Lwoga, 2017; Karavasilis et al., 2016; Kitchen et al., 2015; Karjaluoto et al., 2014; Tan et al., 2014)	Internal locus of control (Tseng and Hsia, 2008)	Ritualistic orientation (Cha, 2013)	Income / income level (Zhang, 2013; Al-Ammary, 2010; Al-Khateeb, 2007)
Autonomy (Fethali and Okada, 2018)	Risk tolerance (Stern et al., 2008)	Expectations (Fryad and Paper, 2015; Tarhini et al., 2015)	Instrument orientation (Cha, 2013)	
Motivation (Lowry et al., 2013; Guardia et al., 2011; Al-Ammari et al., 2011)	Neuroticism (Altanopoulou and Tselios, 2017)	Health concerns (Werber et al., 2018)	Viewing orientation (Cha, 2013)	
Intrinsic involvement (Jackson et al., 1997)	Impulsiveness (Stern et al., 2008)			
Concentration (Lee and Chen, 2010)	Conscientiousness (Altanopoulou and Tselios, 2017)			
Emotion (Lee et al., 2012; Ha et al., 2007) / valence (Lee et al., 2012)				
Curiosity (Lowry et al., 2013)				
Openness to experience (Altanopoulou and Tselios, 2017)				

As was previously mentioned, the largest share of the collected papers report on conducting research in educational contexts. This can explain the extensive list of purely learning-related characteristics as well as other features (see Table 5)

that can be considered important for the learning process – be it formal, non-formal or informal.

System characteristics

As one of the external variables in the finalized version of TAM, there is the construct of *system characteristics*. However, the characteristics are not specified. In the analysed papers, numerous system characteristics are introduced. They can be categorized along the lines of (i) the basic system features, (ii) quality aspects, (iii) source of challenges, (iv) accessibility, and (v) available support. It should be noted that these categories can also be ascribed to the *facilitating conditions* in UTAUT, which refer to "the degree to which an individual believes that an organizational or technological infrastructure exists to support use of the system" (Venkatesh et al., 2003, 453).

Table 6 ***A classification of system characteristics***

System features	Quality aspects	Source of challenges	Accessibility	Available support
System characteristics (Lwoga and Lwoga, 2017; Saed and Abdinnour-Helm, 2008)	System quality (Lee et al., 2017; Govander and Rootman le Grange, 2015; Shim and Oh, 2015)	Innovativeness of IT (Zhang et al., 2008)	Accessibility (Zhang, 2013)	Technical support (Govender and Rootman le Grange, 2015; Ramkumar and Jenamani, 2015; Son et al., 2012)
Features (Chin and Lin, 2016)	Technical quality (Lau and Woods, 2009)	Technology turbulence (Autry et al., 2010)	Visibility (Bhatiasevi and Krairit, 2013)	System support (Cho et al., 2009)
User-centric characteristics (Lwoga and Lwoga, 2017)	Content richness (Barhoumi, 2016)	Technological breadth (Autry et al., 2010)	Trialability (Bhatiasevi and Krairit, 2013)	User manuals functionality (Sternad et al., 2011)
System integration (Saeed and Abdinnour-Helm, 2008)	Content quality (Lau and Woods, 2009; Lee, 2006)	Technological complexity (Son et al., 2012)	Free access (Barhoumi, 2016)	Software maintainability (Bhatiasevi and Krairit, 2013)
Platform service (Chang and Chen, 2018)	Pedagogical quality (Lau and Woods, 2009)	Service complexity (Oh et al., 2016)	Affordability (Zhang, 2013)	Actionable feedback (Liu et al., 2009)
Information system usefulness (Saed and Abdinnour-Helm, 2008)	Information architecture (Barhoumi, 2016)	ICT feature demands (Melas et al., 2011)	(Internet) Cost (Alnajjar, 2017; Al-Khateeb, 2007)	
Tool functionality (Dishaw and Strong, 1999)	Information integrity (Egea et al., 2011)	Waiting line (Oh et al., 2016)	Internet availability (Al-Khateeb, 2007)	
Software functionality (Abdullah et al., 2016; Bhatiasev and Naglis, 2016; Bhatiasevi and Krairit, 2013)	Publisher's quality (Barhoumi, 2016)			

It can be claimed that the original TAM overlooked a number of important system characteristics. From the elements listed in Table 6, it is evident that for

an ICT to be accepted and used, it is important for it to be truly functional, have all-round quality and accessibility, and if potential challenges might occur, the support element might be essential.

Interaction with technology

In the collected papers, two types of interactions with technology can be noticed. They can be divided into (i) the general interaction and (ii) relationship with technology.

*Table 7 **A classification of interaction with technology related elements***

Category	Variables					
Interaction	Learner-learner (Nagy, 2018)	Learner-teacher (Nagy, 2018)	Interactivity (Alkali and Abu Mansor, 2017)	Interaction (Nagy, 2018)	Collaboration index (Naspetti et al., 2017)	Communication (Rackers et al., 2013; Sternad et al., 2011)
	(Focused) Immersion (Shin et al., 2013; Lowry et al., 2013; Saade and Bahli, 2005)	Situational involvement (Jackson and Leitch, 1997)	Telepresence (Lee and Chen, 2010)	Presence (Shin et al., 2013	Temporal dissociation (Lowry et al., 2013; Saade and Bahli, 2005)	Time distortion (Lee and Chen, 2010)
Relationship with technology	(Emotional) attachment (Teo et al., 2018; Teo, 2016)	Citizen engagement (Cegarra-Navarro et al., 2013)	Technology subscription (Gupta and Jain, 2015)	Control (Lowry et al., 2013)		

As the elements in Table 7 suggest, when conducting TAM research, it might also be of use to take into account the different existing relationships not only in terms of how much interactivity an ICT allows, but the directions of the interaction as well. The latter is an important aspect especially when one considers ITC use in educational contexts.

Other external variables

It is natural that people incorporate technology into their daily (esp. professional) lives not only voluntarily. There are numerous external forces that influence individuals to embrace a certain ICT. The column on the left-hand side of Table 8 indicates the variables that stand for the stimuli for change as was discovered in the collected papers. As was already mentioned, support (see the middle column of Table 8) is another important aspect when getting accommodated to using technologies. Finally, one of the key variables of the original TAM, *perceived usefulness*, might be influenced by variables that are related to benefits of using a particular technology (see the right-hand side colum of Table 8).

It should be noted that the elements present in Table 8 might be also seen as the more specific instances of nature of implementation (column 'stimuli for change') in the original TAM or facilitating conditions (column 'support source') in UTAUT.

*Table 8 **A classification of other external variables***

Stimuli for change	Support source	Benefits
External isomorphic pressures (Liu et al., 2008)	Government support (Al-Subari et al., 2018)	Technology benefits (Di Benedetto et al., 2003)
Social pressure (Cho et al., 2009)	Top management (Ramkumar and Jenamani, 2015; Son et al., 2012; Shih and Huang, 2009)	Economical benefits (Di Benedetto et al., 2003)
Peer influence (Salajan et al., 2011)	University support (Al-Mushasha, 2013)	
Argument for change (Jackson and Leitch, 1997)		
Firm-generated information (Lee et al., 2017)		
Policies (Barhoumi, 2016)		
Rules (Barhoumi, 2016)		

Miscellaneous variables

After ascribing all the variables into categories that were presented in Tables 3-8, some elements could only be labelled as miscellaneous. They are the following: *flow, task characteristics*, *course attributes*, *business process fit*, *task technology fit*, *quality of work life*, *user-generated information*, *confirmation*, and *individual differences*. Since these variables do not belong purely to perceived characteristics, user / consumer / system characteristics or interaction characteristics, they were not placed into the tables. However, this is not to say that such elements are not at all related to the variables that are present in Tables 3-8.

Moderating effects

The original TAM does not include any moderating variables. They were introduced in TAM2, TAM3, and UTAUT. As can be seen from Figures 4-6, the moderating drivers are *voluntariness*, *experience*, *gender*, and *age*. All of them except for voluntariness were found after inspecting the collected papers. In addition to them, scholars also introduced such moderators as *specialty*, *education*, *environmental concern*, and *time consciousness*.

Combination with other theories and frameworks

The variables that were used to extend the original TAM come from a variety of other theories, research frameworks, or literature from a specific discipline. As can be seen from Table 9, the majority of such additions come from marketing literature that explains consumption-related behavior.

Table 9 **Examples of theories and frameworks used to extend the original TAM**

Title	Source examples	Comments
TAM2	Karavasilis et al., 2016; Bhatiasevi and Krairit, 2013	See section *Historical Development of Technology Acceptance Model (TAM)*
UTAUT	Altanopoulou and Tselios, 2017; Kabir et al., 2017	See section *Historical Development of Technology Acceptance Model (TAM)*
Innovation Diffusion Theory (IDT)	Rigopoulou et al., 2017; Karavasilis et al., 2016; Bhatiasevi and Krairit, 2013; Zhang, 2013; Chen et al., 2002	Deals with the following features of innovations: relative advantage, compatibility, complexity, trialability, and observability.
Dhammism	Teo et al., 2018	Adds a Buddhist condition of attachment to explain person-to-object attachment.
Self-determination theory (SDT)	Fathali and Okada, 2018	SDT deals with different types of motivation.
Theory of Planned Behavior (TPB)	Rigopoulou et al., 2017; Lin et al., 2015; Lin et al., 2013; Cha, 2013	Helps to predict individual's behavior.
Expectation-Confirmation Theory (ECT)	Shin et al., 2013	Claims that if an individual is satisfied about previous use of technology, s/he will continue to use it.
Expectation Disconfirmation Theory (EDT)	Cho et al., 2009	Helps to explain the individual's choice (not) to use technology after having used it and weighed all pros and cons.
Consumption Theory	Zhang, 2013	Deals with how individuals make decisions of consumption.
Consumer motivation theory	Shim and Oh, 2015	Helps to explain why consumers are motivated to consume.
Value Consumption Theory	Rigopoulou et al., 2017	Deals with five consumption values (functional, conditional, social, emotional, and epistemic) which influence consumers' choice.
Social Exchange Theory (SET)	Gefen and Keil, 2008	Claims that when a person has to make a decision, s/he makes a cost-benefit analysis and chooses the most beneficial route.
Preferential decision knowledge	Muthitcharoen et al., 2011	Helps to understand how an individual develops different choices; can be divided into Attitude-Based Preference and Attribute-Based Preference.
Task-technology fit model (TTF)	Barhoumi, 2016; Dishaw and Strong, 1999	Refers to a piece of technology being able to meet the requirements set by a specific task.
Trust theory	Shim and Oh, 2015	Helps to describe a relationship between different business agents.
Variables from mobile technology and sales force automation (SFA) literature	Karjaluoto et al., 2014	Refer to improving the work of sales force through equipping it technology.
Big five personality characteristics	Altanopoulou and Tselios, 2017	Refers to the following personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience.
Software characteristics	Bhatiasevi and Krairit, 2013	Refer to software functionality, software reliability, and software maintainability.
Cognitive absorption (CA)	Lowry et al., 2013; Saade and Bahli, 2005	Refers to involvement with an ICT, includes temporal dissociation, focused immersion, and heightened enjoyment.
TPACK	Teo et al., 2017	Refers to the instructor's technological pedagogical content knowledge.
Health Belief Model (HBM)	Wahyuni and Nurbojatmiko, 2017	Based on the assumption that when an individual feels that there are risks to his/her health, s/he will take precautions.

Conclusion

It can be claimed that Technology Acceptance Model (TAM) is a versatile means to conduct research and explain an individual's behaviour that is related to technology acceptance (e.g. in educational contexts) and its further usage. The present paper analysed 108 papers that come from over ten different scientific areas, which helped to reveal what variables, models, and theories can be combined with the original TAM. The results indicate that the original TAM on its own is not entirely sufficient, thus scholars have mostly extended it with diverse context-specific variables.

Interestingly enough, numerous scientists enhance the original TAM by combining it with TAM2, TAM3, and UTAUT constructs. In addition to that, a number of other variables are added as well. They can be broadly classified along the lines of the features that are related to (i) perceived characteristics, (ii) user / consumer characteristics, (iii) system characteristics, (iv) interaction with technology, and (v) external features.

The analysis of the collected papers also reveals that scholars tend to combine TAM not only with its extensions (i.e. TAM2, TAM3, and UTAUT), but with other theories and frameworks as well. In the collected papers, the original TAM is mostly combined with other intention and behavior theories that mostly come from marketing literature.

The results presented in this paper have both theoretical and practical importance. As the paper reports on the variables coming from diverse scientific fields to extend TAM, the results might be useful in constructing a new, more advanced intention theory that would more accurately explain a person's acceptance and usage of, for example, educational ICTs. It is recommended that future endeavours extend the original TAM to build a model for a better understanding of educational technology adoption. In practice, the results presented in the paper might be helpful not only in constructing a research framework for an interdisciplinary context, but also when developing or improving a certain piece of educational technology, thus making it more sustainable.

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ИННОВАЦИОННЫЙ НАУЧНО-ОБРАЗОВАТЕЛЬНЫЙ КЛАСТЕР В СФЕРЕ ИКТ

Innovative Scientific-Educational Cluster as a Mechanism Accelerated Innovation Process in ICT

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Abstract. *The article investigates the issues and challenges related to the variability, mobility of technologies of education, development of the conceptual framework based on modernization of IT education, formation of professional knowledge of future specialists of an IT profile in the system of continuous IT education in the conditions of the educational and scientific complex "school-college-university" and the ability IT expedient of such system of knowledge. The IT efficiency of the system of professional knowledge could be achieved through a scientific justification of the project-creative component that is not investigated enough. And there is necessity to implement this experimental innovative component of the professional IT training. In the process of the research the author worked out a theoretical cluster system model of economy by applying innovative technologies where intersubjective innovative connections are available. The research results involve clarification of the following concepts essence "modernization of the system of professional knowledge in IT" and "future specialists in the sphere of ITs"; introduction of a project- creative approach in an educational-scientific complex "an IT - school with its specialization – an IT - college – an IT-university" under conditions of the IT education.*
Keywords: education, knowledge, IT, system, cluster.

ВВЕДЕНИЕ
Introduction

Эффективность экономики определяется степенью развития инновационных процессов, для которых в равной мере важными компонентами являются получение новых знаний и их трансфер в производственные секторы экономики и социальную сферу. Создание промышленных и инновационного научно-образовательных кластеров (ИНОК) является своеобразной платформой генерирования и передачи инноваций. Актуальность написания данной статьи обобщается накопленный опыт по созданию научно-образовательных объедений в ведущих стран, и ставится целью показать применение таких кластеров в

Узбекистане. В первую очередь Узбекистану для успешного проведения реформ в сфере образования, в частности высшего образования, очень поучительно исследовать взаимовлияние системы высшего образования с бизнесом. В данной статье приведен пример создания кластеров для интеграции образовательных учреждений с бизнесом.

ИНОК - это объединение юридических лиц и индивидуальных предпринимателей, вне зависимости от их организационно- правовой формы и формы собственности, имеющих совпадающие долгосрочные цели совместной деятельности в области разработки, внедрения в производство и коммерциализации новых технологий и видов инновационной конкурентоспособной продукции, профессиональной целевой подготовки и повышения квалификации кадров в интересах участников кластера, создания совместной научно-образовательной инфраструктуры, поддержи-вающей инновационный цикл разработки и выпуска продукции, технологического и кадрового обеспечения производства (Dewey, 1940).

Теоретические аспекты инновационного научно- образовательных кластеров
Theoretical aspects of innovative scientific - educational clusters

Идея промышленных кластеров, сформулированная Майклом Порте-ром, включает в себя объединение компаний одной отрасли, связанных стратегией вертикальной интеграции: поставщиков, производителей, финансовых институтов (Usmonov & Radjapov, 2017). Такие кластеры влияют на рост конкуренции между предприятиями – участниками кластера тремя способами: повышая производительность труда компаний, создавая инновационные решения в соответствующей направлению бизнеса области, и стимулируют его расширение (Usmonov et al., 2017).

Образовательная составляющая инновационных кластеров позволяет использовать преимущества взаимодействия с целью более быстрого и эффективного распространения новых знаний, стимулирующих инновации для роста конкурентоспособности экономики Узбекистана. Инновационный кластер может быть определен как географическая группировка учреж-дений и фирм, которые будут стимулировать и укреплять инновационную культуру в экономике региона.

Географическая близость фирм является необходимым, но не единственно достаточным условием для стимулирования инноваций и роста кластеров. Очень важно наладить механизм обмена и обратной связи между различными участниками и заинтересованными сторонами: местными и региональными органами власти. Существуют также примеры виртуальных кластеров, которые построены на механизме интенсивного обмена

знаниями, несмотря на географическую удаленность членов кластера.

Сильными сторонами кластера, помимо благодатной почвы для новаторов (Usmonov & Radjapov, 2017), является доступность высококвалифицированных человеческих ресурсов, наличие профессиональных услуг и венчурных инвесторов. Университеты играют значительную роль в развитии региона как центры инноваций. Такие примеры существуют в таких странах, как Израиль, Германия, Швеция, Финляндия, Япония, Китай и Корея. Изучение этих кластеров показывает, что их самая большая сила в сотрудничестве, где все заинтересованные стороны связаны в симбиотических отношениях.

Для Узбекистана очень полезным является опыт Индии по созданию ИТ- парков, так как разработка программных продуктов не требует больших вложений на транспортировку готовой продукции. Узбекистан являясь вторым в мире не имеющим выхода на мировые рынки через море, поучительно изучать опыт создания таких ИТ-кластеров. Например, Национальный научно-технический совет по развитию предпринимательства (NSTEDB) при Министерстве науки и технологии правительства Индии инициировало создание большого количества технопарков и инновационных инкубаторов с целью стимулирования и содействия развитию инноваций по ИКТ в стране. На 2008 г. в Индии действовало четыреста национальных научно-исследовательских лабораторий, тысяча триста лабораторий при промышленных предприятиях. Научно-технические разработки производятся также в 358 университетах страны и 500 иностранных научно-исследовательских центрах. Так или иначе, любой объект инновационной инфраструктуры должен находиться вблизи университета и в полной мере использовать выгоды от такого симбиотического существования (see http://www.nstedb.com/).

Университет (объекты его инновационной инфраструктуры) как координационный центр кластера должен использовать свои сильные стороны: наличие поддерживающей инновации инфраструктуры (исследовательских лабораторий, центров непрерывного обучения, бизнес-центров и инновационных инкубаторов); исследовательский потенциал и предпринимательский дух преподавателей и студентов; сотрудничество с местными органами власти и бизнесом; возможность разработки инновационных программ обучения, востребованных рынком; доступ к государственным программам и грантам и т.д. (Etskowitz, 2010).

Инновационный научно-образовательный кластер в Узбекистане
Innovative scientific - educational cluster in Uzbekistan

В настоящее время учреждения науки, образования и бизнеса развиваются по траекториям, часто не связанным друг с другом. Большинство предприятий Республики Узбекистана (РУ) не сотрудничают с учреждениями высшего образования. Вместе с тем полностью не решен ряд актуальных вопросов своевременной подготовки высококвалифицированных специалистов, отвечающих современным требованиям, для социально-экономического развития регионов республики с учетом потребностей отраслей и сфер экономики в необходимых специальностях, формирования содержания высшего образования в соответствии с программами перспективного развития и производственными, техническими и технологическими отношениями непосредственно на предприятиях, в учреждениях, трудоустройства в соответствии со специализацией и профессией. (Fedorov, 2011).

В частности, в выводах группы авторитетных международных экспертов, привлеченных при сотрудничестве Комитета Организации Объединенных Наций по вопросам образования, науки и культуры (UNESCO) и консалтинговой компании («DGP Research & Consulting»), на основе анализа результатов комплексного исследования системы образования Республики Узбекистан, проведенного в январе — июне 2017 года, указывается на такие недостатки, как необеспечение целостности теории и практики в процессе высшего образования, в результате неэффективной организации квалификационной практики студентов на производственных предприятиях значительная часть выпускников, вместо того чтобы выходить готовыми специалистами, после устройства на работу заново осваивает свою профессию, специальность, а также несоответствие механизма контроля качества образования, нехватка квалифицированных педагогических и управленческих кадров в образовательных учреждениях, недостаточное налаживание эффективного сотрудничества с зарубежными образовательными учреждениями.

Кроме того, не отвечает требованиям участие отраслей экономики в процессах формирования заказов на подготовку кадров в перспективе, разработке квалификационных требований к выпускникам, обеспечении качества подготовки специалистов, необходимых для отрасли. Работодателями не осуществляется системная работа по обеспечению соответствия программ высшего образования требованиям меняющегося рынка труда.

Имеются разрывы в системе взаимосвязи высшее образование - наука - производство, не обеспечена их интеграция. Научно-исследовательские

институты не привлечены на должном уровне к процессу подготовки кадров в высшем образовании, научные исследования осуществляются без учета реальных потребностей отраслей экономики. Отсутствие системной подготовки квалифицированных научных и научно-педагогических кадров приводит к снижению научного потенциала высших образовательных учреждений. Выходом из сложившейся ситуации является сотрудничество предприятий в сфере развития инноваций, выраженное в перенесении более прогрессивного опыта в практику отстающих предприятий (Usmonov et al., 2017).

Однако, исходя из данных последних исследований, количество малых и средних предприятий, которые подписали любое соглашение о сотрудничестве в инновационной деятельности с другими предприятиями или учреждениями очень мало. Только около 14 % предприятий имеют соглашения о сотрудничестве в сфере инноваций. Из них около 56 % - это предприятия, действующие в столице - Ташкенте (Usmonov et al., 2017).

Необходима разработка организационно-экономических механизмов управления инновационным развитием, способных обеспечить более высокую степень взаимодействия образования, науки и бизнеса. Полагаем, что развивать механизмы такого взаимодействия целесообразно на основе формирования кластеров. Кластер - это географически сконцентрированная группа взаимосвязанных, дополняющих друг друга компаний и организаций, действующих в определенной сфере, одновременно конкурирующих и взаимодействующих в сферах общих интересов. Создание кластеров, как промышленных, так и инновационного научно-образовательных находится в Узбекистане на начальной стадии. В настоящее время недостаточно четко проработаны механизмы формирования инновационного научно-образовательных кластеров: определение их элементов, концепции развития, инструментов управления и оценки эффективности (Porter, 1998).

Сейчас поддержка научных исследований и разработок, а также стимулирование устойчивого инновационного климата являются стратегическим приоритетом социально-экономического развития РУ с момента принятия в 2008 г. Постановления Президента Республики Узбекистан № ПП-916 «О дополнительных мерах по стимулированию внедрения инновационных проектов и технологий в производство», который регламентирует создание действенных механизмов по стимулированию развития и внедрения в процессы модернизации, технического и технологического обновления производства научно-прикладных исследований и инновационных разработок, обеспечения более тесной связи науки и производства, а также учитывая роль Республиканской ярмарки инновационных идей и проектов в установлении тесных

кооперационных связей между научно-исследовательскими организациями и предприятиями отраслей реальной экономики, выделения правовых отношений, связанных с разработкой и осуществлением государственной политики в области науки и инноваций. Основной целью государственной политики в области науки и инноваций является устойчивое социально-экономическое развитие РУ, основанное на стимулировании и максимально широком использовании научно-технического и технологического потенциала, ориентированного на ценностях открытого демократического общества (Usmonov et al., 2017).

Рассмотрим территорию и потенциал города Ташкент с точки зрения развития инноваций по созданию центров преимуществ в сфере информационных технологий (ИТ). Ташкент (особое территориальное образование) - столица и крупнейший город Узбекистана, город республиканского подчинения. Крупнейший по численности населения город Узбекистана и Средней Азии, центр Ташкентской городской агломерации, важнейший политический, экономический, культурный и научный центр страны. Население города превышает 3 миллиона человек, и он расположен в северо-восточной части Узбекистана, на равнине в долине реки Чирчик, на высоте 440-480 м над уровнем моря и занимает территорию в 334.8 км2. В городе Ташкент действуют 34 высших образовательных учреждений, из них 10 являются государственными университетами разных профилей. Для нашего исследования рассмотрим Ташкентский университет информационных технологий имени Мухаммада аль-Хорезми - ТУИТ. В составе Университета и его региональных филиалов действуют 13 факультетов, 62 кафедр и ведется подготовка кадров по 23 направлениям образования. Наличие в Ташкенте ТУИТ, готовящего кадры по ИКТ для экономики не только для столичного региона, но и для всей страны всегда способствовало поддержанию его статуса и конкурентоспособности в рамках РУ (htpp://www.edu.uz/).

Стратегия социально-экономического развития Ташкента предусматривает создание ряда инновационных структур по стимулированию развития малого и среднего бизнеса в столичном регионе, в частности, в сфере информационных технологий. В целях создания благоприятных условий для формирования и активного развития высокотехнологичных отраслей экономики, основанных на использовании ИКТ, дальнейшего углубления интеграции науки, образования и производства в данной отрасли за счет предоставления дополнительных льгот и преференций разработчикам и заказчикам продуктов информационных технологий, увеличения экспорта продукции ИКТ, а также стимулирования привлечения отечественных и зарубежных инвестиций был создан Инновационный центр по поддержке разработки и внедрения информационных технологий

«Mirzo Ulugbek Innovation Center» (далее - Инновационный центр).

В данной стратегии закладывается основы развития партнерства между наукой, бизнесом и структурами власти в сфере ИКТ, образуя взаимодействие партнеров инновационного научно-образовательного кластера по схеме «школа – университет – производство». (рис.1.). Профессорско-преподавательский состав ТУИТ привлекается для проведения экспертиз проектов, программ и законов на региональном, так и на уровне всей страны. Тогда как система регионального образования, является важнейшей интеллектуальной предпосылкой повышения уровня инновационного потенциала и общей конкурентоспособности города Ташкента.
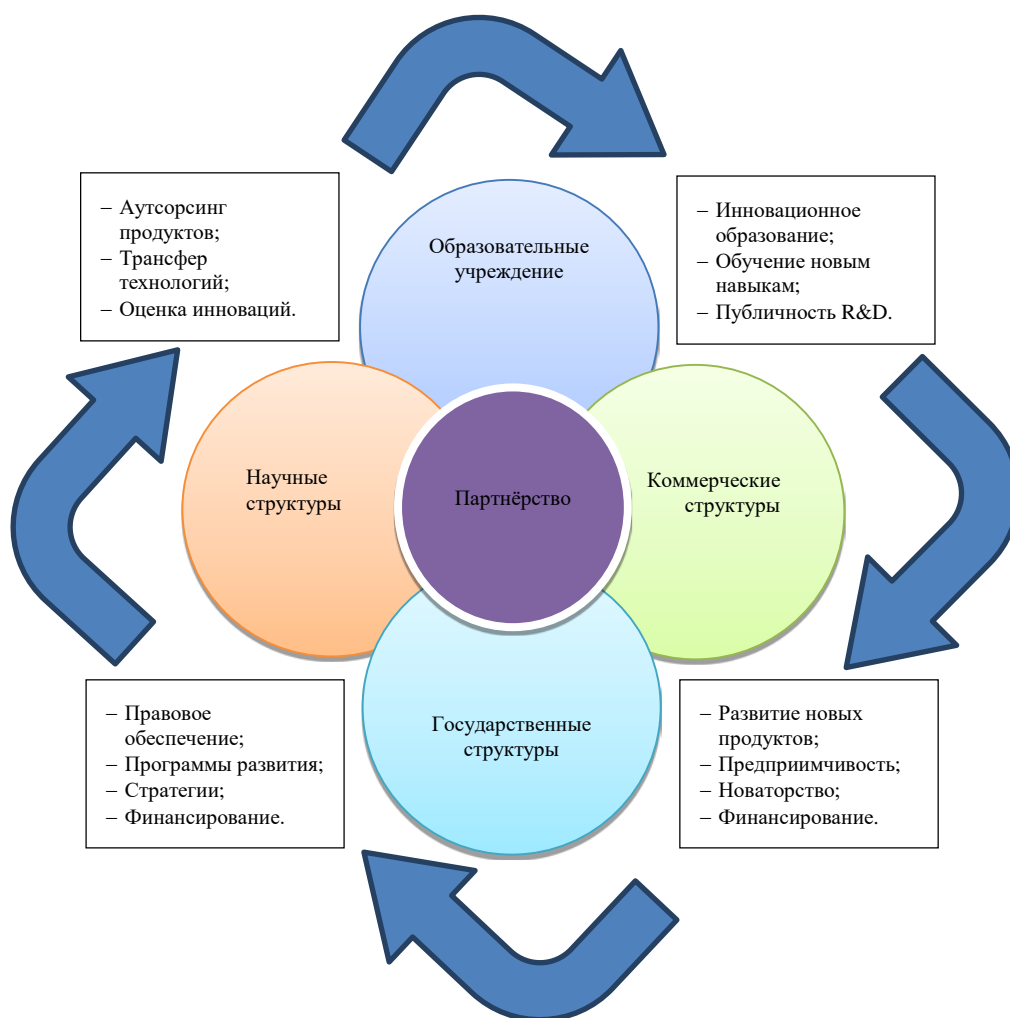

Рисунок 1. ***Сферы взаимодействия партнеров инновационного***
научно-образовательного кластера
Figure 1 ***Theoretical model of the IT - system "school-university-industry"***

На современном этапе в Инновационном центре Ташкента создается на принципе экстерриториальности в пределах территории Республики Узбекистан с размещением резидентов Инновационного центра на всей территории республики для создания максимально благоприятных условий развития инновационного производства продукции информационных технологий. В этой ситуации именно ТУИТ должен занять лидирующую роль в построении инновационной инфраструктуры научно-образовательного кластера региона по производству продукции информационных технологий.

Выгоды вступления организаций в состав кластера в силу синергетического эффекта очевидны. Центр, ядро ИНОК будет выступать в качестве консультативного органа для создания между различными участниками и заинтересованными сторонами необходимых связей. Они могут включать в себя организацию семинаров, конференций, групповых дискуссий, лекций и т. д., обеспечивая при этом участие университета, соответствующих субъектов местной и национальных промышленности, научно-исследовательских институтов, гражданского общества и правительства.

Центр инновационного кластера будет координировать и стимулировать предпринимательскую активность как в самом вузе среди студентов, так и в действующем бизнесе; выявлять проблемы, с которыми сталкиваются местные сообщества. В сочетании с благоприятной инновационной средой республика, включающей нормативную и финансовую составляющую, партнеры кластера сосредотачиваются на внедрении прогрессивных технологий обучения, оптимизации исследований и ускоренном развитии новых инструментов и подходов для обучения (Katz & Muro, 2010). Для эффективной деятельности ИНОК должен сформировать связи между четырьмя ключевыми партнерами: преподавателями, исследователями, предпринимателями и госслужащими, каждый из которых привносит свои уникальные преимуществами в общую сеть.

В рамках ИНОК могут быть апробированы новые дисциплины и технологии обучения с участием заинтересованных сторон, а также студентов и преподавателей. Данные инновационные школы могут объединить не только участников кластера, но и городские лицеи, библиотеки, общественные и исследовательские центры. Они будут обеспечивать способность быстро разрабатывать, тестировать, и собирать данные о новых подходах и продукты, продвигать фундаментальные и прикладные исследования в сфере ИКТ. Тесная связь с партнерами-предпринимателями позволит обеспечить высокий спрос на студентов,

подготовленных по новым программам, с применением современных методов преподавания.

Предоставляя инвестиционный капитал, предприниматели могут влиять на ускорение исследовательских процессов и коммерциализации интеллектуальной собственности и увеличить вероятность успеха новых предприятий, построенных на знаниях и решениях, которые генерируются в кластере.

Ускорение темпов инноваций требует развития сотрудничества между преподавателями, исследователями и коммерческими и государственными партнерами и создания общего плана исследований и развития экосистемы столичного региона (рис. 2).
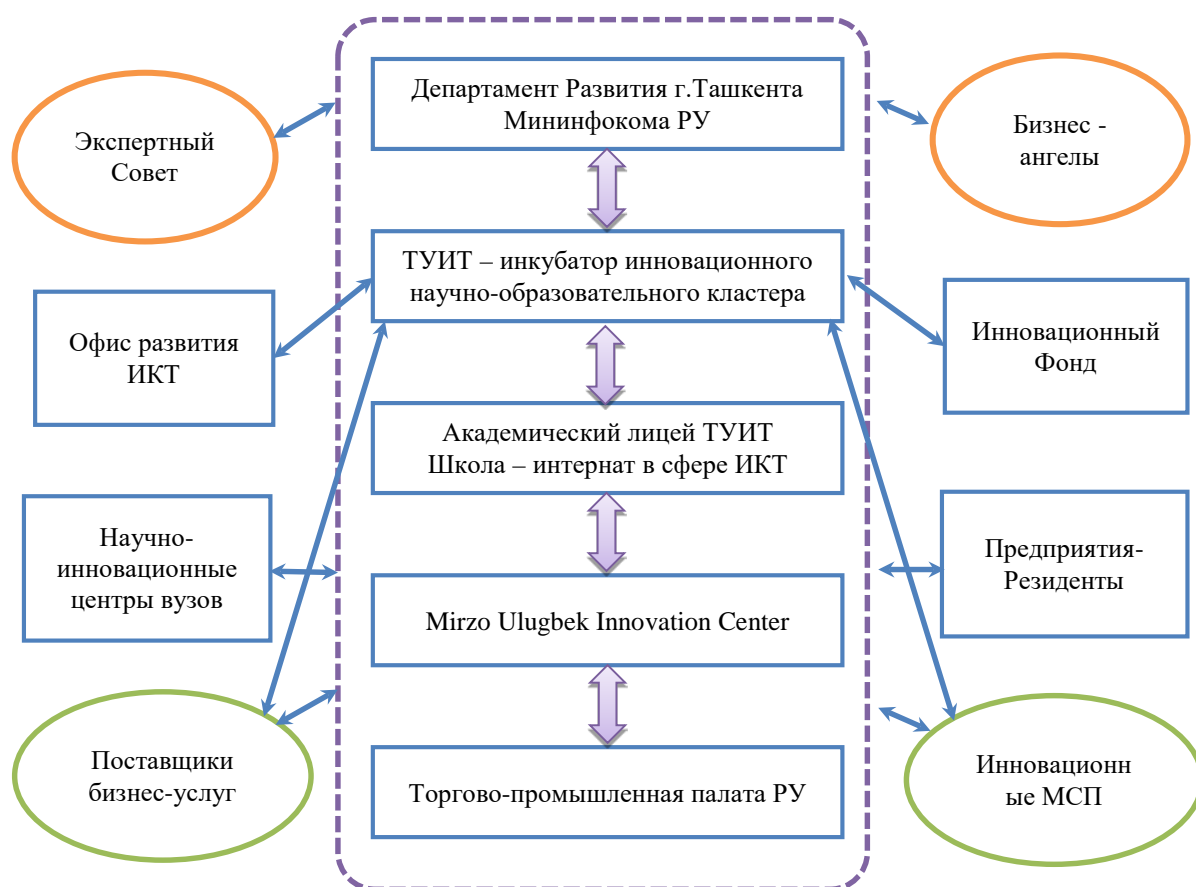

*Рисунок. 2. **Предлагаемая инновационная инфраструктура в сфере ИКТ с ее основного элемента «инновационного научно-образовательного кластера»*** *(разработано автором)*
*Figure 2 **Theoretical model of innovative ICT education and industry cooperation with its main element of the "innovative scientific and educational cluster"*** *(developed by the author)*

В настоящее время в ТУИТ уже создан ряд структур поддержки научно-инновационной деятельности: Научно-Инновационный Центр, Узбекско-Индийский и Узбекско-Корейский Центр информационных технологий, а также учебный Центр электронного правительства. Однако необходимо с самого начала сделать упор не только на создание инноваций, но и на процесс их коммерциализации и распространения от создателя к пользователю.

Основными направлениями деятельности подобных центров являются: внедрение технологий из вузовского сектора науки в сектор промышленности, привлечение инвестиций для развития инновационной деятельности ТУИТ и города, содействие развитию международного сотрудничества, выполнение работы по заказу бизнес-структур в рамках научных исследований.

Объективным фактором современной экономики является потребность общества в системе надежных бизнес-услуг, в постоянном подъеме инновационности, основанной на научных исследованиях, а также в высококвалифицированных кадрах. Для активного развития инновационной экономики, экономики, основанной на знаниях, необходима модернизация системы образования, изменение содержательных акцентов в подготовке молодежи. В первую очередь, необходимо формирования инновационного предпринимательского мышления у студентов ТУИТ.

Партнеры ИНОК, созданного в городе Ташкент (рис. 2) совместно разрабатывают программы дополнительного образования в рамках внедрения системы непрерывного образования. Для этих целей ИНОК привлекает преподавателей, исследователей, студентов из других стран. Научно-образовательная основа деятельности кластера является базой для коммерчески востребованной инновационной деятельности (Education Innovation Clusters, 2012). Ускорение темпов инноваций требует сотрудничества между преподавателями, исследователями и коммерческими партнерами работать над решением проблем региона и создать общий центр исследований и развития его экосистемы.

Полноценный ИНОК взаимодействует с предпринимателями, финансовыми структурами и госорганами - заказчиками инноваций. Деятельность кластера позволит сформировать инновационные цепи «кафедра – научно-исследовательский центр – инновационный инкубатор – технопарк – МСП», повысить информационную доступность о реализуемых проектах для потенциальных инвесторов и повысить конкурентоспособность как вуза и МСП, так и в целом региональной экономики. Основой модели ИНОК выступает взаимодействие трех компонентов: государство, бизнеса, университет (Usmonov et al., 2017). Главенствующая роль того или иного компонента модели может зависеть от расстановки сил

в регионе, инициативы сторон. В конечном итоге данная модель должна прийти к равновесию ее составных частей. К примеру, в Сколково роль инициатора перемен взяло на себя государство, в Томске - университеты. Как показывает практика, проекты, основанные на инициативе, произрастающей снизу-вверх, в конечном итоге более успешно реализуется. Но для этого требуется зрелое гражданское общество, инициативная местная власть ясно одно - для успешной реализации модели важен сбалансированный подход. (Etskowitz, 2010).

Выводы
Conclusions

На современном этапе в городе Ташкенте начата работа по региональной политике в области инноваций в сфере ИТ. Проблемы столичного региона возможно разрешить за счет создания новых инновационных структур-кластеров и, прежде всего, посредством обеспечения механизма взаимодействия участников кластера и заинтересованных в его развитии сторон. Технологии, объекты интеллектуальной собственности при создании кластеров в столице могут быть заимствованы из внешних рынков. Для их свободного перемещения в столице важно создать условия, которые позволили бы их генерировать, воспроизводить и трансформировать в капитал инновационного предприятия.

Для эффективного функционирования научно-образовательного кластера в сфере ИКТ на территории столицы необходимо решение первоочередных следующих задач:

- создание нормативной правовой базы поддержки формирования таких кластеров на национальном и региональном уровне;
- развитие элементов инновационной инфраструктуры: технопарки, бизнес- инкубаторы, центры трансферта технологий, венчурные компании;
- создание системы государственной поддержки инновационных компаний на этапе старта, в первую очередь малого бизнеса.

Симбиоз предпринимателей, государственных структур, образовательных учреждений и поставщиков бизнес-услуг региона с центром - Ташкентским университетом информационных технологий позволит наладить потоки обмена инновационной информацией, изобретениями и готовыми продуктами, и технологиями между всеми структурами кластера и в дальнейшем распространить их на весь регион, страну в целом.

Summary

The paper considers the issues of creating an innovative scientific and educational cluster in Uzbekistan on the basis of foreign experience. The main conditions for the effective functioning of the scientific - educational cluster in the field of ICT are revealed: the creation of a regulatory legal framework to support the formation of such structures at the national and regional levels, the development of innovative infrastructure elements, and the stimulation and strengthening of innovative culture in the economy of the capital and the country. The challenges connected with variability and mobility of technologies contribute to the transformation of a modern IT structure of the Uzbekistan society, the knowledge society in the post-industrial economy, into knowledge-based economy. In a new information society, a competitive system of IT knowledge should be a priority. The formation of which is provided by the training of competent IT experts.

Improvement of educational activity, which began in our country according to the national doctrine based on the personal oriented education completely conforms to requirements of the modern accelerated social development. At the same time there is also a necessity of forming of an extensive system of training during the life for future specialists in the sphere of ITs through the extreme dynamism and variability of modern global and national - IT and industrial-innovative space that particularly nowadays refreshes the conceptual and theoretical analysis of the issues related to the peculiarities and problems of implementation of IT education throughout life.

Now there is a problem of development of the conceptual framework based on improving of Uzbekistan education to the world educational standards, where the important place is taken by urgent issues connected with the formation of the system of future specialists' professional knowledge in the IT sphere. In the process of formation of this system it's essential to take into account the principle of continuity. Besides it presupposes the structuring of thematic units of theoretical and applied and effective interaction of subsystems of specialized, secondary and higher professional IT education. Whereupon the priority is the project - creative approach to the stage – by - stage formation of scientific-educational cluster approach in the system of continuous IT education.

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