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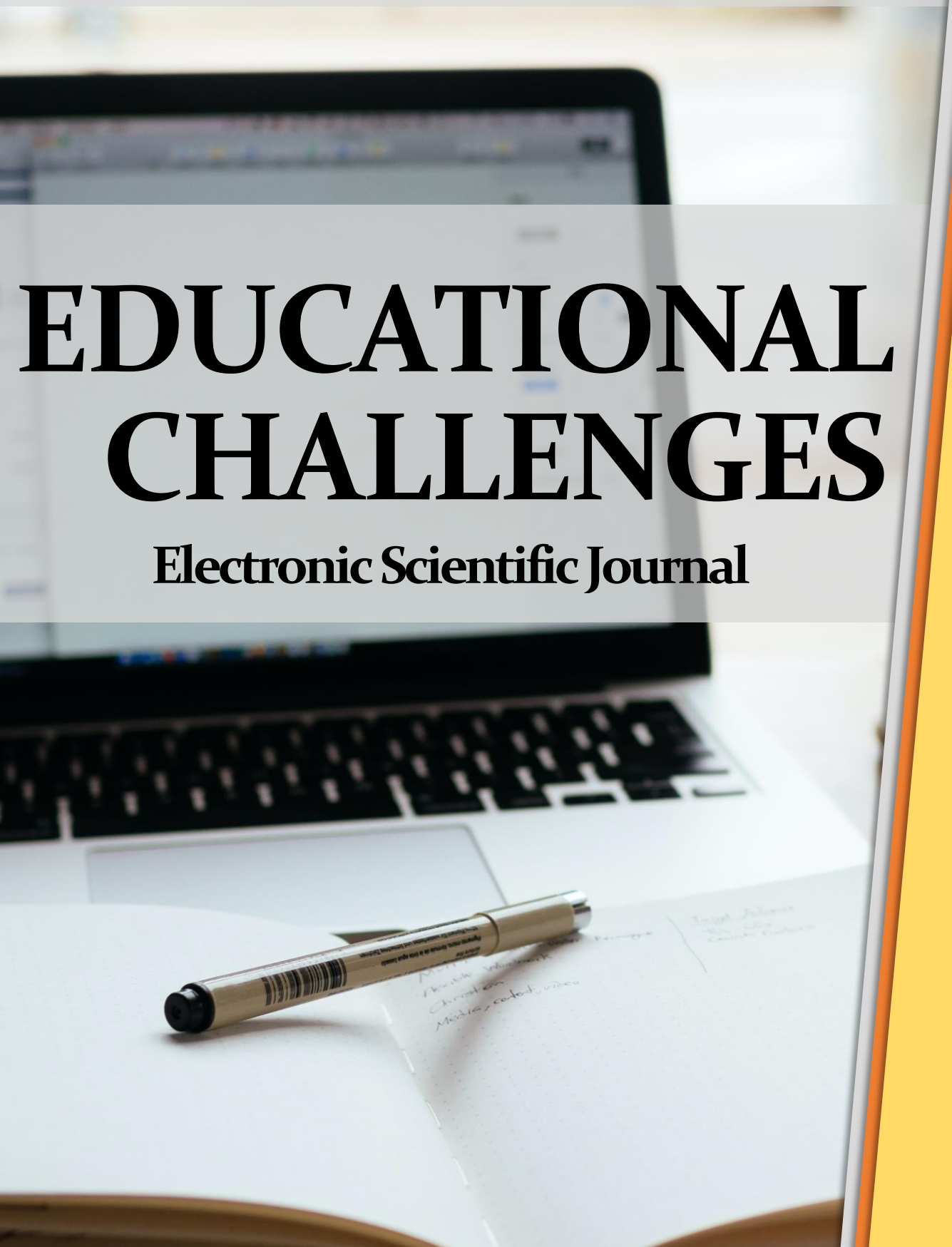

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SELECTED, ADOPTED AND IMPLEMENTED SOCIAL-EMOTIONAL LEARNING PROGRAM: THE KINDNESS CURRICULUM FOR KIDS

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ABSTRACT

*The **aim** of this manuscript is to introduce the program of social-emotional learning. Developed by the Centre for Healthy Minds (CHM) this program is called the Kindness Curriculum (CHM, 2017). Founded by the world renowned neuroscientist Dr. Richard J. Davidson, the Centre for Healthy Minds offers a kinder, wiser, more compassionate world.*

***Methodology**. Qualitative research method was used in this study. The methods of documentary research, observation and interview were also applied. The Kindness Curriculum was employed as a documentary study. The target audience and the object of observation were primary school children aged 6 to 7, the teachers were interviewed.*

***Results**. The mission of the centre is to cultivate kindness and relieve suffering through the scientific study of the mind. There are some social-emotional training programs, but the program developed by the centre is free. This program has been used by preschools and some researchers. The study involves the adaptation of the Kindness Curriculum to Turkish culture. The program contains twenty-four lessons in eight topics. These lessons include short stories, songs and entertaining games. The program can be conducted by one specialist both in preschool institutions and in primary classes. During the adaptation process, the program was translated into Turkish by two specialists and they controlled the entire translation process, which balanced the adaptation of the program by 80%. The benefits of the program for Turkish children have been studied by three psychologists. The program was used as a pilot research in the first grade of primary school.*

***Conclusions**. There are many positive results of the program application implemented by teachers. Schools are encouraged to add this program to their*

curriculum, and there is a need for more experimental research on the usefulness of the proposed program.

KEY WORDS: *primary school pupils, the Kindness Curriculum, social-emotional learning, program development, Turkey.*

INTRODUCTION

The importance of social-emotional learning (SEL) has been widely discussed all over the world. There are several associations such as collaborations of academics on social-emotional learning (CASELL) and the Centre of Healthy Minds (CHM) developing and conducting new programs and research on this topic. The program introduced in this manuscript was developed by CHM. Let's look closely at CHM.

SEL program showed that students who participated in the universal, school-based SEL program demonstrated improved social and emotional skills, attitudes, and behaviour compared to students who did not participate in the universal SEL program Portnowa, Downera & Brownb, 2018).

Social-emotional learning (SEL) is mainly in the course of development, children must learn how to communicate with others and think, feel, and act in contexts that they distinguish from all that happens around them (Elias, 2019).

The Centre for Healthy Minds (CHM).

This organization was set up in the University of Wisconsin Madison. Established by the world-renowned neuroscientist Dr. Richard J. Davidson, the Centre for Healthy Minds offers a kinder, wiser, more compassionate world. The purpose of the community is to promote well-being and reduce sufferings through scientific knowledge of the mind.

There are some important questions and comments by the CHM. What if our world were a kinder, wiser, more humane place? The world where changing your mind not only increases your well-being but leads to the well-being of others in your society and throughout the globe?

This is the aim of the Centre for Healthy Minds at the University of Wisconsin–Madison. Being born with rational and physical strength is required at a global scale, manage accurate scientific research to bring new penetrations aimed at promoting the well-being of all people.

Their inquiry, rooted in neuroscience, proceeds down to one primary question: What establishes a healthy soul?

To start answering this question, we have examined the science of emotions, meditative traditions and conditions of mind we assume affect well-being, including mindfulness, flexibility, patience, enjoying positive emotions, kindness, understanding, gratitude and empathy.

The Centre, part of one of the world's top research organizations, profits from cross-disciplinary collaborations in the arts and virtues, the physical and natural sciences, and the social sciences. They take satisfaction in being a global centre for changes in affective and thoughtful neuroscience in expanding to well-being over the lifespan (centrehealthyminds.org, 2021).

THEORETICAL FRAMEWORK

Core values of the association are:

- *Create an impression on the society*

The meaning is the grounding system for all the experiments and professions do commonly. Centre gives awareness of what our product involves in the world, prioritizes research and projects that have the highest potential to improve well-being and reduce suffering and attempt to increase the influence of advantageous results of our work.

- *Encourage a prosocial workplace*

Whereby the community does its professional common values. They are dedicated to producing a workplace and society of collaborators that incorporate their purpose and revelation. They take this responsibility by communicating with respect, kindness, empathy, and appreciation approaching each other and the support they share.

Who is Dr. Richard J. Davidson?

Having dedicated life to healthy minds at University of Madison, Davidson is well-known for his groundbreaking achievement investigating emotion and the brain. A friend and confidante of the Dalai Lama, he is a highly sought-after authority and chairman, leading consultations on well-being on international platforms such as the World Economic Forum, where he attends the Global Council on Mental Health. Time Magazine described Davidson as one of "The 100 Most Influential People in the World" in 2006.

His investigation is broadly based on the neural principles of emotion and emotional technique as well as techniques to improve human flourishing, including meditation and explained thoughtful applications. His studies have focused on people across the lifespan, from birth to old age. Besides, he's conducted studies with people with emotional disturbances such as different disorders and autism, as well as proficient meditation practice. His investigation uses a wide variety of techniques including MRI, positron emission tomography, electroencephalography, and advanced genetic and epigenetic systems.

Davidson has written hundreds of experimental papers, numerous parts, and articles, and is a co-author with Daniel Goleman of "Altered Traits: Science Reveals How Meditation Changes Your Mind, Brain, and Body" (Avery, Sept. 5, 2017). He is also the producer, with Sharon Begley, of The New York Times bestseller "The Emotional Life of Your Brain" (Penguin, 2012). He has been emphasized widely in conventional media, including The Today Show, ABC's Nightline, National Public Radio, National Geographic Magazine, Time Magazine, Newsweek, O: The Oprah Magazine, PBS's The Charlie Rose Show, Harvard Business Review, and further national and international programs.

Davidson is Professor of Psychology and Psychiatry at the University of Wisconsin–Madison where he has had a faculty post since 1984. He is the founder of Healthy Minds Innovations, Inc., an altruist dedicated to promoting the purpose of the Centre for Healthy Minds.

So, the **aim** of this manuscript is to introduce the program of social-emotional learning. Developed by the Centre for Healthy Minds (CHM) this program is called the Kindness Curriculum.

METHODOLOGY

Qualitative research method was used in this study. The methods of documentary research, observation and interview were also applied. The Kindness Curriculum was employed as a documentary study. The target audience and the object of observation were primary school children aged 6 to 7, the teachers were interviewed; 102 primary school first grade children from four different classes participated as volunteers in this pilot study.

RESULTS

About the Kindness Curriculum.

The Kindness Curriculum of social-emotional program consists of eight topics and twenty-four lessons (Table 1 Kindness Curriculum Distribution). Topics and lessons are the following:

Topic 1: Mindful Bodies and Planting Seeds of Kindness.

Lesson 1 Mindful Bodies and Awareness of Attention and Breath.

Lesson 2 Growing Seeds.

Table 1. *Kindness Curriculum Distribution*

LESSON	LESSON TITLE	NOTE	BOOK TITLE	AUTHOR	ESTIMATED TIME	THEME(s)
Topic 1: Mindful Bodies and Planting Seeds of Kindness						
3	Growing Friendships with Kindness		**Sumi's First Day of School**	Soyung Pak	7 minutes	Emotions and caring behaviors
4	Quiet Emotions on the Inside	Begin reading portions of this book on first day of curriculum.	**A Quiet Place**	Douglas Wood	Read in multiple sittings.	Restfulness and quiet
5	I Can Notice Things When I Am Quiet Inside	Read story with students prior to lesson.	**The Listening Walk**	Paul Showers	10 minutes	Restful and quiet place
6	Different Emotions Feel Differently on the Inside		**Quick as a Cricket**	Audrey Wood	10 minutes	Feelings in the body
8	Working with Emotions in a Kind and Friendly Way	Read story with students prior to lesson.	**I'm the Best**	Lucy Cousins	7 minutes	Hurting feelings and fixing them
9	Emotions Change Many Times Each Day	Read story with students or play audio recording prior to lesson; skim and summarize text as needed.	**Dogger**	Shirley Hughes	10 minutes	Kindness and gratitude
10	Busy Mind and Clear Mind		**Moody Cow Meditates**	Kerry Lee MacLean	8 minutes	Being with anger
12	What Can We Do When We Are Upset?		**When Sophie Gets Angry**	Molly Bang	6 minutes	Working with anger and uncomfor table feelings
14	Forgiving Myself	Read story with students prior to lesson; skim	**Down the Road**	Alice Schertle	10 minutes	Forgiveness

		and summarize text as needed.				
16	Gratitude for People or Things in My Life		**Gracias/ Thanks**	Pat Mora	10 minutes	Gratitude for all that we have
17	Gratitude for My Body	Read story with students prior to lesson.	**All of Me!**	Molly Bang	10 minutes	Gratitude
18	Gratitude for Other People		**What's My Job?**	Lyn Calder	10 minutes	Adult jobs and services offered
19	People Around the World Want Peace		**Can You Say Peace?**	Karen Katz	5 minutes	Peace
20	Connections with Others/ Dependence	Read story with students prior to lesson.	**Somewhere Today**	Shelly Moore Thomas	8 minutes	Depending on each other
			How Kind!	Mary Murphy	5 minutes	Passing kindness on to others
21	Caring for Animals and Insects		**Hey, Little Ant**	Philip and Hannah Hoose	7 minutes	Kindness, helpfulness, empathy
22	Gratitude and Caring for Our World		**In My World**	Lois Ehlert	2 minutes	Gratitude for the world

Lesson 23 Bringing it All Together
Lesson 24 Wrap-up

The Kindness Curriculum lessons provide opportunities for literacy learning in the classroom. Literature for children used at these lessons offers reinforcement of literacy skills as well as a way of engaging students in the lessons. Books are not just read to students; the reader engages the students in the book as an adventure, arousing their natural curiosity and problem-solving skills. Asking questions about what characters feel, what might happen next and the links with what students learn now (HMO, 2017: 63-64).

This study lasted 22 weeks and included two terms. The program was held as a game and physical activity lessons. The SEL program is used only half an hour weekly. All participants seem to be very glad to take part in the study not only university students but also primary school pupils and their teachers.

This long-term program was successfully used for the fourth grade pupils in primary school, and is important for both teachers and parents. Of course, cultural peculiarities are very important. Developing and applying social-emotional programs are vital.

SEL aims at developing students' social-emotional skills and promoting a positive school environment. It is of great interest to educators, policymakers, and researchers

(Nickersona, 2019). SEL describes a variety of skills such as responsible decision-making, relationship skills, self-management, social awareness, and self-awareness (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2020)

DISCUSSION

A study highlighted indications of perceived positive changes in children's social, emotional and mental health (SEMH) difficulties and the importance of making and thinking about art and overcoming such difficulties in art therapy (McDonald, Holttum & Drey, 2019).

Many schools have Positive Behavior Intervention Supports (or its School-Wide form); many have SEL program in curriculum. Others have adopted mindfulness, growth mind-set, restorative practices, or the increasing popular "kernals" interventions designed to build SEL with high efficiency (Elias, 2019).

CONCLUSIONS

By taking the time to determine where social-emotional learning can fit into the curriculum, health educators maintain high standards of practice that continue to benefit their students. Ignoring social-emotional learning is a great disservice to the students who rely on health education to learn to be their healthiest, happiest selves (Bartlett, 2019).

Social-emotional learning program is very important for well- being of children. Bear in mind that developing SEL program is not easy. Those program requires specialists, educators and child development psychologist. Adaptation to target culture using such program as Healthy Minds will be very useful. Further studies and experiments are required.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

FUNDING
The authors declare that this study received no specific financial support.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ОБРАНА, АДАПТОВАНА ТА ПРИЙНЯТА ПРОГРАМА СОЦІАЛЬНОГО ЕМОЦІЙНОГО НАВЧАННЯ: ПРОГРАМА ДОБРОЗИЧЛИВОСТІ ДЛЯ ДІТЕЙ

Метою *статті є представлення програми соціального емоційного навчання. Ця програма, розроблена Центром здорового розуму, названа програмою доброзичливості у 2017 р. Центр здорового розуму, заснований всесвітньо відомим неврологом доктором Річардом Дж. Девідсоном, пропонує створення більш доброго, розумного і співчутливого світу.*

Методологія*. У цій розвідці використано метод якісного дослідження. Використовувалися метод документального дослідження, спостереження та співбесіда. У якості документального дослідження використана програма доброзичливості. Цільова аудиторія – діти початкової школи віком від 6 до 7 років – були об'єктом спостереження, а вчителі були опитані.*

Результати*. Місія центру полягає у вихованні доброти та полегшенні страждань за допомогою наукового вивчення розуму. Існують деякі програми соціального емоційного навчання, але програма, розроблена центром, є безкоштовною. Цією програмою користувались дошкільні навчальні заклади та деякі дослідники. Дослідження включає адаптацію навчальної програми доброзичливості до турецької культури. У восьми темах програма містить двадцять чотири уроки. Ці уроки містять короткі розповіді, пісні та розважальні ігри. Програму може проводити один фахівець як у дошкільних закладах, так і в початкових класах. В процесі адаптації програма була перекладена турецькою мовою двома фахівцями і вони контролювали весь процес перекладу, що збалансувало адаптацію програми на 80%. Турецьку програму досліджували три психологи, корисна вона для турецьких дітей чи ні. Програма застосовувалася як пілотажне дослідження в першому класі початкової школи.*

Висновки*. Є багато позитивних результатів застосування програми, яку впроваджували вчителя. В якості рекомендації школи можуть додати цю програму до свого навчального плану, також існує потреба в більш широких експериментальних дослідженнях щодо корисності пропонованої програми.*

КЛЮЧОВІ СЛОВА: *учні початкових класів, програма доброзичливості, соціальне емоційне навчання, розробка програми, Туреччина.*

ÖZET / ABSTRACT [in Turkish]:

SEÇILMIŞ, BENIMSENMIŞ VE UYGULAMALI SOSYAL DUYGUSAL ÖĞRENME PROGRAMI: ÇOCUKLAR İÇIN İYILIK MÜFREDATI

*Bu yazının **amacı** bir sosyal duygusal öğrenme programı tanıtmaktır. The Centre for Healthy Minds (CHM) tarafından geliştirilen bu program Kindness Curriculum (CHM, 2017) olarak adlandırılmıştır. Dünyaca ünlü sinirbilimci Dr. Richard J. Davidson tarafından kurulan Sağlıklı Zihinler Merkezi, daha nazik, daha akıllı ve daha şefkatli bir dünya öngörüyor.*

***Metodoloji.** Bu çalışmada nitel araştırma yöntemi kullanılmıştır.*

***Sonuçlar.** Misyon derneği, zihnin bilimsel bir anlayışıyla refahı geliştirmek ve acıyı dindirmektir. Mevcut bazı sosyal duygusal öğrenme programları vardır, ancak CHM tarafından geliştirilen program ücretsizdir. Bu program anaokulları ve bazı araştırmalar tarafından kullanıldı. Bu çalışma, İyilik Müfredatının Türk kültürüne uyarlanmasını içermektedir. Sekiz temada programda yirmi dört ders bulunmaktadır. Bu dersler arasında kısa hikayeler, şarkılar ve eğlenceli oyunlar yer alıyor. Program, anaokullarında ve ilkokul sınıflarında tek bir uzman tarafından yürütülebilir. Uyarlama sürecinde program iki uzman tarafından Türkçeye çevrildi ve tüm çeviriler kontrol edildi ve% 80 uyarlama dengelendi. Türkçe programı, Türk çocukları için yararlı olup olmadığını üç psikolog tarafından araştırıldı. Program, ilkokul birinci sınıfta arsa çalışması olarak uygulanmıştır.*

***Bulgular.** Programın uygulanmasının öğretmenler tarafından ima edilen birçok olumlu sonucu vardır. Bir öneri olarak okullar bu programı müfredatlarına ekleyebilirler ve bu programın yararlılığı için deneysel araştırmalara ihtiyaç vardır.*

ANAHTAR SÖZCÜKLER: *İlköğretim Öğrencileri, İyilik Müfredatı, Sosyal Duygusal Öğrenme, Program Geliştirme, Türkiye*

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TECHNOLOGY OF FORMING FUTURE TEACHERS' READINESS FOR PEDAGOGICAL IMPROVISATION

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ABSTRACT

The article grounds the relevance of the special preparation of students of pedagogical universities for pedagogical improvisation based on the analysis of psychological and pedagogical literature and the ways in which future teachers acquire professional knowledge and skills.

Having analyzed the content of the educational programs of psychology and pedagogy we proved that no purposeful training of future teachers for pedagogical improvisation has been organized. It caused the need for developing an appropriate technique.

*The **purpose** of the article is to develop a technique to form future teachers' readiness for pedagogical improvisation in the process of studying psychological and pedagogical disciplines.*

***Methodology**. The research was conducted with the application of theoretical (analysis of psychological and pedagogical literature to define a conceptual-categorical apparatus; grounding the technique of forming future teachers' readiness for pedagogical improvisation) and empirical methods (surveys, questionnaires, testing, observation, conversation, dialogue, methods of expert evaluation, self-assessment analysis of learning outcomes, content of educational programs of psychological and pedagogical disciplines).*

*In the course of the research the following **results** were achieved: the essence of the concepts «readiness for pedagogical improvisation», «learning technique» was defined; structural components of readiness for pedagogical improvisation were singled out; surveys, interviews and questionnaires were conducted among the future teachers to identify their level of readiness for pedagogical improvisation. Moreover, the research contributed to the development of a technique to form future teachers' readiness for pedagogical improvisation, which led to the gradual formation of students' skills to improvise.*

*The conducted research allowed us to draw the **conclusion** that the readiness for pedagogical improvisation is a stable individual quality that integrates the values, knowledge, skills, which should be formed in several stages. Motivational-targeted stage was aimed at stimulating the development of positive motivation for improvisation; content and procedural stage that provided for acquiring the necessary knowledge and skills of pedagogical improvisation; evaluation-reflexive stage involving evaluation and correction of personal and professional development, content, forms and methods of training.*

KEY WORDS: *pedagogical improvisation, readiness, teacher, technique, training.*

INTRODUCTION

Any activity consists of stereotypes and improvisations, the relationship of which is manifested in especially bright ways. In particular, the stereotype in pedagogy is the structure of the educational process, programs, plans, textbooks, methodological tutorials, on the one hand, work experience or lack of it on the other hand. The latter means the existence of clichés, dogmas, and this is not the driving force behind the educational process in the modern school.

Children expect something new, interesting from the teacher, so improvisation is determined by the specifics of pedagogical activity, the conditions of its course. Educators not just have the right to improvise, they have to improvise, must

constantly work on themselves in order to be in a state of improvisational readiness, readiness to create and search for the best solutions in the lesson to fully and effectively realize their intentions.

Scientists have studied various aspects of training future teachers for professional activity. In particular, the technologies of training specialists are studied by Gorbanyova (Gorbanyova, 2016), L. Katrevych (Katrevych, 2015), N. Lozins'ka, I. Krets'ka (Lozins'ka et al, 2012), C. Moorman, A. Miner (Moorman, Miner, 1998), O. Rusanova (Rusanova, 2014), S. Zolotukhina, O. Bashkir, O. Zhernovnykova (Zolotukhina et al, 2018), A. Montuori (Montuori, 2003).

The issues of training future teachers to perform professional activity are in the focus of attention of O. Vaganova, I. Vinnikova, I. Sundeeva, M. Kutepov, A. Popkova (Vaganova et al, 2020), educational technologies, namely discussion techniques within the learner-centred vocational education, are developed by G. Klinkov, M. Rodionov, O. Kozlova, E. Vezetiu, E. Vovk (Klinkov et al, 2020).

Interactive technologies are researched by O. Vaganova, I. Rudenko, A. Lapshova, M. Bulaeva, A. Popkova (Vaganova et al, 2020). Ways of preparing future teacher for pedagogical improvisation are covered in scientific works by O. Bashkir (Bashkir, 2013), O. Ben-Horin (Ben-Horin, 2016), I. Denysiuk (Denysiuk, 2015), S. Dezutter (Dezutter, 2011), V. Kharkin (Kharkin, 1992), V. Zahviazynskyi (Zahviazynskyi, 1987) and others.

However, there has not been developed a unified technique for the formation of improvisation skills among students, taking into account their majors.

The purpose of the article is to develop a technique to form future teachers' readiness for pedagogical improvisation in the process of studying psychological and pedagogical disciplines.

METHODOLOGY

The following methods were used in the course of the research: theoretical: analysis of the philosophical, psychological and pedagogical literature for the purpose of defining a conceptual-categorical apparatus, grounding the technique to form future teachers' readiness for pedagogical improvisation; empirical: surveys, questionnaires, testing, observation, interview, dialogue, methods of expert evaluation, self-assessment of learning outcomes, analysis of the content of educational programs of psychological and pedagogical disciplines.

In the context of the research the essence of the concepts «pedagogical improvisation», «learning technique» was defined, structural components of the readiness for professional activity were singled out, the content of the educational programs of Psychology and Pedagogy was analyzed: future teachers were interviewed and questioned with the aim of revealing their skills in improvising, which gave grounds for developing a technique for the formation of future teachers' readiness for pedagogical improvisation.

The experimental work was carried out at the Faculty of Foreign Philology of H. S. Skovoroda Kharkiv National Pedagogical University and at the Faculty of Social and Pedagogical Sciences and Foreign Philology of the Municipal Establishment «Kharkiv Humanitarian Pedagogical Academy» of Kharkiv Regional Council in the course of studying psychological and pedagogical disciplines («Fundamentals of Pedagogical Excellence», «Pedagogy», «Psychology», «Modern Approaches to Teaching Foreign Languages»).

RESULTS

Pedagogical improvisation is a quick, flexible and adequate reaction to newly created situations or those ones that spontaneously, suddenly arose in pedagogical activity and require a teacher to react instantly. The goal

of pedagogical improvisation is to immediately find a new solution in the specific conditions of education and upbringing.

The stages of pedagogical improvisation are: enlightenment as a result of the problem evaluation; instant comprehension of the idea and the choice of ways to implement it; public embodiment of the idea; an immediate analysis of the result. There are three main types of pedagogical improvisation: classical, improvisation with homemade preparation and mixed type (Bashkir, 2013, 97–103).

Pedagogical improvisation is characterized by an obligatory pedagogically relevant end result, combines formal, regulated activities with creative ones and acts as an indicator of the quality of interaction between its stereotyped and improvised components, bears a public character, requires teacher's expertise in verbal and non-verbal means of communication, which provide a vivid expression of thought, the logic of the utterance, the effectiveness of persuasion.

The educational-upbringing effect of pedagogical improvisation is achieved due to general culture, pedagogical attention, imagination, inspiration, intuition, taking into account the experience of the teacher-improviser (Bashkir, 2014, p. 93).

In the process of developing the technique for forming future teachers' readiness for pedagogical improvisation, the essence of the concept «readiness» was specified.

The complexity of the issue of readiness for activity is proved by various approaches to defining this concept, which gave grounds for singling out its following components: psychological, theoretical and practical, ensuring the formation of future teachers' positive attitude towards the acquisition of theoretical knowledge on pedagogical improvisation and mastering relating skills.

Having analyzed the educational programs of psychological and pedagogical disciplines for the purpose of formation of future teachers' readiness for pedagogical improvisation, we found out that the process of preparing students for improvisation in the conditions of a higher pedagogical education institution is spontaneous, there are no purposeful activities aimed at the formation of skills to improvise.

In order to identify the level of future teachers' readiness for pedagogical improvisation, a special diagnostics was carried out according to Table 1. It included training participants' self-analysis, peer analysis, as well as clarifying analysis carried out by the lecturer during classes.

Table 1. *The scheme of analyzing the readiness for pedagogical improvisation (Kharkin, 1992).*

Level of knowledge of the subject and the methods of teaching it	**A**
Level of the skill to apply pedagogical and psychological knowledge	**B**
Level of the skill to distribute and concentrate attention	**C**
Level of imagination development	**D**
Level of creativity (state of inspiration, creative search)	**E**
Level of the communicative skills	**F**
Level of speech proficiency and the whole psychophysical apparatus	**G**
Level of intuition development	**H**
Level of the transformation skill	**I**
Level of the skill to instantly and adequately analyze the situation	**J**
Level of the skill to make instant decisions	**K**
Level of the skill to instantly and publicly implement taken decision	**L**
Level of the skill to naturally switch from improvisation to the planned	**M**

The conducted analysis of the level of future teachers' readiness for pedagogical improvisation not only showed a low formation level of these skills among the students, but also contributed to their acquaintance with the subject of the study.

Therefore, the definition of the essence, the place of improvisation in the system of professional teacher training, the identification of a low level of students' mastery of the skills of pedagogical improvisation, the lack of purposeful work on the formation of students' readiness for pedagogical improvisation in universities became the basis for scientific grounding the relating technology, which involves psychological, theoretical and practical components of professional readiness.

The concept «technology» (from the Greek "techne" – art, craftsmanship, skill, and logos – the word, science) means a set of knowledge, information about the sequence of individual production processes and operations. Technological approaches in pedagogy began to be used in the early 1960s, which was associated with the development of scientific research in the field of educational processes, especially in the field of pedagogical psychology, didactics, methodology of teaching educational disciplines.

However, today the term «pedagogical technology» cannot boast a generally accepted definition. Here are some of the most common examples of the interpretation of the concept «pedagogical technology»:

- pedagogical technology can be represented by scientific, process-descriptive and procedural-active aspects. Pedagogical technology functions as a science that studies the most rational ways of learning, and as a system of methods, principles and regulators used in teaching, and as a real learning process (Selevko, 1998, p. 14–15);
- pedagogical technology is a system set and the order of functioning of all personal, instrumental and methodological tools used to achieve the pedagogical goal (Klarin, 1989, p. 10);
- pedagogical technology is a systematic method of planning, applying, evaluation of the whole process of learning and knowledge acquisition taking into account human and technical resources and interaction between them to achieve the most effective form of education (Pekhota, 2013, p. 29).
- In the context of our research, the technology of forming future teachers' readiness for pedagogical improvisation is treated as «actions and coordination of the elements of the educational process, the implementation of which guarantees the achievement of the set goals» (Prokopenko, 2013, p. 51).

In addition to the above, the development of the technology to form future teachers' readiness for pedagogical improvisation is grounded on the following requirements:

- systemacy, which means that the process has to be logic, its parts have to be interrelated;
- purposefulness, which means that all actions have to be aimed at reaching the main goal – students' theoretical and practical readiness for pedagogical improvisation;
- manageability, which involves diagnosing the achievement of goals, fixing the intermediate and final results; correction, if necessary, without disturbing the content of the technological process;
- optimality and effectiveness, which means selecting optimal ways, forms, methods, actions, operations in accordance with the main goal; ensuring achievement of results. The effectiveness of the technology is determined not only at the end of the entire technological cycle, but also at intermediate stages. If the real result

differs significantly from the expected one, the suitability of this technology has to be questioned;

- reproducibility, which involves repetition and creative reproduction of the technology and its components by other subjects in educational conditions of the same type.

The technology to form future teachers' readiness for pedagogical improvisation is presented in Figure 1. It involves implementing motivational-targeted, content-procedural and evaluation-reflexive stages.

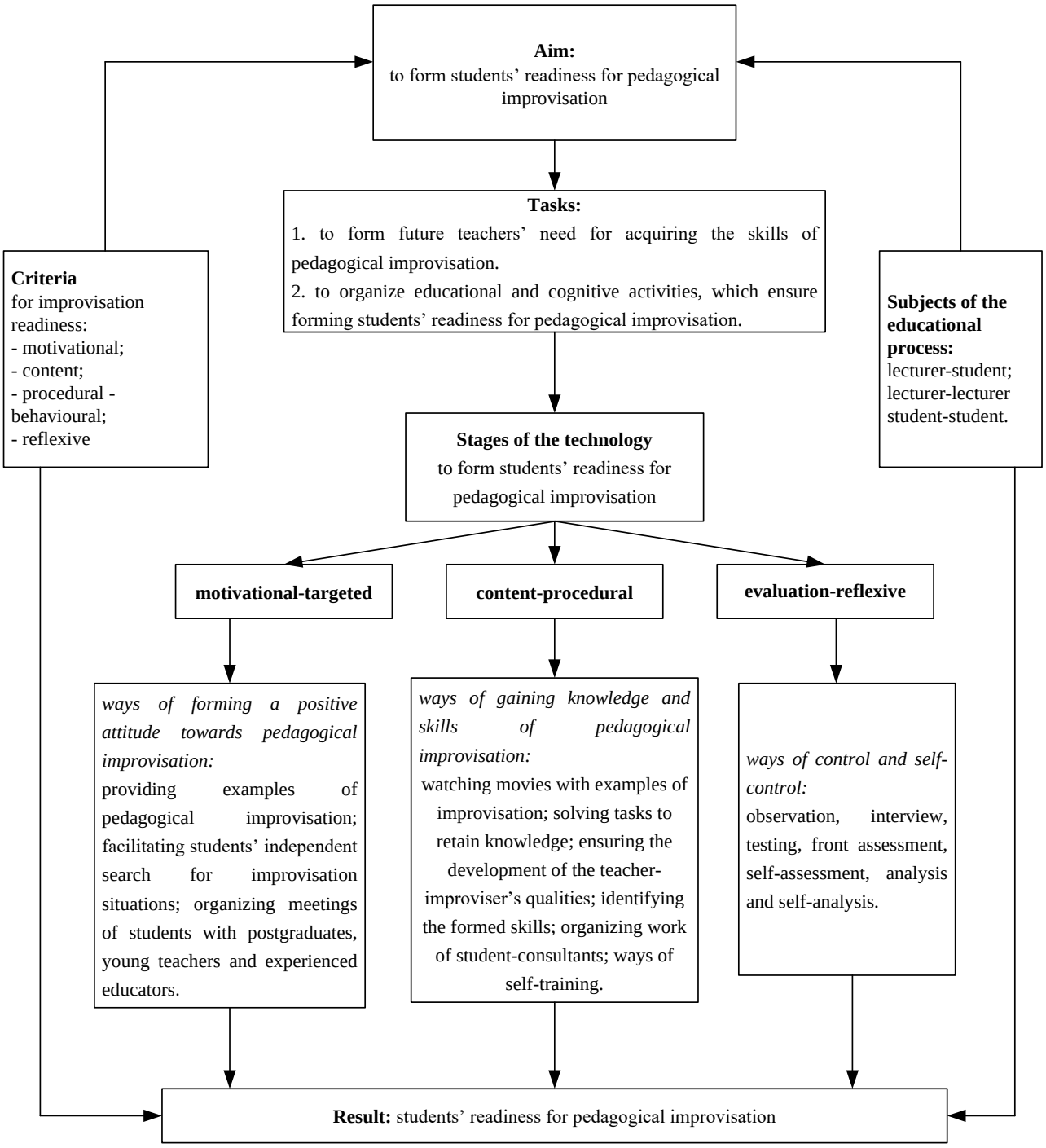

Figure 1. *The technology to form future teachers' readiness for pedagogical improvisation*

The main objectives of the motivational-targeted stage are:

- stimulating the development of students' positive motivation for improvisation;
- ensuring awareness of the specifics of future professional activity, which requires a steady need to achieve a high level of professionalism, creativity, activity, initiative as the basis for the implementation of pedagogical improvisation;
- determining students' educational needs through identifying specific knowledge, skills, qualities, which should be mastered by the future improviser;
- clarifying students' individual characteristics, which provides for effective organization of the educational process, engaging students into certain types of work;
- stimulating educators' personal and professional growth through the recognition of their needs, opportunities, analysis of their own improvisations;
- defining the aim of learning, that is, identifying specific knowledge, skills that the teacher-improviser lacks;
- selecting and developing a learning strategy, which includes determining a structural contribution and the alternation of theoretical, practical, experimental learning, practices, etc.

The next stage – content-procedural – requires students to gain knowledge (about the nature of improvisation, its role in providing the necessary atmosphere in the lesson, ways to form the skills of pedagogical improvisation) and the skills to improvise.

They are the skills associated with the situation evaluation: to concentrate and distribute attention, to activate the acquired knowledge and search for bright, original solutions in unpredictable situations and ways of their implementation, to instantly reasonably evaluate pedagogical problems, respond quickly and urgently to students' questions, remark, actions, act in the natural way under the changing circumstances of the activity.

The skills that enhance the effectiveness of pedagogical improvisation: to transform, to think outside the box, anticipate situations that can cause improvisation, to assess students, to interest and engage them in improvisation, to evoke required reaction, communication skills (verbal and non-verbal ones).

At this stage, the following tasks are solved:

- creating favourable educational conditions;
- selecting knowledge on the fundamentals of the phenomenon under study, namely: on the nature of improvisation, its specificity, structure, types, functions, peculiarities, the interrelation of improvisation with creativity, as well as its role in providing a comfortable interaction between participants of the educational process;
- educators' engagement into various types of educational activities;
- stimulating internal motive forces, actualization of knowledge and experience through solving various situations of educational nature;
- developing and doing the exercises aimed at the formation of skills to improvise;
- encouraging students to self-prepare for pedagogical improvisation.

The evaluation-reflexive stage involves the evaluation and correction of the content, forms and methods of preparing future teachers for pedagogical improvisation; determining the effectiveness of the implemented technology.

DISCUSSION

The research proved that the effectiveness of any technology depends on the methods of its implementation. Pedagogical dictionaries

define a work method as a component of the dynamic structure of activity, a set of methods and techniques of activity that ensure its result (Mizherikov, 2004).

Effective ways to form future teachers' readiness for pedagogical improvisation include:

- ways-recommendations for success (Kaloshyn, 2003, p. 11):
- be an activist. Act, do business. Be active, not sluggish;
- don't wait for ideal conditions. They will never exist. Try to foresee possible difficulties and obstacles. Overcome them if they arise;
- remember that ideas only will never lead to success. Ideas become valuable only if they are implemented;
- overcome fear and gain confidence through action. Do what you fear, and fear will pass away. Try it yourself and realize these words are true;
- tune your mind to work. Don't wait when inspiration comes, you can wait for eternity. That's why act, and you will trigger it yourself,
- be a person who starts everything immediately. Get rid of 'tomorrow' or 'next week' promises;
- get down to work immediately. Do not waste time preparing for action. It is better to start acting. Take the initiative in your hands. Show that you have the ability;
- ways of self-control, which contribute to the formation of students' ability to cope with their feelings and emotions, to prevent being seized with them;
- ways of rational thinking (Kaloshyn, 2006), which involve analyzing a critical situation, our own feelings, beliefs, self-arguing, making a conscious decision, avoiding unreasonable behaviour;

ways of self-criticism, because turning to yourself means understanding the signals you give to your students. It contributes to successful implementation of ideas during improvisation.

Therefore, N. Tarasovych (Tarasovych, 2004) gives some tips on effective improvisation:

- it is necessary to analyze your own activity more often, trying to step into students' shoes (identify their point of view);
- attend your colleagues' lessons and compare their behaviour with your own;
- see how personal flaws affect work, students' attitudes;
- admit your mistakes, analyze teachers' nicknames;
- ways to overcome pedagogical conflicts as a means of positive impact on students. K. Levitan (Levitan, 1990, p. 151–154) treats them as «art of persuasion».

Researching the area of conflicts D. Scott stresses that one of the main sources of conflicts is the lack of ability to listen properly (Ziaziun, 2006, p. 141). When people understand that no one is listening to them a feeling of hostility, prejudice or condemnation may arise. A gloomy look, haste, restless gestures can indicate lack of interest, respect or sympathy for the speaker. This can upset a person and create some tension in the relationship, although you didn't intend it.

And, vice versa, if you demonstrate that you are really listening to the speaker, understand and sympathize, you will reduce the probability of conflict to minimum. Moreover, the information received during a conversation may further be useful.

This, by the way, does not mean that you should agree with all that has been said. But people need to feel heard and understood. To listen properly means hearing and perceiving the true feelings of the speaker. This is the key principle according to D. Scott (Ziaziun, 2006).

It is known that pedagogical improvisation involves identifying the reasons, recognizing contradictions, complications that arise in relationships or studies, searching for

effective ways to overcome them, applying teachers' experience and inventiveness. Therefore, one of the main ways of preparing future teachers for pedagogical improvisation is to solve problem situations, which are the source of classical, unprepared pedagogical improvisation. They happen regardless of the teacher's will and their solutions ensure the continued effectiveness of education.

A problem situation is a difficulty, impossibility to explain a fact or solve a problem, relying on the available knowledge (Moiseiuk, 2001), an obstacle to the realization of the goal (Lozhkin, 2000), a set of circumstances and conditions in which the activities of a person or group unfold that cover contradictions and do not have a single-valued solution, a psychological model of the conditions for the generation of thinking on the basis of the cognitive needs that arose situationally (Mizherikov, 2004). Awareness of any contradiction in the process of activity is the basis for improvisation.

The realization of the idea during pedagogical improvisation is carried out in a communicative way. When implementing the developed technology ways of communicative influence have been identified. They contribute to the formation of future teachers' readiness for pedagogical improvisation at the stage of intention realization and include: suggestion, persuasion, imitation, inspiration (with one's mood).

They differ in essence, objectives, psychological mechanisms of influence on the individual, but if teachers are perfect at using such techniques, it allows them to relieve tension, to sound clear and convincing.

Communication, as well as the language system, obeys certain laws. They are related to the regularities of the communication process, psychological characteristics of the communication participants, their social roles. Communicative laws are not rigid, they can change over time, vary from nation to nation. At the same time, they can be manifested in any type of interpersonal or mass-communication, so they can be regarded as objective laws of communication.

Developing the technology involved introducing students to the following laws: mirror development of communication, dependence of communication effectiveness on communication efforts, progressive growth of listeners' impatience, lowering the IQ level of the audience with increasing their number, communicative self-preservation, the rhythm of communication, speech self-influence, confidence in clear statements, attraction of criticism, information self-emergence, modification of non-standard communicative behaviour of communication participants, accelerated dissemination of negative information, information corruption («spoiled phone»), emotional affiliation («infection»), speech amplification and emotion absorption.

The ways of forming readiness to improvise also include exercises, assignments, trainings, business games aimed at the development of various components of pedagogical improvisation (imagination, originality, speech, intuition, response rate).

In our opinion, the whole educational process at the university should focus on preparation for pedagogical improvisation. The whole set of knowledge, abilities and skills acquired by future teachers, is the basis for the overall cultural development of students, which is the key to successful improvisation.

When developing the technology of forming future teachers' readiness for pedagogical improvisation, two methods were used (Kharkin, 1992).

The first one is inclusion of improvisation elements when teaching various academic disciplines throughout the entire period of studying. For example, conduct a lecture on improvisation as a phenomenon of

pedagogical creativity in the course «Introduction to the specialty»; introduce the structure of pedagogical improvisation, its stages, etc. during practical classes; demonstrate the development and implementation of pedagogical improvisation in a particular lesson while teaching methodology of different subjects.

The second method is training of pedagogical improvisation, the content of which can be different. It depends on the pedagogical experience, creative potential, development of trainers' pedagogical skills.

In addition, the mandatory ways of implementing the developed technology include studying the structure of the improvisation process, analysis of lessons from the point of view of real and the possible use of improvisation, express-analysis of various pedagogical improvisations, creation of group pedagogical tasks, their improvisational demonstrations and solutions, theatrical production of improvisational situations, compiling «a box of improvisations», etc.

CONCLUSIONS

Thus, the readiness for pedagogical improvisation is a stable individual quality, which integrates the values, knowledge, skills, necessary for the implementation of pedagogical improvisation in the educational process. The readiness for pedagogical improvisation depends on a substantiated technology, which will provide psychological, theoretical and practical components.

The technology of formation future teachers' readiness for pedagogical improvisation in the process of studying psychological and pedagogical disciplines is treated as actions and interactions of the elements of the educational process, the implementation of which guarantees the achievement of the set goals. The effectiveness of any technology depends on the way it is implemented.

It is proved that the main stages of the technology of forming future teachers' readiness for pedagogical improvisation are motivational-targeted, aimed at stimulating the development of positive motivation for improvisation; content-procedural, which provides for acquiring the necessary knowledge and skills of pedagogical improvisation; evaluation-reflexive, when personal and professional development, content, forms and methods of preparation are evaluated and adjusted.

Theoretical substantiation of the technology for the formation of future teachers' readiness for pedagogical improvisation when studying psychological and pedagogical disciplines is not a final solution to the issue of students' readiness to improvise. Further studies, apart from the practical implementation of the developed technology, should be focused on the difficulties associated with the unpreparedness of university lecturers for such work.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ТЕХНОЛОГІЯ ФОРМУВАННЯ ГОТОВНОСТІ МАЙБУТНІХ УЧИТЕЛІВ ДО ПЕДАГОГІЧНОЇ ІМПРОВІЗАЦІЇ

У статті на основі аналізу психолого-педагогічної літератури й способів формування в майбутніх учителів професійних знань, умінь і навичок обґрунтовано актуальність спеціальної підготовки студентів педагогічних університетів до педагогічної імпровізації.

Проаналізовано зміст навчальних програм із психології та педагогіки, що засвідчило відсутність спеціально організованої підготовки майбутніх учителів до педагогічної імпровізації й зумовило розробку відповідної технології.

***Мета** статті – розробити технологію формування готовності майбутніх учителів до педагогічної імпровізації в процесі вивчення психолого-педагогічних дисциплін.*

*Досягнення мети стало можливим завдяки використанню наступних **методів** дослідження: теоретичних (аналіз психолого-педагогічної літератури з метою визначення понятєво-категоріального апарату; обґрунтування технології формування готовності майбутніх учителів до педагогічної імпровізації) та емпіричних (опитування, анкетування, тестування студентів, спостереження, бесіда, діалог, методи експертних оцінок, самооцінки, аналіз продуктів навчально-пізнавальної діяльності, змісту навчальних програм психолого-педагогічних дисциплін.*

*У ході дослідження було досягнуто наступні **результати**: визначено суть понять «педагогічна імпровізація», «навчальна технологія»; виокремлено структурні компоненти готовності до майбутньої професійної діяльності; проведено спостереження, опитування й анкетування майбутніх учителів з метою виявлення в них рівня готовності до педагогічної імпровізації. Проведена робота сприяла розробці технології формування готовності майбутніх учителів до педагогічної імпровізації, що спричинила поетапне формування в студентів умінь імпровізувати.*

*Проведене дослідження дозволило зробити **висновок,** що готовність до педагогічної імпровізації – це стійка риса особистості, що об'єднує цінності, знання, вміння, формування яких здійснюється у декілька етапів. Мотиваційно-цільовий етап був спрямований на стимулювання розвитку позитивної мотивації до імпровізації; змістово-процесуальний передбачав оволодіння необхідними знаннями й уміннями педагогічної імпровізації; на оцінно-рефлексивному етапі здійснювалася оцінка й корекція особистісно-професійного вдосконалення, змісту, форм і методів підготовки.*

КЛЮЧОВІ СЛОВА: *педагогічна імпровізація, готовність, учитель, технологія, підготовка.*

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CRITICAL THINKING DEVELOPMENT OF PRIMARY SCHOOL PUPILS BY MEANS OF INVENTIVE PROBLEMS

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ABSTRACT

*The **purpose** of the research is to determine the effective tools for the critical thinking development for primary school pupils.*

***Methodology**. The retrospective analysis of the primary education systems development in Ukraine and in highly developed countries was used, the primary school is determined to be the initial stage of the pupils' critical thinking development. The material of the study is primary school educational programmes, branches of education, and existing academic subjects, it indicates the necessity to develop and implement the particular subject, and its aim is to develop critical thinking and the abilities to express one's own opinion, assess risks and solve problems. According to the State Standard of Primary Education the key competencies require the following skills: creativity; initiative; the abilities to justify one's position logically, to manage emotions constructively, to assess risks, to make decisions, to solve problems, to cooperate with others.*

***Results**. The article clarifies that critical thinking is a type of thinking aimed at solving problems, namely studying the argument line (hypotheses, criteria, definitions, arguments, facts, etc.), analyzing alternative solutions; forecasting and*

assessing consequences. It is proved in practice that inventive problems serve as an effective way to develop critical thinking. The basis of such problems is the theory of inventive problem solving (TIPS). It is determined that an inventive problem contains a cognitive contradiction, its solving promotes the pupils' critical thinking development. The authors' subject 'Eureka' for pupils of 2-4 classes is offered. Its aim is to develop pupils' critical thinking, creative and inventive abilities, and also primary skills to carry out natural science researches. The results of the subject approbation are given.

***Conclusions**. Primary school pupils' critical thinking development can be achieved through the introduction of a range of new subjects at the initial stages of the education. The aim of such subjects is to teach pupils to solve inventive problems.*

KEY WORDS: *creativity, critical thinking, eureka, inventive problem, primary school.*

INTRODUCTION

The convergence of NBIC-technologies (N – nano; B – bio; I – info; C – cogno) requires the formation of an integrated scientific and technological area of knowledge, which leads to the expansion of the human creativity boundaries. Therefore, it is of particular importance to train STEM-staff (Science, Technology, Engineering and Mathematics) as it can result in the formation of the national scientific and technical elite in the future.

This is emphasized in the documents of international organization's and projects, including UNESCO (Girls' and women's education in science, technology, engineering and mathematics), UNICEF (Techno Girl), the concepts of Convergence of knowledge and technology for the benefit of society (CKTS), Foresight Education project, 100Kin10 (Enriching America's classrooms with 100,000 more, excellent STEM teachers by 2021).

According to the results of the international study TIMSS (Trends in International Mathematics and Science Study) the assessment of primary school pupils' preparation level shows that 20% of the test tasks offered to the 4th form pupils were based on the rational ways to solve practical problems, find arguments and form hypotheses.

All this is connected with the pupils' critical thinking development. The results indicate that in 2007 Ukraine took the 25th place (out of 45 countries) in Mathematics and the 19th place in Natural Science, whereas in 2011 the country took the 19th place (out of 60 countries) and the 18th place respectively. Ukraine did not take part in 2015.

In view of this, it is quite reasonable that according to the State Standard of Primary Education the key competencies require the following skills: the ability to express one's own opinion orally and in writing; critical and systematic thinking; creativity; initiative; the abilities to logically justify one's position, to constructively manage emotions, to assess risks, to make decisions, to solve problems, to cooperate with others.

According to the results of the retrospective analysis of the primary education systems development in Ukraine and in highly developed countries (Singapore, China, Japan, USA, Finland, Great Britain, France, etc.), the primary school is determined to be the initial stage of the pupils' critical thinking development.

As stated in the analysis of psychological and pedagogical works (H. Kostiuk, V. Moliako, O. Muzyka, S. Witelson, etc.), the most sensitive period for the critical thinking development is the primary school age, which is facilitated by morphofunctional,

mental and personal features of the development of pupils of this age.

Morphofunctional features of primary school pupils are: the musculoskeletal system development, which requires the provision of a feasible complex load on certain muscle groups, which stimulates their development through the performance of special exercises; the brain development, which requires to carry out systematic and various activities that would have a positive effect on a brain and on the formation of its functional characteristics; the nervous processes development (processes of the nervous system excitation prevail over the inhibition processes), which implies greater mobility, frequent switch from one type of activity to another one. All these features are ought to be taken into account in the process of the critical thinking development.

Mental features of the primary school pupils' development are considered in the scope of a holistic system of their mental neoplasms: thinking (the transition from visual to verbal-logical); attention (stability); memory (the change of involuntary memorization to arbitrary and figurative to verbal-logical); imagination (the transition from reproductive forms of imagination to creative); speech (silent reading symbolizing the emergence of inner speech); sensation and perception (high visual acuity and hearing, good orientation in shapes and colours), etc.

Personal features of the primary school pupils' critical thinking development include such qualities as interest, activity, inventiveness, etc. (Dotsenko, 2018).

THEORETICAL FRAMEWORK

Today the problem of the critical thinking development is becoming relevant among teachers and psychologists. The problem is a generally accepted direction in foreign pedagogy and psychology. Various aspects of critical thinking are reflected in the works of famous psychologists and educators (B. Bloom, J. Dewey, M. Lipman and others) and are especially relevant today (K. Meredith, T. Oliinyk, O. Pometun, D. Steel, C. Temple, O. Tiahlo, D. Halpern, A. Khutorskyi and others).

Studies on the critical thinking development state that critical thinking is a type of thinking aimed at solving problems, namely studying the line of argument (hypotheses, criteria, definitions, arguments, facts, etc.), analyzing alternative solutions; forecasting and assessing consequences.

Critical thinking is a complex process of creative integration of sources, reassessment and restructuring of concepts and information. It is an active and interactive process of cognition, taking place simultaneously on many levels. In this way, critical thinking helps to analyze and form judgments, knowledge, regardless of the professional sphere of activity.

The requirements for critical thinking have resonated over the centuries in the works of great philosophers, beginning with Aristotle, Socrates. The pragmatism philosophy (J. Dewey) was the basis of critical thinking. It considered thinking as a necessary tool for active adaptation of a person to the outside world, and for the formation and application of one's concepts and judgments.

The study of the critical thinking development is connected with the Socratic critical analysis of concepts and considerations, which became the basis for the emergence of a new discipline, Logic.

It is worth noting that the Socratic method of considerations was widely used in the debates organization, in particular, in proving the opponent's ignorance, deviations in his/her judgments, etc. These ideas were further used by I. Kant in writing «Critique of Pure Reason». He proved the practical significance of critical thinking to justify one's own position, find errors in the opponent's speech, give strong arguments, etc. (Kant, 2000).

His opinion was supported by such philosophers as F. Nietzsche, M. Foucault, Z. Freud, M. Heidegger (Philosophy of education, 2009). They emphasized that critical thinking is based on «interpretive mind», which means to see new dimensions of the problem, to solve it through discussion. In modern philosophy, this idea was continued by K. Popper, who noted that critical thinking is aimed at solving problems, making assumptions and criticizing in order to eliminate errors.

D. Halpern (2000) determines not only the logical factors of critical thinking, but also creative, i.e. synthesizing factors that are formed in the process of interconnection of feelings, imagination and thinking and become crucial in the human criticism development. Therefore, modern education faces the challenge to educate a person who is independent, free, able to comprehend the phenomena of the surrounding reality by himself/herself, and to defend his/her own opinion.

Thus, critical thinking in the context of our study is defined as the ability of an individual to self-assess the surrounding reality, information, knowledge, opinions and statements of others, the ability to find effective solutions considering existing stereotypes and criteria.

The recent studies on the critical thinking development prove its significance in the modern world. Thus, the Concept of the New Ukrainian School (2016) and the State Standard of Primary Education (2018) regard critical thinking as a key competence and a common skill for all subjects (p. 12).

O. Pometun and I. Sushchenko in the methodical manual «Guide for the Critical Thinking Development of Primary School Pupils» (2017) mention the features of teaching critical thinking. They emphasize that «critical thinking involves an unbiased study of a subject or a problem.

The process begins with determining what is already known about a problem and what is to be learnt. Then, it is necessary to freely identify the facts, consider the options and move on to the fact-based thinking. Next, the information is compared, in particular one's own prejudice and prejudice of other pupils and specialists. Finally, the basis for one's own judgment is created» (p. 13).

Abdur Rahman As'ari, Ali Mahmudi, Elah Nuerlaelah (2014) specify the characteristics of critical thinkers. They are: (1) inquisitive, (2) eager to be well-informed, (3) ready to use critical thinking, (4) reasonable, (5) self-confident, (6) open-minded, (7) flexible, (8) receptive to others' opinions, (9) objective and fair-minded, (10) wise, and (11) ready to change their mind if it is necessary. Critical thinkers also: (1) maintain clarity, (2) work systematically, (3) persistently look for the necessary information, (4) stay practical, (5) and accurate, (6) never give up, (7) try to be as precise as possible.

So, the **purpose** of the research is to determine the effective tools for the critical thinking development for primary school pupils.

METHODOLOGY

A completely new approach to the development of students' algorithmic, logical and critical thinking is explained in the theory of inventive problem solving (TIPS). The founder of the theory is an inventor, a science fiction writer, Henrikh Altshuller (Altshuller, 1979).

This methodology was first tested in the 60s of the twentieth century in the technical creativity groups. The groups were taught by the engineers and the teachers who had been trained at the seminars by H. Altshuller. In those classes, students were taught to organize the creative process: to invent new never-before-seen aircraft, cars, ships, and then design their models.

Those inventions participated in regional and foreign competitions and became winners of exhibitions, received invention patents. It was then that the statement that

creativity is an innate talent was first questioned.

The basis of TIPS-pedagogy is a problem-solving method that associates this theory with developmental education. TIPS-pedagogy is aimed at teaching ways to solve inventive problems. The structural content of this theory is presented as a system of interrelated aspects: the critical thinking development, the creativity development, and the development of creative personality.

The main characteristics of critical thinking include the ability to find and determine patterns in a certain amount of information; skills of information systematization and structuring; the ability to use hidden resources to solve problems, skills to form hypotheses and test them, the ability to see, formulate and resolve contradictions.

The critical thinking development involves the purposeful formation of such a quality as consistency, since the inventive problems solving requires the ability to perceive any object or phenomenon comprehensively (system – supersystem – subsystem); the ability to establish connections (functional, causative, spatial, logical) between different systems.

In the scientific literature there is no unambiguous approach to the definition of «inventive problem». This concept is defined as:

- «a problem based on the contradiction between the known and the sought, which are found through a system of mental or practical actions» (I. Lerner, 1988, p.15);
- «a problem that contains a certain practical or theoretical contradiction that requires research activity, which leads to finding a solution» (V. Okon, 1990, p.220), etc.

We define an inventive problem as a problem that contains a cognitive contradiction, whose solution promotes the development of pupils' critical thinking, in particular, the ability to find analogies and connections between different objects and different characteristics of an object; to summarize known facts and identify particular cases; to establish cause and effect relations between objects; to carry out geometrical and physical interpretation of analytical characteristics, etc.

Considering the existing approaches to the definition of «inventive problem», we use the following classification: 1) the problems associated with studying mathematical objects; 2) the problems associated with comparing mathematical concepts and establishing relationships between them; 3) the probative problems; 4) the problems associated with studying mathematical hypotheses; 5) the generalisation problems.

In practice, the types of research problems are:

1. preparatory (reproductive problems, which can serve as a basis for solving higher level problems);
2. training (partially-reach problems). They are used to practice certain research skills in simple situations;
3. research. They are used to consolidate research skills in more complex situations.

The inventive problems structure is generally identical to the structure of thinking in professional activity: problem statement – problem solving – solution check and its justification – control and evaluation of the solution correctness.

The general approach to solving inventive problems can be represented by three different in aim and methods stages.

1. The analytical stage, the purpose of which is to analyze the development of the system (machine, mechanism) to identify contradictions and their causes.
2. The operational stage, which consists in a systematic, targeted search for possible ways to eliminate the identified contradiction.
3. The synthetic stage is aimed at making additional changes to the elements of

the system. These changes are required by the identified contradictions.

The categorical apparatus of TIPS is based on two basic concepts: the «contradiction» and the «ideal final result». The concept of the «contradiction» has different interpretations. In some cases it is a situation in which one excludes the other, something that is incompatible with it or opposite to it; in others – it is the incompatibility between two or more things; contradiction. According to the psychologists, people only tell us interesting information when we contradict them. The same goes for TIPS. Interesting ideas appear when contradictions are overcome.

When faced with an inventive problem with no clear solution, it is often unclear where to start. Usually such problems are solved «by trial and error». To solve any problem in TIPS it is necessary to define the ideal final result first. The «Ideal Final Result» (IFR) is a heuristic technique that reduces the influence of the psychological inertia and allows a person to focus on choosing the optimal solution based on the defined contradictions.

Considering the categorical apparatus of TIPS, we have developed a certain algorithm for solving an inventive problem for primary school pupils. It consists of the following stages:

1. Read carefully, understand and analyze the problem text.
2. Identify and formulate the contradiction between the real and the desired object state.
3. Formulate the ideal final result, i.e. identify the most effective one.
4. Suggest several options for achieving the ideal final result.
5. Choose the best solution.

RESULTS

The ability to solve inventive problems is developed in the course of 'Eureka' for project classes. The subject is taught to the pupils of 2-4 classes in the framework of the project «The Intellect of Ukraine». Considering the inevitable demand for specialists in the field of STEM education, the main task of this discipline is to form pupils' positive attitude to scientific creativity, to develop their logical and critical thinking, mathematical abilities, intelligence.

The conceptual aim of 'Eureka' is to form pupils' abilities to invent, as well as primary skills to carry out researches in the field of nature science. This is ensured through the implementation of competence, activity and personality-oriented approaches, the adherence to the principles of the scientific research in the natural science field, as well as the basic characteristics of the inventive problems solution theory.

The performance of the specified tasks is possible due to:

- the semantic lines aimed at the development of pupils' creative, systematic, algorithmic thinking;
- the implementation of the individual approach, cooperation and co-creation principles;
- the adherence to the activity approach principles;
- the educational process organization on the basis of developmental and heuristic education.

The first semantic line of 'Eureka' is the development of pupils' creativity and critical thinking.

When creating the tasks aimed to develop pupils' critical thinking, we consider the powerful potential of problems faced in primary school Mathematics tournaments to spark pupils' creative intellectual abilities. For this very reason 'Eureka' included a set of increased complexity Mathematics problems. It was developed on the basis of school tournament problems considering general didactic principles, as well as the basic characteristics of the mental actions gradual formation theory.

The second semantic line of Eureka is the formation of pupils' heuristic and research techniques (Gavrysh, Dotsenko, 2020).

In modern science, heuristic is understood as a complex branch of scientific knowledge, which is developed at the intersection of psychology, artificial intelligence theory, structural linguistics, information theory, pedagogy and psychology of creativity. It studies the patterns of the development of new actions in a new situation. The subject of heuristic, as a branch of scientific knowledge, is defined as special meta-methods of solving creative or heuristics problems, which are used to find new specific and semantic ways of solving problems.

By their nature, heuristics are universal ways of solving creative problems that do not depend on the content of a particular activity. They allow to intensify the process of generating ideas (hypotheses) and optimise the process of searching for solutions.

The selection of the heuristic tasks was carried out in accordance with the State Standard of Primary General Education. The assessment of the acquired knowledge and skills in the proposed educational and methodical course of 'Eureka' is carried out in the process of repetition and generalisation, regular tests, heuristic races. In accordance with the minimax principle the tasks include not only the mandatory minimum (necessary requirements) that must be learnt by all pupils, but also the maximum they can master.

The methods that allow us to solve inventive problems form the conceptual basis of 'Eureka'. We offer the algorithmic methods that form a conscious, controlled, purposeful and effective process of mental activity. Thus, we work to improve the culture of thinking.

As a result, pupils develop the way of thinking that helps them to operate the most general fundamental laws, to study scientific laws and to explain the surrounding reality phenomena (Dotsenko, Bulakhova, Dorozhko, 2013).

There are the examples of some inventive problems.

Problem 1: «Bird flocks are a big problem for modern airports around the world. But first of all it concerns the USA, in particular the Atlantic coast of this country where the air route network is extremely dense. Collisions of airplanes with birds always threaten a catastrophe. How do airport services scare away birds?»

Problem 2: «During the excavation of an ancient tomb, which was carried out 40 kilometers from Rome, the archaeologists found bas-reliefs that had been carved from quality marble. The scientists consider these sculptures to be one of the most valuable findings in recent times. The scientists were particularly amazed by the fact that on these ancient Roman bas-reliefs oranges were in the shape of cubes and vases. How did the gardeners manage to grow whimsical-shaped oranges?»

Problem 3: «In Sweden, as in other European countries, the population suffered from environmental pollution by cans for a long period of time. The trouble is that cans are covered with a layer of tin, which protects them from rust and destruction for decades. Therefore, the metal garbage thrown by tourists covered forest glades, river banks and lake shores, distorting landscapes. How did the Swedes manage to protect nature from this disaster?»

Pupils solve a problem in accordance with a certain algorithm:

1. Read carefully, understand and analyze the problem text.
2. Identify and formulate the contradiction between the real and desired object state.
3. Formulate the ideal final result, i.e. determine the best result you want to achieve. Expenditure should be reduced to a minimum.

4. Suggest several options for achieving the ideal final result.
5. Choose the best solution.

A teacher is ought to pay particular attention to the first stage of solving inventive problems. Before proceeding to the problem solving, it is necessary to analyze the problem as a whole, to get accustomed to it, to note its features, to outline roughly possible ways to solve it. As the practice shows, the majority of pupils are not able to solve inventive problems, and one of the reasons for that is a teacher's strict regulation of their activities.

Strict control restrains pupils' initiative, the constant fear of making mistakes leads to stereotyped actions. Another reason is self-doubt, which is caused by failures in previous educational activities. As a result, the majority of pupils is characterized by their cognitive inertia, which leads to their inability to abandon the usual reasoning, to notice their mistakes and correct them. A teacher's main task at this stage is to create a scenario for success (Gavrysh, Dotsenko, 2020).

The next step is to identify the contradictions. At this stage, using heuristic techniques, pupils formulate contradictions to the given problem. For example, at this stage pupils' teamwork should be implemented along with the brainstorming technique (A. Osborn), which is defined as a collective search for non-standard ways to solve problems. During a brainstorming session, a teacher writes all the information down, avoiding any displays of criticism (verbal, gestural) and supporting any idea.

Consider the process of identifying contradictions on the following problem example: «Nadiyka has a big friendly family. In the evening, everyone gathers around the kitchen table: grandma, grandpa, dad, mum, brother Serhiyko and sister Olenka. Unfortunately, the table is quite small and it is uncomfortable to have dinner together. However, during the day, when parents are at work and children are at school, this table is big enough for grandma to cook. How to make this table to be always comfortable?».

To identify contradictions, pupils use the words IF, THEN, BUT. For example, for the given problem, pupils should think in the following way: IF the table is small, THEN it takes up little space in the kitchen, BUT it is difficult for the whole family to gather around it during dinner. IF the table is big, THEN the whole family can gather around it during the dinner, BUT it takes up a lot of space in the kitchen and it is uncomfortable for grandma to cook. Having summarized their arguments, pupils fill in *Table 1* and determine the ideal final result.

Table 1.

1. IF… / THEN… / BUT…	the table is small, it takes up little space in the kitchen, it is difficult for the whole family to gather around it.
2. IF… / THEN… / BUT…	the table is big, the whole family gathers around it during the dinner, it takes up a lot of space in the kitchen and it is uncomfortable for grandma to cook.
3. THE OBJECT HAS TO / BE BOTH… / AND…	the whole family could gather around the table, the table has to take up little space
4. IDEAL / FINAL / RESULT	Folding table.

Practice shows that the effectiveness of solving the inventive problems depends on the following requirements: a) not to suppress a pupil's intuition; b) to encourage pupils to develop their intuition and to direct pupils to further logical analysis of the

proposed ideas; c) to cultivate pupils' self-confidence and belief in their abilities to solve problems.

Therefore, at the beginning, Eureka introduces a set of methods to stimulate and activate pupil's eagerness for creative and research activities. For example, pupils encounter the concept of «invention», «inventor» via video clips. Then pupils draw and describe an invention (for example, a device for pupils) that they dream of creating.

Many years' experience in implementing inventive problems in primary schools educational process shows that TIPS-technologies allow pupils to master their thinking skills, learn to solve creative problems, boost imagination. TIPS as a technology of creativity promotes pupils' and teachers' development and self-development.

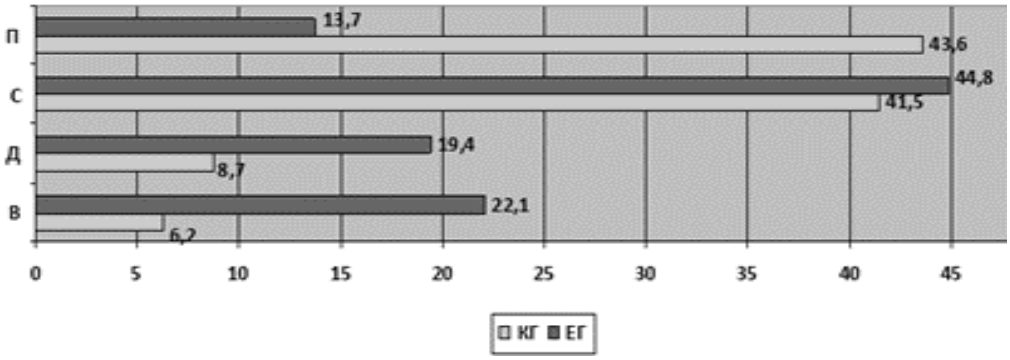
'Eureka' effectiveness was experimentally proved during 2010-2020 in 271 comprehensive schools (primary school), which represent the scientific and educational project «The Intellect of Ukraine».

682 pupils of 1-4 classes took part in the experiment. The experimental group (EG) included 340 pupils, the control group (CG) – 342 pupils.

The capacity for creativity and critical thinking was determined via the tests of J. Guilford and E. Torrance. Criteria and markers are defined:

- flexibility (the ability to see an object from a new angle, to find its new use and functional application in real life; the ability to change an object perception so that its new, hidden aspects can be seen; the ability to produce various ideas in an uncertain situation);
- originality (the ability to produce remote associations; the ingenuity of the ideas expressed; pronounced aspirations for intellectual novelty).

The obtained data is shown in histogram 1.



Histogram 1. *The development pace of creativity and critical thinking levels in control and experimental groups. (КГ – CG, ЕГ – EG)*

The obtained experimental results validity was verified by the mathematical statistics methods. Data, verified by Pearson's test and Student's t-test, confirmed the occurrence of positive changes in the creative skills development of primary school pupils while studying natural-mathematical cycle subjects. The experimental results prove the effectiveness of the developed and approbated didactic system of creative skills development. Primary school pupils acquire such skills while studying natural-mathematical cycle subjects.

According to the experiment results, Eureka is recommended for comprehensive schools and is approved by the Ministry of Education and Science of Ukraine.

CONCLUSIONS

The study proposes one of the ways to develop critical thinking of primary school pupils in the process of studying the natural-mathematical cycle subjects (Mathematics and Eureka).

1. A retrospective study of primary education systems development in Ukraine and developed countries (Singapore, China, Japan, the USA, Finland, the UK, France, etc.) proves the necessity to organize a thorough process of developing pupils' critical thinking.
2. According to historical, philosophical and psychological-pedagogical scientific literature analysis, critical thinking is a type of thinking aimed at solving problems, namely studying the line of argument (hypotheses, criteria, definitions, arguments, facts, etc.), analyzing alternative solutions; forecasting and assessing consequences.
3. In the framework of our study, critical thinking is defined as an individual ability to independently assess the surrounding reality, information, knowledge, others' opinions and statements, the ability to find effective solutions based on existing stereotypes and developed criteria.
4. It is practically proved that one of the approaches to pupils' algorithmic, logical and critical thinking development is the theory of solving inventive problems (TIPS), whose founder is H. Altshuller.
5. Inventive problem is defined as a problem that contains a cognitive contradiction, whose solution promotes the development of pupils' critical thinking, in particular, the ability to find analogies and connections between different objects and different characteristics of an object, to summarize known facts and identify particular cases, to establish cause and effect relations between objects, to carry out geometrical and physical interpretation of analytical characteristics, etc.
6. The ability to solve inventive problems is developed in the course of Eureka for project classes. The subject is taught to the pupils of 2-4 classes in the framework of the project «The Intellect of Ukraine». The conceptual aim of Eureka is to form pupils' abilities to invent, as well as primary skills to carry out research in the field of nature science. The main aim of Eureka is to form critical thinking of primary school pupils through the relevant content lines.
7. The experimental results prove the effectiveness of 'Eureka' that is demonstrated on the histogram and confirmed by data verification via Pearson's test and Student's t-test.
8. The subject 'Eureka' is recommended for comprehensive schools.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

РОЗВИТОК КРИТИЧНОГО МИСЛЕННЯ УЧНІВ ПОЧАТКОВИХ КЛАСІВ ЗАСОБАМИ ВИНАХІДНИЦЬКИХ ЗАДАЧ

Мета дослідження *– визначення ефективних засобів розвитку критичного мислення учнів початкових класів.*

Методологія*. Було використано ретроспективний аналіз розвитку систем початкової освіти в Україні та у високорозвинених країнах; з'ясовано, що саме з початкової ланки потрібно організовувати процес розвитку критичного мислення учнів. Матеріалом дослідження стали типові освітні програми початкової освіти, освітніх галузей, та чинних навчальних предметів, що вказує на необхідність розробки та впровадження спеціального навчального предмета, метою якого є розвиток критичного мислення, вміння висловлювати власну думку, оцінювати ризики та розв'язувати проблеми. У Державному стандарті початкової освіти спільними для всіх ключових компетентностей визначено такі вміння, як ініціативність, здатність логічно обґрунтовувати позицію, вміння конструктивно керувати емоціями, оцінювати ризики, приймати рішення, розв'язувати проблеми, співпрацювати з іншими особами.*

Результат*. З'ясовано, що критичне мислення – це тип мислення, який спрямований на розв'язання проблем, зокрема: дослідження лінії аргументації (гіпотези, критеріїв, дефініцій, аргументів, фактів тощо), аналіз альтернативних рішень; прогнозування й оцінювання наслідків. Практично доведено, що ефективним способом розвитку критичного мислення є винахідницькі задачі, підґрунтям яких є теорія розв'язання винахідницьких задач (ТРВЗ). Визначено, що винахідницька задача містить пізнавальне протиріччя, процес вирішення якого сприяє розвитку в учнів критичного мислення. Запропоновано авторський навчальний предмет «Еврика» для учнів 2-4 класів, метою якого є формування в учнів критичності мислення, творчих здібностей та здібностей до*

винахідництва, а також первинних умінь здійснювати наукове дослідження в природничій галузі. Наведено результати апробації навчального предмета.

***Висновки**. Для розвитку критичного мислення учнів початкових класів потрібно з початкової школи впроваджувати нові навчальні предмети, метою яких є навчання учнів розв'язувати винахідницькі задачі.*

КЛЮЧОВІ СЛОВА: *винахідницька задача, еврика, креативність, критичне мислення, початкова школа.*

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GENERAL SCIENTIFIC BASICS OF PEDAGOGICAL HISTORY RESEARCHES

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ABSTRACT

The manuscript presents general scientific basics of researches on history of pedagogy. They are connected with methodology and historiography. As studying history of any science is always significant because it helps to clarify the state of the problem under research as well as contributes to improving the scientific level of the author's investigation it is very important to make this investigation in a proper methodological way in order to avoid errors in the work of the researcher. Thus, the paper is topical.

*The **purpose** of the article is to determine the methodology of historiographical investigation of researches on history of pedagogy. The objectives of the study are to clear up the methodological principles of the mentioned research, methods of their knowledge and means of historiographical research in this area.*

*The **methodology** used in the study is presented by general theoretical methods such as analysis and synthesis of related researches together with narrative*

method. They helped to receive and present the results as well as to make the conclusion.

*The **results** of the study show that any research of the historiography of pedagogical history should be based on scientific methodology. Tools for such researches are methodological principles (historicism, systematics, objectivity, comprehensiveness, and continuity), methods (analysis, synthesis, methods of typology and comparison, as well as bibliographic method) and means of knowledge (information technology, computers, office equipment, information computing devices).*

*The **conclusions** allow asserting that mastering the methodological tools is a necessary condition for improving the scientific level of historiographical research on the history of pedagogy.*

KEY WORDS: *historiographical research, history of pedagogy, methodological tools, researcher, scientific basics.*

INTRODUCTION

The issues of methodology together with the historiographical analysis of research on history of pedagogy are of great importance today, as they not only clarify the state of the issue to be studied, but also contribute to improving the scientific level of the author's investigation. It is known that without a serious historiographical analysis of previous research, it is impossible to understand the process of development of any knowledge, to identify gaps in it and to determine the prospects for further exploration.

Moreover, a careful analysis of existing scientific works allows the author to clearly understand his own solution to the question, "to avoid unnecessary repetitions and fruitless duplication of what has already been done" (Nechkina, 1965, p. 22), and saves time, because of course the author must make something new, to advance science, instead of repeating what has long passed.

According to scientists, without a history of consideration of the views development, i.e. analysis of how the accumulated factual knowledge was comprehended and generalized, there is practically no development of actual scientific knowledge in a particular field (Tokarev, 1966, p. 4-5). Thus, the presence of qualitative historiographical research indicates the maturity of science itself.

However, such a mandatory component of any scientific research as the analysis of scientific literature, unfortunately, is overshadowed by the fact that it is often formal in nature and presents just a review of previously published books and articles, without in-depth analysis, while it should include a methodology.

That is, the construction of one's own concept should be based on the analysis made by scientists before or should include evaluation or comparison of different concepts and selection of the most suitable of them from the author's point of view, not just a descriptive selection of quotations and expressions (Sukhomlynska, 2007, p. 8-9).

Analysis of research shows that a significant amount of historiographical research has emerged in recent decades, as any science requires careful study of both its own history and the history of the issue under research. Thus, much attention was paid to historiography by Ya. Kalakura (2004), I. Kolesnyk (2000), E. Lunyak (2004), and others, who studied historical historiography in detail. L. Holubnycha

(2012; 2012a; 2012 b), N. Hupan (2002), O. Sukhomlynska (2007) made a significant contribution to the development of theoretical and methodological aspects of pedagogical historiography.

A wide range of pedagogical issues has been studied from a historiographical point of view in many scientific works (Strazhnikova, 2015; Tkachev, 2015; Bondar, 2020 etc.).

Methodological issues of scientific research have also been in the field of view of scientists. However, the issues of methodological tools for historiographical analysis of research on history of pedagogy remain insufficiently developed. Therefore, it is necessary to differentiate the concepts of methodological principles and methods of scientific research, as well as to determine the relationship between them.

The **purpose** of the article is to determine the methodology of historiographical research of scientific works on history of pedagogy. The objectives of the paper are to outline the methodological principles of such research and methods of their knowledge, and means of historiographical research in this area.

METHODOLOGY

As the article is of theoretical character, general theoretical methods were used. They include analysis and synthesis of related researches as well as narrative method, which facilitated to receive and present the results and make the conclusion.

RESULTS

In modern scientific research, the generalization and analysis of the predecessors' achievements of the problem under study are of particular importance, but of even greater importance is the awareness of the internal laws of science.

Thus, it is not enough to know how a pedagogical problem arose and was understood, how a specific issue of teaching and education as well as their acquisition was solved in a specific period, a scientist needs to know why this approach to this issue existed, why views on a particular problem changed in different periods, what was the positive or negative impact on the development of methodological and pedagogical thought in general.

Determining the patterns of development of the studied problem should be the essence of the methodological approach to the historiographical analysis of a particular problem. Scholars believe that "historiography without methodology is fruitless, and methodology without historiography is pointless" (Dniprov, 1986, p. 136), because it ignores the real problems and experience of a particular science, because methodology and historiography are interdependent.

Moreover, the level of development of science depends on the level of development of its methodology, theoretical generalization of the material (Sakharov, 1981, p. 107). Methodology should be not only the starting point of any scientific work, but also the guiding thread of any research and historiographical study of existing works, including. Thus, in-depth research is always based on a general methodological approach and methodological principles of historiographical analysis.

Let us consider the methodological tools of historiographical research on history of pedagogy. Naturally, the complexity and diversity of objective reality led to the emergence of numerous methods of its study, which in turn served as the basis for the emergence of a special doctrine of methods of scientific knowledge.

When beginning to study any theoretical question, it is first necessary to define the conceptual scope of scientific terms used to describe the question, because the concept itself reflects the essential features, properties and connections of the

phenomena of reality being studied. In science, concepts act as the main elements of the scientific-mental, cognitive process and express the substantive essence of any theory.

This doctrine is the methodology. The term "methodology" is of Greek origin and consists of two words: methodos, which means the path of research, and logos – teaching. That is, literally "methodology" translates as "the doctrine of the path of research."

A large explanatory dictionary of the modern Ukrainian language gives two interpretations of the concept of "methodology": 1) methodology – the doctrine of the scientific method of cognition and transformation of the world; its philosophical, theoretical basis; 2) methodology – a set of research methods used in any science in accordance with the specifics of the object of knowledge (Large explanatory dictionary, 2012, p. 371). In the context of our study, the second meaning of this term is more appropriate.

From the point of view of philosophy, the methodology "synthesizes the theoretical bases of the most expedient and effective general scientific methods of research and facilitates scientists' choice" (Stefonov, 1967, p. 129). That is, the main emphasis of philosophers is on a combination of theoretical principles of research, as they consider "theoretical consciousness" to be the basis and distinguishing feature of any science.

Sociology sees methodology as "a set of organizational forms, techniques and methods of research" (Becker, 1961, p. 278), which indicates the equivalence of both scientific methods and research organization.

Scholars-historians of pedagogy offer the following definition of methodology: "methodology is a system of essential aspects of worldview and theory that make up the research principles of science" (Petryaev, 1976, p. 10), thus emphasizing the special importance of worldview, because when studying any concept of historical-pedagogical process it is the worldview of the researcher that determines the goals and objectives of his research, its methodology, which has a decisive influence on the formation of his own concept.

Pedagogy interprets methodology as "the doctrine of the initial provisions, structure, functions and methods of scientific and pedagogical research" (Zagvyazinsky, 2001, p. 10), "system of principles and methods of construction of theoretical and practical activities" and emphasizes that the manifestation of methodological principles of pedagogical research, scientific and pedagogical research at the philosophical, general scientific, specific scientific levels, as well as at the level of specific research is a necessary condition for studying the genesis of pedagogical thoughts (Kurylo, 1999, p. 42-43).

Thus, analyzing the above definitions, we conclude that the modern methodology of historiography of research on history of pedagogy is based on the synthesis of general theory of scientific knowledge and the practice, i.e. research experience.

The basis of the methodology of any scientific research is methodological principles. Principles are the starting points of any scientific system; "Empirically developed, scientifically understood and established in practice the most important rules of cognition, compliance with which guarantees the deep study and objective coverage of a process, phenomenon, event" (Kalakura, 2004, p. 26).

The application of methodological principles (rules) prevents errors in the work of the researcher. We emphasize that they are the result of many years of research experience, and neglect of at least one of the following methodological principles will lead to negative consequences such as: incompleteness, inaccuracy, etc. of research on history of pedagogy.

The main and integral principles of historiographical study of the problems of history of pedagogy can be considered the following: historicism, systematics, objectivity, comprehensiveness, continuity.

So let us consider the basic methodological principles of historiographical analysis of research on history of pedagogy.

The main and universal rule of historical knowledge in any field of science is the observance of the principle of historicism. It is this principle, according to scientists, which allows researchers to master the facts of the past. Within the framework of any historical and pedagogical reflection, it is important to solve problems related to the essence, structure and specifics of historical and pedagogical science. The principle of historicism helps to solve these problems.

In historiographical works, this principle is manifested somewhat specifically. In the process of historical development, pedagogical knowledge is constantly improved, streamlined, refined, and tested. If a researcher wants to trace the evolution of pedagogical thought or pedagogical science, he must follow a specific historical approach, i.e. take into account and analyze the historical, economic, socio-political, cultural, philosophical, religious conditions in which the author of the researched study lived and worked, which formed his worldview, his pedagogical views, when his works were published.

After all, adherence to this principle will allow "professionally and comprehensively look at the pedagogical processes that took place in the past, identify changes and innovations (or, conversely, regression), linear, spiral or in some other way" (Sukhomlynska, 2005, p. 11), which is one of the main tasks of the historiographical research on history of pedagogy.

Thus, the principle of historicism in historical and pedagogical science is multifaceted. It, on the one hand, involves consideration of phenomena, facts and ideas in the dynamics, establishing a sequence of stages of development of pedagogical phenomena and facts studied, identifying the specifics of each of these stages, revealing the features of its internal contradictions, connections of the object with others objects, identification of trends in the evolution of pedagogical science; on the other hand.

It requires an analysis of important socio-economic factors that in a certain historical epoch determined the uniqueness of the development of theory and practice of teaching and upbringing: specific forms and methods of teaching, content of education, concepts of education, different interpretations of goals and objectives of education, teaching and upbringing.

It is significant that the concrete-historical principle means, first of all, the concreteness of the study of the historiographical process: historiographical problems can be solved only if the development of pedagogical science is studied in connection with the development of society.

It is known that the development of society, changing political priorities leads to changes in the goals, objectives and content of education and upbringing, because education has always fulfilled the social order. As a result of transformations in education and upbringing, the pedagogical theme changes, and later the pedagogical paradigm do.

That is, for a holistic understanding of the object of historiographical research, it is necessary to refer to the specific historical principle, which involves consideration of pedagogical phenomena, facts, etc., taking into account the specifics of the moment, time.

The disclosure of the qualitative features of each stage in the evolution of these pedagogical issues is through the identification of the conditionality of their emergence and development by various

circumstances of a particular historical period.

Since any science (such as the mentioned one) is systemic in nature, the study of its development requires compliance with the rule of systematicity.

It is known that the development of science is influenced by many factors, including the evolution of scientific thought and related knowledge, in our case such as pedagogical, psychological, historical and so on. All these processes can be studied only using the principle of systematics.

Consistent adherence to the system guarantees the researcher both a comprehensive knowledge of the historiography of methods of teaching and education as well as the development of pedagogical science in general.

Systematization in the historiographical analysis of works on the problem under research also orients scholars to the integrity of pedagogical thought, which is relevant in terms of reforming the educational system.

Objectivity is an indisputable and obligatory requirement for any scientific work. Achieving absolute objectivity is not possible, as there are always two components to research: the subject (researcher) and the object.

Therefore, no matter how hard a scientist tries, it is impossible to completely get rid of the influence of subjectivity. But the principle of objectivity of the historiographical study of research on history of pedagogy implies maximum balance in the assessment of each methodological phenomenon, the study and comparison of different points of view on it. This is greatly influenced by how objectively historiographical sources are selected, how they are analyzed, and how they are interpreted.

The principle of comprehensiveness of historiographical research of scientific works requires careful study and analysis of any phenomenon in educational science in the field of the problem under research from all sides.

Thus, to learn the development of pedagogical thought on certain aspects of the issue, the scientist must identify and explore all sources that contain information about its genesis, trace all areas, trends, scientific schools, and determine the personal contribution of each teacher to the science. In addition, it is necessary to consider not only internal development, but also to take into account the influence of the external pedagogical environment, because neither the pedagogical science of a particular country, nor its scientists are isolated.

No foreign scientific ideas will be accepted and "take root" in any country if it is not ready for them. If such ideas are accepted, then, firstly, it indicates that there are grounds for their development, and secondly, they will definitely be adapted to internal conditions. This is the relationship between the principles of comprehensiveness and systematics and objectivity.

Another indispensable rule of historiographical knowledge of works on history of pedagogy is the succession or continuity of research. The principle of succession insures the scientist against subjective views and one-sidedness.

It contributes to the reflection of didactic science in historiographical research, thereby bringing them closer. Succession allows us to trace the chain of development of methodological thought, where new ideas confirm, organically continue, or replace old ones that have outlived themselves or have not been tested over time.

Each subsequent stage of development of methodical knowledge "stands" on the shoulders "of predecessors" (Holubnycha, 2012a, p. 143), because science is collective in nature. The new generation of researchers

critically rethinks the achievements of previous generations, continues methodological topics, and deepens knowledge of certain methodological problems. Continuity is not only a rule for historiographical analysis of research, but also a pattern of development of educational science itself.

The next component of the methodological tools of the researcher of historiography of history of pedagogy is numerous research methods. The method is "a certain sequence of actions, receptions, operations which performance is necessary for achievement of the set purpose" (Ruzavin, 1974, p. 21).

Scientists note that "the method is the creation of the researcher" (Kovalchenko, 2003, p. 40), but any method has an objective side. Therefore, researchers choose certain methods based on the purpose and objectives of their work. So consider only those methods that are inherent in historiographical knowledge of the problem under research.

Thus, the main of these methods can be considered a specific historiographical analysis and synthesis. They are general scientific interconnected methods of scientific research, universal for the historiography of any issue, as they contribute to solving the goal of historiographical knowledge: to find out the origin of a scientific problem, its development and the achievements of scientists in the subject.

Analysis is the dissection of the object of knowledge into components for the purpose of in-depth study of each of them.

This method covers several factors: analysis of socio-cultural preconditions for the creation of each specific methodological work (motives and circumstances), the nature of research issues on history of pedagogy, analysis of the source base, methodological concepts, directions, trends. Careful analysis of each of the elements helps to understand why the facts being studied are interrelated.

Synthesis is a combination of information obtained, taking into account the results of the analysis of all components of the object of knowledge, i.e. the formation of a holistic view of the historiographical process, the development of pedagogical science.

Methods of typology and comparison allow the researcher to clarify the "growth" of scientific knowledge, to identify a new perspective on the interpretation of "old" problems or the expansion of methodological issues, the stability and general recognition of certain methodological concepts.

The bibliographic method is associated with the personification of the contribution of a particular teacher or outstanding thinker in the development of methodological thought, with the identification of features that were characteristic of the whole generation of teachers of a certain era.

This method warns against the total collection of facts of life and work of the teacher and their mechanical description. It is closely related to the study of the source base of special origin: autobiographies, diaries, memoirs, etc., which allows reconstructing the life and inner world of the individual, to establish the origins of methodological concepts with their cause-and-effect relationships.

Another component of the methodological tools of the researcher of the historiographical aspect of history of pedagogy is the means of scientific knowledge. These include information technology, computers, office equipment, as well as information and computing devices. All these tools help researchers to improve efficiency and intensify scientific work.

DISCUSSION

Thus among methodological tools of historical and pedagogical research we presented and described the following

principles: systematic, objectivity, comprehensiveness, continuity.

However, researchers are constantly updating this list. Thus, the authors of the monograph "Scientific approaches to pedagogical research" emphasize the importance of synergetic, culturological, axiological, resource, anthropological, personalized and other approaches (Scientific, 2012). K. Petryaev (1976) also proposes to add chronological, problematic, biographical and chronological-thematic principles (p. 160-164).

Considering methods of historical and pedagogical research, we designated analysis, synthesis, methods of typology and comparison, bibliographic method. Ya. Kalakura (2004) identifies the following methods of historiographical cognition: analysis, synthesis, system-structural and problem approach, logical, historical-chronological, historical-situational, comparative, retrospective, biographical, typology, classification, periodization, etc. (p. 29).

We totally agree with the scholars that proposed principles and methods of researches in connection with the topic of our manuscript are significant and may be fruitful for scientific investigation.

CONCLUSIONS

Thus, the analysis of the researches under the investigation allows us to draw the following conclusions:

1) the study of the historiography of researches on history of pedagogy should be based on scientific methodology;
2) methodological tools of the researcher are methodological principles (historicism, systematics, objectivity, comprehensiveness, continuity), methods (analysis, synthesis, methods of typology and comparison, bibliographic method) and means of historiographical knowledge (information technology, computers, office equipment, information computing devices);
3) mastering the methodological tools is a necessary condition for improving the scientific level of historiographical research on history of pedagogy.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ЗАГАЛЬНОНАУКОВІ ОСНОВИ ДОСЛІДЖЕНЬ З ІСТОРІЇ ПЕДАГОГІКИ

У рукописі представлені загальнонаукові основи досліджень з історії педагогіки. Вони пов'язані з методологією та історіографією. Оскільки вивчення історії будь-якої науки завжди є важливим, воно допомагає з'ясувати стан досліджуваної проблеми, а також сприяє підвищенню наукового рівня авторського розслідування, дуже важливо зробити це дослідження належним методологічним шляхом, щоб уникати помилок у роботі дослідника. Отже, стаття є актуальною.

***Метою** статті є визначення методології історіографічного дослідження наукових праць з історії педагогіки. Завданнями дослідження є з'ясування методологічних засад згаданого дослідження, методів їх пізнання та засобів історіографічного дослідження в цій галузі.*

***Методологія**, яка використовується у дослідженні, представлена загальнотеоретичними методами, такими як аналіз та синтез відповідних досліджень разом із наративним методом. Вони допомогли отримати та представити результати, а також зробити висновок.*

***Результати** дослідження показують, що будь-яке дослідження історіографії педагогічної історії повинно базуватися на науковій методології. Інструментами для таких досліджень є методологічні принципи (історизм, систематичність, об'єктивність, всебічність та наступність), методи (аналіз, синтез, методи типології та порівняння, а також бібліографічний метод) та засоби отримання цих знань (інформаційні технології, комп'ютери, оргтехніка, інформаційні обчислювальні пристрої).*

***Висновки** дозволяють стверджувати, що оволодіння методологічним інструментарієм є необхідною умовою підвищення наукового рівня історіографічних досліджень з історії педагогіки.*

КЛЮЧОВІ СЛОВА: *дослідник, історіографічні дослідження, історія педагогіки, методологічний інструментарій, наукові основи.*

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SPECIAL ASPECTS OF PROFESSIONAL ACTIVITY OF MOTOR TRANSPORT PROFILE TEACHING ENGINEERS

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ABSTRACT

The article characterizes the special features of the motor transport profile teaching engineers' professional activity in vocational institutions (teacher of vocational training, master of vocational training), higher education institutions (engineering teacher) and in manufacturing.

*The **purpose** is to clarify the special aspects of motor transport profile teaching engineers' professional training in higher education institutions of Ukraine.*

*The following research **methods** are used observation, description through individual interviews, expert evaluation method and questionnaire.*

*The **results** are the following. It is stated that engineering and pedagogical education involves the rational integration of psychological, pedagogical and engineering components of professional training. It is noted that the professional training of teaching engineers is aimed at the formation their professional engineering and professional pedagogical competencies. This integrated training includes two equivalent integrated components: engineering (technical and*

technological, manufacturing, special, industrial branch) and pedagogical (humanitarian and social).

It is stated that successful professional activity of a teaching engineer of motor transport profile is connected with professional training in institutions of higher education and the content and organization of their self-education in the process of professional development. To ensure proper training of a teaching engineer for successful activities, it is necessary to keep a continuous connection between the engineering and technical awareness and pedagogical activities.

Modern professional activity of a teaching engineer is characterized by their innovative activities, the specifics of them is caused by the peculiarities of professional-pedagogical education and conditions of engineering-pedagogical activities, which provide generation and transformation of new ideas into innovations and form the management system. The innovative activity of teaching engineer is the basis of creative approach to professional responsibilities.

It is ***concluded*** *that a teaching engineer of motor transport profile is a teacher with higher pedagogical and technical education, who performs educational-methodical, engineering-technical, scientific-innovative, communicative-psychological, organizational, managerial and legal activities.*

KEY WORDS: *teaching engineer, motor vehicle profile, professional activity, professional competence, professional training.*

INTRODUCTION

Successful professional activity of a teaching engineer depends on his professional training in educational institutions and organization of his self-education in the process of their professional development. To ensure a teaching engineer proper training for successful activities, it is necessary to have a continuous connection between the pedagogical activity and technical awareness.

The practice of a teaching engineer's training shows that this connection is significantly complicated. The complexity of use lays in the structure of the professional activity, a wide variety of performed engineering and pedagogical functions and tasks, which are constantly changing under the influence of many external and internal factors. To find a way out of this situation, it is possible to determine the general features of the professional activity of a teaching engineer in the field of motor transport.

To determine the special features of a teaching engineer's professional activity, it is necessary to begin with a scientific analysis of the concept of "teaching engineer", because it represents the essence of their activities.

A teaching engineer is a specialist with the higher education, who performs pedagogical, educational-manufacturing and organizational-methodical activities for the students' training in one of the manufacturing branches in the vocational education system, as well as skilled workers in manufacturing. They are characterized by a broad pedagogical profile; they are able to combine the functions of a master of vocational training and a teacher of special technology, general technical subjects, as well as to organize professional training (Zeer, 1988, p. 10).

Modern scientists take a different approach to determining the types of engineering and pedagogical activities. The following

structures of engineering and pedagogical activity are identified: pedagogical, engineering, technical, and manufacturing and technological (Zeer, 1988. p. 10); humanitarian and technical (Bezrukava, 1996, p. 344.); pedagogical and engineering (Tarkhan, 2005, p. 60); professional-engineering and professional-pedagogical (Kankovsky, 2014, p. 132); pedagogical, educational-manufacturing and organizational-methodical (Krokoshenko, 2010, p. 262); psychological-pedagogical, general-scientific, engineering and methodical (Sychavska, 2012, p. 41).

T. Kalinichenko claims that "engineering-pedagogical" activity consists of two independent and closely related components: engineering and pedagogical. Moreover, this connection should be reflected in the process of professional training of teaching engineers, because engineering-pedagogical education is an entire, holistic system (2005, p. 76).

Engineering and pedagogical education (EPE) is unique in its essence and its very nature allows to form such a harmoniously developed teacher, who can possess engineering and pedagogical skills to solve technical problems, think systematically, project technical objects, be aware of special issues in logistics, marketing, labor protection of the motor transport industry and the skills of working with people, to organize the educational process in a technical institution of higher education, to be a leader and educator for young people.

Training of teaching engineers in engineering and pedagogical universities and faculties of technical, pedagogical universities has its own specifics, different educational environment and opportunities for the formation of specialists. Each of the options has its advantages and disadvantages.

In the case of studying in a vocational school, the pedagogical and psychological-pedagogical component of professional training may suffer. It may also be marked by the low professional adaptation of teachers who provide engineering training. These teachers are well acquainted with the subjects of the automotive industry that are taught, but, as a rule, do not have enough idea of the educational field for which engineers-teachers are trained. It is obvious that this fact contributes to reducing the quality of training.

In pedagogical universities, as a rule, a negative situation is created opposite to the previous one: the engineering and technical component of professional training suffers, but psychological and pedagogical components are poorly adapted to the motor transport industry.

We should note that the field of motor transport covers the organization of passenger and freight transport, logistics, transport management, transport safety, environmental issues, intelligent transport systems, maintenance, repair and diagnostics of transport.

Against this background, specialized engineering and pedagogical universities look the most favorable. They have more opportunities to ensure parity and integrate engineering and teaching training. The need for a balanced inclusion in the content of education of these components is due to the professional nature of engineering and pedagogical activities, each side of which, as noted by P. Kubrushko, due to its unconditional functional obligation cannot be primary or secondary (2006, p. 97).

The possibility of successful professional activity of a teaching engineer is directly dependent on the content and organization of their professional training in educational institutions. Accordingly, engineering and pedagogical education offers a rational integration of psychological-pedagogical and engineering-technical components of professional training.

We must note that the professional training of engineers-teachers is aimed at the formation of their professional-engineering

and professional-pedagogical competencies. This integrated training includes two main integrated components – engineering (technical and technological, manufacturing, special, industrial) and pedagogical (humanitarian and social).

Today, European countries follow the path of compulsory pedagogical education for not only humanitarian but also technical subjects' teachers. In Europe, there is the International Society for Engineering Pedagogy («IGIP – Internationale Gesellschaft für Ingenieur pädagogik»), which unites the scientific and pedagogical community of 72 countries.

As a result of the training, IGIP awards students the title of "European teacher of technical subjects"; it also documents the qualifications and competencies of teachers and adds them to the international register of pedagogical engineers.

As noted, some shortcomings of basic education can be corrected in the process of professional activity through training, self-development and self-education.

Among the difficulties faced by a young teaching engineer at the beginning of his professional and pedagogical activity are: cooperation with colleagues and students; mastering the personal style of teaching, the implementation of ways and means of compliance with modern teaching requirements; development of theoretical and practical knowledge of the latest achievements and problems of pedagogy, technology, psychology; development of methods of teaching and educating students, taking into account innovative approaches.

The difficulties as well are introduction of modern educational approaches and advanced pedagogical technologies; implementation of the principles of systematic acquisition of practice and experience in teaching, conducting seminars, practical and laboratory classes; preparation for the advanced training process.

Graduates of engineering and pedagogical specialties (015 Vocational Education (Transport)) receive several stages of professionalization - continuing education - with a bachelor's degree as a teaching engineer, who can work in the workshop of industrial training, education, dormitory education, industrial training instructor, training master class center, equipment and laboratory for equipment of workshops in vocational schools (vocational school, training and manufacturing center, training and manufacturing plant); with an educational degree of registration - a teacher of general technical and special subjects, head of industrial practice, methodologist, vocational training instructor, deputy head, head of an educational institution (college, academy, university).

In addition, the teaching engineer in manufacturing can hold the positions of specialists (technician-technologist, technician-designer), professionals (engineer, design engineer, engineer-technologist), scientists (researcher, graduate student, assistant, researcher), managers (master of the production site, head of the workshop, head of the section, head of the department, head of the laboratory or workshop, etc.) and civil servants (inspector, inspector-methodologist).

Taking into account, studying the results of scientific work, we determined the following interpretation of the professional activity of teaching engineers of motor transport profile, it is an integration activity that includes engineering, pedagogical and scientific components.

Modern engineering is becoming more complex and computerized, which can lead to non-standard tasks that require new innovative thinking.

The specialty of professional activity of teaching engineers of motor transport profile, who became scientific and pedagogical workers in a technical institution of higher education, is created by continuous professional competence development, which implements its professional activity.

Scientists of the Ukrainian Engineering and Pedagogical Academy under the leadership of O. Kovalenko distinguish the following production functions in the professional-engineering and professional-pedagogical components in the professional activity of a teaching engineer: design, organizational, technological, educational and research (2005, p. 9).

According to the developed concept of development of engineering and pedagogical education in Ukraine there are standard production functions of the teaching engineer which contain typical tasks of activity which are carried out by experts not only in education, but also on manufacturing (2004, p. 9). These typical tasks contribute, in addition to improving the quality of training, also to the social protection of graduates of engineering and pedagogical specialties, giving them the opportunity to work as both engineers and teachers.

N. Bryukhanova proposed a list of typical tasks (2007, pp. 153-156), corresponding to each of these functions, in fact, is the sum of the typical tasks of a teacher and an engineer.

Among the large number of typical tasks that constitute the activities' content essence of a teaching engineer of motor transport profile, we highlight the following main typical tasks: the organization of the pedagogical or production process; development of various programs, projects and plans; analysis of technical and regulatory documentation, regulations and rules; workers or technical systems of the automotive industry development and training; conclusion of methodical recommendations, plans of works', schedules', explanatory notes', drawings', technological maps', schemes', instructions', didactic materials' working out; possession of best practices in the field of motor transport; control over the implementation of established requirements, current norms, rules and standards.

The tasks as well are: structuring the worker's professional and subsequent training; management the worker's professional development; pedagogical and technical information in the field of motor transport analysis, adaptation, generalization and systematization; working out technologies and control systems of pedagogical and production process; ensuring safe effective training or production; commissioning of new equipment or facilities; creating a comfortable learning or production atmosphere; motivation, stimulation, coordination and regulation of activities, mastery of relevant professional competencies; development of creativity, innovation and the desire to improve their professional skills.

A teaching engineer's highly qualified professional activity consists in integration of functions of a master of industrial training and a teacher of general-professional and professional-practical disciplines, generates ideas from various branches of knowledge, operates interdisciplinary categories, comprehensively perceives innovative processes in pedagogical and technical systems design tools using fundamental knowledge of pedagogical science and technology.

In the process of pedagogical activity, the object of study is a set of pedagogical actions, pedagogical skills and abilities, skills of professional self-education and self-development; ability to implement and develop their own pedagogical abilities; the ability to manage their own emotional states; make the most of your creative

potential, and the object of study in engineering is the object of study is transport vehicles and technology.

To determine the features of professional activity and the development of professional competence of teaching engineers of motor transport profile, we conducted a series of surveys among teachers of free economic education to clarify their professional needs. This will give us the opportunity to make responsible management decisions on this basis to apply and improve the training of teaching engineers of motor transport.
So, the **purpose** is to clarify the special aspects of motor transport profile teaching engineers' professional training in higher education institutions of Ukraine.

METHODOLOGY

To find answers to the research questions, we reproduce the initial state of development of the professional competence of a teaching engineer of motor transport profile for the purpose of conducting a pedagogical experiment. With this support, the following research methods are used observation, description through individual interviews, expert evaluation method and questionnaire.

The method of observation was also used to collect materials for the study of the topic. The object of observation was the teaching engineers of motor transport profile at the higher education technical institutions. To increase the reliability and quality of the observation, we us the rules of systematization and diversity of observation of professional activities, for professional and career development, self-realization.

The survey was conducted with the help of individual interviews of a motor vehicle teaching engineers to check and supplement the experimental data. The information meets the requirements of validity, reliability and objectivity. The developed questions allowed studying the degree of message communication of the motor transport profile teaching engineers, the need to increase professional competence in continuous self-awareness and self-improvement.

Questionnaire survey for teaching engineers was created on the problems of development of professional competence of motor transport profile teaching engineers with the help of pilot research. For this purpose, a survey was conducted, which was attended by 180 teachers from the Ukrainian Engineering Pedagogics Academy, Kharkiv National Automobile and Road University, Kharkiv State Automobile College, Kharkiv State Automobile and Road College, Kharkiv State Polytechnical College, Kharkiv College of Transport Vehicles of Sumy State University, Engineering College of O. Honchar Dnipropetrovsk National University.

Representativeness of the sample was achieved both in terms of staff (evenly included both masters of industrial training and teachers of professional and theoretical training) and experience of pedagogical work (the sample evenly represents those who have experience up to 5 years and those who work from 6 to 15 years, and those with more than 15 years of experience).

An important method of research was the method of expert evaluations. When selecting experts, we paid attention to such objective data as their positions, practical experience, scientific qualifications and education. Such experts were teachers of engineering and pedagogical departments, leading specialists in the practice of engineering and pedagogical sphere, scientists, experienced psychologists.

During the research work, research interviews were conducted with experts, meetings, scientific and methodological seminars with the participation of these experts were attended. This made it possible to exchange information, develop and coordinate plans, fully understand the problem of developing the professional

competence of teaching engineer of motor transport profile, more clearly define the concept, structure, levels and main areas of research.

The experts were teachers of the Ukrainian Engineering and Pedagogical Academy and Kharkiv National Automobile and Road University.

Experts assessed the importance of professional development by types of professional activity of engineers of pedagogical motor transport profile such as: educational-methodical, engineering-technical, scientific-innovative, communicative-psychological, organizational, managerial and legal activity.

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Instruments for Data Collection

A standardized questionnaire including 8 questions was developed. The questionnaire consisted of the following questions:

1. Your basic education

A. pedagogical education;

B. technical;

C. engineering and pedagogical.

2. The presence of pedagogical education.

A. Yes

B. No

3. How do you understand the concept of "professional competence"?

_____

_____

4. What is the level of the program on the methodology of scientific and methodological competence, which would satisfy your professional and pedagogical needs during advanced training courses?

A. initial (reconstructive);

B. sufficient (variable);

C. high (creative).

5. What professional competence do you want to develop in the intercourse period of professional development?

A. pedagogical and methodical;

B. engineering;

C. scientific and innovative.

6. Do you voluntarily and constantly participate in various professional seminars, trainings, conferences, etc.?

A. Yes

B. No

7. If you need to use new computer technologies (such as MathCad, Solidworks and TechnoPro) in the engineering field, you:

A. perform independently;

B. ask someone to help.

8. Which types of professional activity of the teaching engineer of motor transport profile in your opinion are important in the development of professional competence? Rate a 7-point scale: where 7 points is the best quality, 1 point is the highest quality. The results are to be filled in the table 1 of the survey.

Table 1

Type of professional activity	Rating
• Educational and methodical activity	
• Engineering and technical activities	
• Scientific and innovative activity	
• Communicative and psychological activity	
• Organizational activities	
• Management activities	
• Legal activity	

RESULTS

Interviews with the professors of these universities showed that the level of professional competence increases with the experience of teaching. The maximum values, in their opinion, pedagogical skill is reached in the period from 15 to 25 years of work in Technical Institutions of Higher Education (TIHE).

Answering the questions of the questionnaire, the representatives of the experimental audience report what their basic education is: pedagogical education in 16% of respondents, technical 56% or engineering and pedagogical education 28%. This fact indicates that the vast majority of pedagogical workers of TIHE do not have pedagogical education and need to improve scientific and methodological and other components of professional and pedagogical competence.

The question was asked about the levels of programs in the methodology of vocational training, which provided the satisfaction of professional and pedagogical records in advanced training courses: primary (reconstructive), sufficient (variable) and high (creative). It is not unusual that more than half of the responsibilities are responsible for a sufficient level of 45% and a high level of 24%, but it is noteworthy that 31% of teachers form the initial level. This will indicate that most teachers of TIHE have no pedagogical education, and have the need to develop basic components through scientific and methodological competence.

Representatives of the experimental audience when answering questions about the development of professional competence of motor transport teaching engineers in the intercultural period of training provide the answer: 38% of respondents want to gain pedagogical and methodological competence, 32% say that before they wanted to get relevant information about the latest people of technology and equipment and 30% of the

answers wanted to get scientific and innovative competence from the representatives of the teaching staff of TIHE and teachers of the Educational and Methodical Center of Professional Technical Education (EMC PTE).

The results of the survey revealed that teachers do not always clearly use the message about the change in the concept of "professional competence". A certain part of respondents (29%) recognized professional competence as a set of knowledge of the discipline and methodological and organizational and pedagogical changes. The majority of the described 58% do not participate in professional trainings, seminars, forums, unless required by the administration of the educational institution, so it is concluded as the nominative response of unorganized professional competence of this group of teachers.

Legislative data were obtained on the management of collections of modern computer programs at the beginning: modeling of technological processes (3D modeling of MathCad, Solidworks, TechnoPro and others), which helps to increase efficiency and self-design. About 56% (mostly seniors) need outside help when it comes to creating a computer product (presentation) or membership in design and drawing programs.

Table 2 shows the results of processing questionnaires to determine the importance of professional activities through expert evaluation. As you can see, the experts gave the largest share of educational and methodological and engineering activities. Given that this decision was simultaneous, that the share of these factors is combined, while the engineer-teacher plays the role of teacher and master, and is equal to - 57%.

The third need of the constituent development of professional activity of teaching engineers of motor transport profile is engaged in scientific-innovative activity - 20%; fourth place is engaged in communicative and psychological activities (level of foreign language management, ability to productive pedagogical communication (conflict prevention, authority), culture, etc.) – 9%; organizational and managerial activity for 6%, legal activity (knowledge of laws, regulatory framework) – 2%.

Table 2

Expert assessment of the importance of professional activities according to the level of development of professional competence of teaching engineers of motor transport profile

Type of professional activity	Rating
• Educational and methodical activity	0,3
• Engineering and technical activities	0,27
• Scientific and innovative activity	0,2
• Communicative and psychological activity	0,09
• Organizational activities	0,06
• Management activities	0,06
• Legal activity	0,02
• Total	1

DISCUSSION

Teaching engineers of motor transport profile, who began their teaching activities in a technical institution of higher education, as a rule, do not have pedagogical education, they work intuitively, based on their own limited experience of educational activities.

Given that they are highly qualified specialists in the field of motor transport,

updating and improving special professional knowledge and skills are commonplace for them.

An inexperienced teacher quickly reports the lack of psychological and pedagogical knowledge and skills, lack of pedagogical equipment, which cannot ensure the effectiveness of the educational process, introducing the latest educational technologies.

For these young teachers, first of all, it is advisable to organize psychological and pedagogical training such as "teacher training".

For example, in the Center for Postgraduate Education of V. N. Karazin Kharkiv National University, there are special pedagogical training courses (100 hours) or Educational and Methodical Center of Professional Technical Education (EMC PTE) in the Kharkiv region, which provide primary pedagogical education to employees of TIHE.

After graduation, they master the basics of pedagogy and psychology and achieve an adaptive (reference) level of pedagogical training as the basis for future pedagogical skills. The leading feature is the development of motivation for its formation and development (conscious independent activity of professional, pedagogical and personal improvement).

The complication of engineering and pedagogical activities is in a combination of humanitarian and technical types of work. The practice of proving that graduates of engineering and pedagogical specialties in the field of transport lack professionalism and practice in creating methods for analyzing the performance of vehicles and transport systems, lack experience in using modern computer technology in specialized consumer environments to solve technical enterprises and model processes.

CONCLUSIONS

The generalization of the results of scientific research of students, legal documents, and the educational process of TIHE made it possible to define the features of professional activity and the requirements for professional competence of teaching engineers of motor transport profile.

On the basis of comparing the activities of the engineering industry of motor transport, on the one hand, and the activities of the teacher in the context of TIHE professional tasks, on the other, stated that engineering and pedagogical education involves rational integration of psychological and pedagogical and engineering components.

Thus, it can be determined that a teaching engineer of motor transport profile is a teacher with higher pedagogical and technical education, who carries out educational-methodical, engineering-technical, scientific-innovative, communicative-psychological, organizational, managerial and legal activities.

Successful professional activity of a teaching engineers of motor transport profile is connected with professional training in institutions of higher education and the organization of his self-education in the process of professional development. To ensure proper training of a teaching engineer for successful activities, it is necessary to have a continuous connection between the engineering awareness and pedagogical activities.

In the process of pedagogical activity, the object of study is a set of pedagogical actions, pedagogical skills, strengthening of professional self-education and self-development; ability to realize and develop own pedagogical abilities, to manage their own emotional states, to make the most of the creative potential, the combined studying in engineering activity; the object of studying appears to be motor transport vehicles and technologies.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ОСОБЛИВОСТІ ПРОФЕСІЙНОЇ ДІЯЛЬНОСТІ ІНЖЕНЕРА-ПЕДАГОГА АВТОТРАНСПОРТНОГО ПРОФІЛЮ

У статті схарактеризовано особливості професійної діяльності інженерів-педагогів автотранспортного профілю у професійно-технічних закладах (викладач професійного навчання, майстер виробничого навчання), закладах вищої освіти (інженер-педагог) та на виробництві.

***Мета** – визначити особливості професійної підготовки інженерів-педагогів автотранспортного профілю у закладах вищої освіти України.*

*Було використано такі **методи** дослідження: спостереження, опис за допомогою індивідуальних співбесід, метод експертної оцінки та опитувальник.*

***Результат** дослідження – інженерно-педагогічна освіта передбачає раціональну інтеграцію психолого-педагогічної та інженерно-технічної складових професійної підготовки. Зазначено, що професійна підготовка інженерів-педагогів спрямована на формування та розвиток в них професійно-інженерної та професійно-педагогічної компетентностей. Ця інтегрована підготовка містить два рівноцінні інтегровані складники: інженерний (техніко-технологічний, виробничий, спеціальний, галузевий) і педагогічний (гуманітарно-соціальний).*

Успішна професійна діяльність інженера-педагога автотранспортного профілю залежить від професійної підготовки в закладі вищої освіти та змісту і організації його самоосвіти в процесі підвищення кваліфікації. Для забезпечення належної підготовки інженера-педагога до успішної діяльності повинен існувати безперервний зв'язок між інженерно-технічною обізнаністю та педагогічною діяльністю.

Сучасну професійну діяльність інженера-педагога характеризує його інноваційна діяльність, специфіка якої зумовлена особливостями професійно-педагогічної освіти та інженерно-педагогічної діяльності, які забезпечують генерацію та трансформацію нових ідей у нововведення, а також формують систему управління цим процесом. Інноваційна діяльність інженера-педагога слугує основою творчого підходу до виконання професійних обов'язків.

*Сформульовано **висновки** про те, що інженер-педагог автотранспортного профілю – це викладач із вищою педагогічно-технічною освітою, який здійснює навчально-методичну, інженерно-технічну, науково-інноваційну,*

комунікативно-психологічну, організаційну, управлінську та правову діяльність.

КЛЮЧОВІ СЛОВА: *автотранспортний профіль, інженер-педагог, професійна діяльність, професійна компетентність, професійна підготовка.*

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COGNITIVE ALGORITHMS FOR LEARNING FOREIGN LANGUAGES: PSYCHOLINGUISTICS APPROACH

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ABSTRACT

The relevance of the undertaken research consists in considering psycholinguistics an interdisciplinary field, which studies the interrelation between mind and language. It is important to perceive learning foreign language as an act of cognition, experience, and creativity in the psycholinguistic aspect of studying. Psycholinguistics concerns with the study of the cognitive process that supports the acquisition and use of language.

*The **purpose** of the paper is to reveal the importance of psycholinguistics approach and cognitive science for learning a foreign language in the context of psycholinguistic approach and cognitive methods for learning second language, based on achievements of the "Scientific School of A.V. Khutorsky".*

***Methodology** is of an overview-analytical nature with an attempt to apply cognitive techniques to learning. Our observations on the psycholinguistic approach and the cognitive methods are based on the "Myth of Niels Bohr and the barometer question" by Alexander Calandra.*

***Results**. The analysis made it possible to determine how the logic of reflections has been explored from the lens of psycholinguistics and how the range of cognitive methods can be enlisted to learn a foreign language. It turns next to an overview of cognitive techniques used in psycholinguistics as applied to study. The verbal presentation of the idea is not only a form of compressed thought or interactive, creative cognition, but it also has a literary quality, and makes use of a range of devices in a way. In the article, the solution formation reflects the features of transforming mental representations about the multidimensional space of life.*

Conclusions. *According to the research, the paper concludes that cognitive methods are the ability to create judgments that are paradoxical in form and deep in content, perceived as deviating from the norm, and humor also presupposes the presence of the inverse ability to perceive such judgments in their entirety and depth and emotional brightness.*

KEY WORDS: *cognitive methods, language learning, psycholinguistics, approach, barometer question.*

INTRODUCTION

The famous scientist Chernigovskaya (2013) says that language is the key to consciousness. In the modern world, in the incredible, sometimes fantastic development of technology, the language problem remains relevant. Why, starting to learn a foreign language at the age of 6, in particular, English, some students at age of 16 can speak only basic phrases and use one grammatical tense? We are talking about Ukrainian schools where a foreign language is taught for 10 years.

At the same time, the IQ level in other subjects for these students is quite high. This fact is confirmed by an article of the Ukrainian scientist Nikolaeva (2016), which made analysis of the current state of foreign language teaching in Ukraine from the point of view of intercultural foreign language education.

Earlier, in the Soviet Union, the expression "no ability to languages" was used in relation to them. Now in the 21st century, in the era of globalization, this conclusion looks rather primitive. Numerous techniques have been developed for the so-called "unteachable", which have yielded positive results. As early as in 1965 Noam Chomsky, generally regarded as the most influential figure in 20th-century linguistics, proposed the theory that people have an innate, biological ability to acquire a language (Chomsky, 2000).

Nevertheless, the question remains how does our brain work when we are learning a foreign language? Language, mind, consciousness and the brain that generates them are the most complex systems known to us (Chernigovskaya, 2013). How to study them "from the inside"? The scientific studies allow researchers to consider this issue from different perspectives. For example, psychological "methodology of transaction", which is the process of bringing the subject into the perception of the object of memories of past cognitive experience, allowed to identify the nature of its enrichment with semantic nuances, emotional experiences, values, meanings that are deeply rooted in language, visual images, verbal and visual thinking (Kremen, & Ilyin, 2020).

THEORETICAL FRAMEWORK

In connection with the powerful technogenic development, new scientific multidisciplinary directions appear. In this article we turn to psycholinguistics (from the Greek "mind" + the Latin, "tongue") science. Psycholinguistics is examining the mental aspects of language and speech (Nordquist, 2020). This scientific discipline is studying the ways and the possibilities of the brain processing language.

It is generally accepted that it was Jacob Robert Kantor, American psychologist, who introduced the term "psycholinguistics" for the first time in his book (1936) "An Objective Psychology of Grammar". This idea was further developed in a 1946 by Nicholas Henry Pronko, Kantor's student, in his article "Language and Psycholinguistics: A Review". The strongest influence on the development of psycholinguistics as an academic discipline was provided in the Interdisciplinary Seminar in Psychology and

Linguistics at Cornell University in 1951 (Nordquist, 2020).

Carool David highlighted the fundamental concepts of psycholinguistics. According to his reasoning psycholinguistics is the study of how individuals produce, comprehend and acquire language (Carroll, 2008). Psycholinguistics studies also focused on the social rules having interrelated parts in language use and the brain mechanisms linked with language.

Psycholinguistics emphasizes the awareness of language and the cognitive processes connected with ordinary language use (Carroll, 2008). Many scientists agree that a sector of both psychology and linguistics, psycholinguistics is part of the subject of cognitive science. Cognitive science combines knowledge of linguistics, psychology, and, to a lesser extent, branches such as neuroscience, artificial intelligence and philosophy.

One of the main enthusiasts in this area is the *Academy of Neuroscience for Architecture* in San Diego, California. The Academy believes that discoveries in neuroscience will lead humanity to a Cultural Revolution, which is comparable only to the Renaissance. This optimism is due to the fact that not so long ago, scientists have refuted the well-known axiom "nerve cells do not recover".

In the late 1990s, neuroscientist Fred Gage proved that new neurons emerge over the course of a person's life, allowing them to expand their learning ability at any age. At the same time, neuroscientists began to better understand how the brain perceives and interprets different types of information. The combination of this knowledge will allow us to recognize and develop the learning abilities (Babkin, 2014).

In modern linguistics, interest in psycholinguistic approach is growing, the semantic structure of which is formed in human perception based on knowledge about the world. Wilson (2018) emphasizes three of the most commonly asserted psycholinguistic models posed in the literature: the fossilized Universal Grammar approach, the recreative approach, and the resetting approach. Reliance on the image of the world allows to navigate the situation, reflect on the reality or unreality of the event.

Reality is interpreted ambiguously: at the moment of perception, the cognitive, motivational, emotional spheres of a person's personality appear. Psycholinguistic approach views learning as a cognitive individual process happening within the individual and then moves to the social dimension (Purba, 2018).

So, the **purpose** of the paper is to reveal the importance of psycholinguistics approach and cognitive science for learning a foreign language in the context of psycholinguistic approach and cognitive methods for learning second language, based on achievements of the "Scientific School of A.V. Khutorsky".

METHODOLOGY

Most scientists point out applying cognitive learning methods that permit linking subjective-mental, natural and rational fundamentals of an individual. This approach allows integrating into completely through interrelated discussions, actions, reflections and self-regulation.

As a result, it provides improving the efficiency of cognitive advancement and the intellectual system in its entirety. In this case, a distinguishing characteristic of education is that the leading part is assigned to sensory-perceptual and emotional-intuitive ways of gaining knowledge and skills. (Khutorsky, 2003).

Actually, the cognitive learning methods are active; they allow revealing the procedural aspects of intelligence, contributing to the identification and development of hidden individual abilities of learners.

The researcher Andrej Khutorsky identified the following cognitive teaching methods:

Heuristic perception method. Perception as a purposeful personal observation of various objects by a learner is a preparatory stage in the formation of his theoretical knowledge. Perception is the wellspring of the student's information, a method of acquiring it from the reality of being, that is, it tends to be ascribed to heuristic educating strategies. The reason for this strategy is to instruct individuals to procure and develop knowledge through perception.

The "implantation" method. Through sensory-figurative and mental portrayals, representations the student attempts to "move" into the considered object, feel and know it from within. Perception of the object for this situation turns, in a manner of speaking, into self-perception of the student, if one first succeeds in identifying oneself with the object.

The method of semantic vision. The simultaneous concentration of actual vision and an inquisitive mind on the educational object permits one to get (see) the main driver of the object, the idea contained in it, the essential significance, for example, the internal quintessence of the object.

What's more, as in the previous strategy, here it is needed to create a specific state of mind in the student, comprising of dynamic sensory-mental cognitive activity. Exercises for the deliberate utilization of this technique lead to the advancement of non-conventional cognitive characteristics for use in students, like motivation, inspiration.

The method of symbolic vision. A symbol as a profound picture of the real world, containing its meaning, can go about as a method for noticing and cognizing this reality. The technique for symbolic vision is the understudy's finding or building associations between an object and its image.

The method of figurative vision. For this situation, the educational activity as a result of student perception is expressed in a symbolic or figurative form, and not just through a depiction of natural science realities. This strategy creates allegorical ways to deal with cognition in students.

The comparison method. The comparison strategy is applied to compare the adaptations of various students, their variants with cultural and historical counterparts, which were detailed by great researchers, rationalists, philosophers when contrasting different analogs with each other.

The method of facts. This method refers to such a phase of cognition as the search for facts, recognizing them from non-realities. The requirement for the natural observation of educational objects with the assistance of physical senses requires the use of this learning strategy, update and change of the standard content of education.

Research method. The object of exploration is chosen: scientific, natural, cultural, symbolic and so forth. Students are welcome to freely explore a given object according to the plan.

It implies several successive stages of research: objectives, work plan, facts about the object, tests drawings of investigations, new facts, questions and issues that have emerged, forms of answers, hypotheses, reflexive decisions, conscious ways of activity and results, conclusions. Such algorithmization of students' activities assists with getting their own educational results.

The method of constructing concepts. The development of the contemplated concepts in students starts with the realization of the thoughts they as of now have. The aftereffect of such work is an aggregate creative product mutually formulated meaning of a concept that is composed on the board. Different formulations remain in students' notebooks

as a condition for their own self-determination according to the concept being considered.

Method for building rules. The rules concentrated as general education courses can be made, "discovered" by students. For instance, from the content recommended by the educator, students distinguish the spelling underlying rules and afterward create their own writings on these principles. The investigation is completed according to the algorithm indicated by the educator, which relies upon the type of text and the task.

Hypothesis method. Students are offered the following task: to create versions of answers to a question or issue presented by the educator. The underlying assignment is to choose the basis for developing renditions. Students offer introductory positions or points of view on the problem. They get familiar with multi-logical, multi-faceted approaches to deal with the development of hypotheses.

At that point, they learn how to most completely and obviously formulate their responses to the question, in light of the rationale and intuition. The technique for hypotheses is created when tackling prescient issues, for example, "what will occur if …".

The forecasting method differs from the hypothesis method in that it is applied to a real or planned process. Pupils, relying on previous observations, discovered patterns and their own predictive abilities perform a drawing. After a given time, the forecast is compared with reality, the results are discussed, and conclusions are drawn.

The method of errors. This strategy includes changing the grounded negative mentality towards mistakes, supplanting it with a useful utilization of mix-ups (and pseudo-mistakes) to develop educational processes. Finding the connection between the mistake and "correctness" animates the heuristic activity of students, leads them to a comprehension of the relativity and fluctuation of any information.

The method of constructing theories. Students are invited to perform a theoretical generalization of their work in the following ways: 1) the facts discovered by the students are classified according to the grounds given by the teacher.

For example, 1) facts about the structure of an object, facts about its functions, facts about processes, facts about relationships; 2) the types of positions of observers are clarified, for example, the chronological position (sequential recording and description of events), mathematical (the quantitative characteristics of the object, its shape and proportions are investigated), figurative (expressive verbal characteristics of the object, its symbolic features are found); 3) questions and problems related to the most remarkable facts are formulated.

RESULTS & DISCUSSION

Thanks to the considered methods proposed by Khutorsky, we turn to an applied life example. The material for observations for psycholinguistic analysis was the well-known *The myth of Niels Bohr and the barometer question*.

This story was published in 1959 in the journal *Pride* of the *American College Public Relations Association* entitled *Angels on a Pin*, by Alexander Calandra, professor of physics at Washington University in St. Louis, Missouri. The story is about a physics student who surprises his professor by his extraordinary response to a simple question of physics (Calandra, 1959).

It was required to give an answer to a simple examination question from the point of view of physics: *"Show how it is possible to determine the height of a tall building with the aid of a barometer"*.

The student correctly answers the question from the standpoint of logical thinking and gives a solution to the problem, but

incorrectly from the standpoint of an established, generally accepted solution: *"Take a barometer to the top of the building, attach a long rope to it, lower the barometer to the street and then bring it up, measuring the length of the rope. The length of the rope is the height of the building"* (Calandra, 1959).

He provides a solution that is accessible to students with basic knowledge of physics. The student doesn't use a barometer as "an instrument measuring atmospheric pressure".

In this context, he applies this barometer in its direct linguistic definition: from Ancient Greek βάρος (báros, "weight") + romanized *métron* meaning "measure". In terms of the cognitive methods presented by Khutorsky, one can single out the method of semantic vision.

This simultaneous concentration on the educational object and the "inquisitively tuned" mind allows us to see the root cause of the object, the idea contained in it, the primary meaning, that is, the inner essence of the object.

A certain mood is created, consisting of active sensory-mental cognitive activity. At the same time, one of the main pedagogical goals is to instill skills in mastering the characteristics inherent in humor: conciseness, brightness of description, use of an ironic tone and selection of essential details.

In addition, besides this answer the student had many solutions to this problem. The next answer was: *"Take the barometer to the top of the building and lean over the edge of the roof. Drop that barometer, timing its fall with a stopwatch. Then using the formula, calculate the height of the building"* (Calandra, 1959).

In the Spiritual Regulations of 1721 there is such a prescription "The newly arrived student to taste the memory and wit and, if it seems very stupid, not to be admitted to the Academy" (Musiychuk, 2020).

The effectiveness of this answer is based primarily on the fact that the mechanism of activating intellectual activity, in the process of perceiving a solution, generates a change in meaning (generation of a new meaning) based on an appeal to the creative abilities of this student. From the perspective of cognitive approach, in this case it should be allocated the method of facts. The conscious mastery of students' physical receptors requires steady advancement in additional cognitive activity.

Most importantly, this refers to such a phase of comprehension as the search for facts. The requirement for the natural perception of educational objects with the assistance of physical senses requires the utilization of this teaching method, modification, and change of the standard substance of training.

In this way, the interaction of reflection is straightforwardly identified with the capacity to learn through the recognizable proof of verifiable content, through the dynamization of stable semantic connections, the obliteration of semantic stereotypes.

The student continued to give his versions of the solution to the same problem: *"You could take the barometer out on a sunny day and measure the height of the barometer and the length of its shadow, and the length of the shadow of the building and by the use of a simple proportion, determine the height of the building"* (Calandra, 1959).

This student with different linguistic and educational backgrounds thinks differently. This decision is also based on the creation of alternative meanings to the existing ones through the rise of a new meaning created by critical deviations from the regularizing primary assumptions interceded by the game significance; arousing extra interest in the issue, all through of-coherent types of verification.

Concerning the organization of cognitive technique, it is conceivable to recognize the

technique for metaphorical vision. That implies an emotional-figurative investigation of an object. The educational product because of student perception is expressed in a verbal or graphic figurative form.

The student suggested the following way to resolve the issue: *"In this method you take the barometer and begin to walk up the stairs. As you climb the stairs, you mark off the length of the barometer along the wall. You then count the number of marks, and this will give you the height of the building in barometer units. A very direct method"* (Calandra, 1959).

We observe research method. The object of research is selected - scientific, the student explores the given object according to the following plan: to walk up the stairs – to mark off the length of the barometer along the wall – to count the number of marks and results - conclusions.

Such algorithmicization of this activity amplifies the creativity. It gets his own educational result. The reflection, which is most clearly manifested in the affective-cognitive form of techniques, effectively contributes to an increase in intellectual activity by changing the methods of coding information, selecting strategies for processing information, and arbitrarily applying one's intellectual actions. This is achieved by systematically repeating the algorithmic stages of the study.

Then the student proposed the most difficult solution to this problem: *"...if you want a more sophisticated method, you can tie the barometer to the end of a string, swing it as a pendulum, and determine the value of 'g' at the street level and at the top of the building. From the difference of the two values of 'g' the height of the building can be calculated"* (Calandra, 1959).

We witnessed Heuristic observation method. Perception as a deliberate individual impression of different objects by a student is a preliminary stage in the arrangement of his hypothetical knowledge. Perception is the wellspring of the student's knowledge, a method of getting it from the truth of being, that is, it very well may be ascribed to heuristic educating strategies.

Students doing perception get their own outcome, including: a) educational aftereffect of perception; b) the applied strategy for perception; c) a complex of individual activities and emotions that went with the perception. The level of a student's imagination throughout his perception is dictated by the oddity of the outcomes acquired in comparison with those generally accessible to him prior.

Finally, this student concluded, there are many other ways of solving the problem: *"Probably the best", he said, "is to take the barometer to the basement and knock on the superintendent's door. When the superintendent answers, you speak to him as follows: "Mr. Superintendent, here I have a fine barometer. If you tell me the height of this building, I will give you this barometer"* (Calandra, 1959).

And this is also a kind of solution to the issue. This is a method for constructing rules. The rules studied in general education courses can be created, "discovered" by students. In this fable, we can see the interrelationships among science, language and cognition.

This story illustrates an extraordinary approach to learning and the use of cognitive techniques. However, to determine how our brain works and why we make exactly such decisions remains at the level of research, scientific theories. A physics student and his professor engage in a conversation whose native language is English, but they think differently.

The focus on the positive result of the incentive provides the obligatory accounting of known or assumed background knowledge, social and communicative status of interlocutors, communicative situations (Shynkaruk, & Kharchenko, 2020). Is this

style of thinking in a different way imparted by the language, the culture, or both?

Will we find, upon deeper inspection, fundamental similarities in thought processes in individuals with diverse linguistic and cultural backgrounds? This question was posed by David Carroll in his book *Psychology of Language*. According to his way of thinking, it is obviously difficult to measure a person's world view (Carroll, 2008).

CONCLUSIONS

Basing on our analysis, we may assume that cognitive processes help to find a non-standard solution to a problem, using skills, knowledge about the world. The psycholinguistic approach allows establishing causal relationships.

The results obtained make it possible to formulate conclusions about which mechanisms underlie psychological phenomena and cognitive processes, cause their development and qualitative restructuring. They also show the ability to manage your thinking, consciousness, in such a way as to convey information to people (educated, literate) who are not ready to accept it as true.

In the psycholinguistic approach, interaction helps learners activate the individual internal cognitive processes that allow them to access the comprehensible input they need to further advance in the acquisition of the second language (Long, 1996).

An excellent answer to the question "what is language?" gives the scientist Altmann: "So, finally, what is language? .... Language, quite simply, is a window through which we can reach out and touch each other's minds. We must be sure, always, to keep that window open" (Altmann, 1997).

The fact that the study of psycholinguistics approach is interdisciplinary is undeniable; this is also a great advantage. Meanwhile, it is also obvious that the interdisciplinary nature of psycholinguistics creates additional conditions for the development of a person's creative abilities in the learning foreign language process.

Along with this, at present, there is an interest in methodological recommendations aimed at intersubject connections that form an idea of the general nature of the action of cognitive mechanisms, and above all in the field of creative activity, creative thinking, and intellectual activity of the individual.

In modern linguistics, interest in psycholinguistic analysis is growing, the semantic structure of which is formed in human perception based on knowledge about the world. Reliance on the image of the world allows us to navigate the situation, reflect on the reality or unreality of the event. The reality is interpreted ambiguously: at the moment of perception, the cognitive, motivational, emotional spheres of a person's personality appear.

The cognitive approach in the study of human consciousness is to understand how people decode information about reality and organize it in order to make comparisons, make decisions and solve problems of everyday life. Obviously, there is still much more to study about teaching and learning language.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

КОГНІТИВНІ АЛГОРИТМИ НАВЧАННЯ ІНОЗЕМНИМ МОВАМ: ПСИХОЛІНГВІСТИЧНИЙ ПІДХІД

Актуальність проведеного дослідження полягає у розгляді психолінгвістики як міждисциплінарної галузі, яка вивчає взаємозв'язок розуму та мови. Важливо сприймати вивчення іноземної мови як акт пізнання, досвіду та творчості в психолінгвістичному аспекті навчання. Психолінгвістика стосується вивчення пізнавального процесу, який підтримує засвоєння та використання мови.

***Мета** роботи – розкрити значення психолінгвістичного підходу та когнітивної науки для вивчення іноземної мови, зокрема, розглянути психолінгвістичний підхід та когнітивні методи вивчення другої мови, засновані на досягненнях «Наукової школи ім. Хуторського».*

***Методологія** має оглядово-аналітичний характер зі спробою застосувати когнітивні методи до навчання. Наш аналіз психолінгвістичного підходу та когнітивних методів базується на відомому «Міфі про Нільса Бора та питання про барометр» Олександра Каландри.*

***Результати**. Аналіз дав змогу визначити, як логіку рефлексій можливо досліджувати з погляду психолінгвістики та як когнітивні методи залучити до вивчення іноземної мови. Зроблено стислий огляд когнітивних методів, що застосовуються у психолінгвістиці. Словесна презентація ідеї є не лише формою стиснутої думки чи інтерактивного, творчого пізнання, але вона також має літературну якість і певним чином використовує цілий ряд пристроїв. У статті формування рішення відображає особливості трансформації психічних уявлень про багатовимірний простір життя.*

***Висновки**. Згідно з дослідженням, зроблено висновок, що когнітивні методи – це здатність створювати парадоксальні за формою і глибокі за змістом судження, що сприймаються як відхилення від норми, а гумор також передбачає наявність зворотної здатності - сприймати такі судження у їх цілісності й глибин, та емоційної яскравості.*

КЛЮЧОВІ СЛОВА: *когнітивні методи, вивчення мови, психолінгвістика, підхід, питання про барометр.*

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COMPARATIVE ANALYSIS OF DISTANCE LEARNING SYSTEMS IN THE UNITED ARAB EMIRATES AND THE UNITED STATES OF AMERICA

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ABSTRACT

The article is devoted to the current problem of distance learning. In the theoretical field, various aspects of the functioning of distance education are considered on the example of the analysis of the works of leading scientists in this field.

*The main **aims** of this research are: to analyze some of the best educational systems in the world (including distance learning) – systems of the USA and the UAE; to describe the main features of distance education in the USA and the UAE; to make some proposals, based on the experience of these countries, to optimize the system of distance education in Ukraine; to analyze the opportunities of their implementation and adaptation in Ukrainian education institutions. The theoretical basis of the study was open sources of information and educational portals of leading higher education institutions in the UAE and the United States.*

*The **methodology** is the following. The theoretical framework of the study presents the leading experience of implementing distance learning of students in the context of state and educational policy of the represented countries. A comparative analysis of educational systems in the UAE and the United States is done within the framework of the introduction of distance learning.*

*The study presents the research **results,** they are the proposals for optimizing the process of distance learning in Ukraine based on the experience of the UAE and the United States. The main ones are: development of criteria, requirements and recommendations for distance learning based on the following indicators: a) the amount of educational material; b) course duration; c) duration of the lesson d) technical requirements (e.g., the availability of a headset, a stable Internet connection, etc.); providing students and pedagogical staff with the necessary material and technical resources and checking the compliance of material and technical support with the educational requirements; establishment of centers for quality control of the distance learning process.*

*The **conclusions** present the prospects of the study: developing of future comparative studies of distance learning systems; finding the most effective ways to make distance learning process better; elaborating and reasoning new approaches of teaching in the conditions of distance learning; setting up new platforms, applications, videos and so on in order to provide the process of distance learning; finding perspective directions of developing distance education and so on.*

KEY WORDS: *digital technologies, distance education, students, UAE, USA.*

INTRODUCTION

Transformational processes are becoming faster, old models of functioning and interaction are fading into the background. The penetration of information technologies is creating new possibilities to transmit data and to form new education environment. The pandemic of COVID-19 has become an accelerator of implementation of distance and blended learning in the world. The quarantine, introduced by the Ukrainian government, has made all the educational institutions face a difficult problem of providing the students with their constitutional right for education. According to the decree of the Ministry of Education and Science of Ukraine, learning must have been conducted remotely, in other words it must be distance learning (The Ministry of Education and Science of Ukraine, 2020).

So that, Ukrainian educational institutions have faced a lot of technical and didactical problems, related to the learning process, its optimization, control and checking the material learned by students.

The system of distance learning in Ukraine is poorly developed, that's why our educational system has faced some problems that must be solved immediately in the situation like this.

Besides, distance learning as a pedagogical process has as technical as educational features that Ukrainian educational system is not always able to deal with. Studying the experience of the countries with well-developed educational systems of distance learning is a vital factor of construction of an effective distance-learning educational environment.

Many scientists consider problems, related to researching different theoretical and practical matters of implementation of distance education. Thus, *general principles of distance learning* are studied in the works of Clark, J. T. (2020), King, F. B., Young, M. F., Drivere-Richmond, K., & Schrader, P. G. (2001), Kolbina, T., & Oleksenko, O. (2020), Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011).

The implementation of distance-learning technologies into the educational process are studied by Bacher-Hicks, A., Goodman, J., & Mulhern, C. (2020), Chen, Y., Lou, H., & Luo, W. (2002), Simonson, M., Zvacek, S. M., & Smaldino, S. (2019), Veletsianos, G. (2010), Williamson, B., Eynon, R., & Potter, J. (2020).

The features of distance learning in the USA and UAE are studied by Abulibdeh, E. S., & Hassan, S. S. (2011), Boumarafi, B. (2010), Collins, S. (2008), Daouk, L., & Aldalaien, M. (2019), Forte, G. J., Schwandt, D. R., Swayze, S., Butler, J., & Ashcraft, M. (2016), Goglio, V. (2019), Kara, M., Erdoğdu, F., Kokoç, M., & Cagiltay, K. (2019), Taha, A. (2007), Mirza, A. A., & Al-Abdulkareem, M. (2011).

Main **aims** of this research are:

- to analyze some of the best educational systems in the world (including distance learning) – systems of the USA and the UAE;
- to describe the main features of distance education in the USA and the UAE;
- to make some proposals, based on the experience of these countries, to optimize the system of distance education in Ukraine;
- to analyze the prospects of their implementation and adaptation in Ukrainian education institutions.

THEORETICAL FRAMEWORK

The processes of implementation of distance-learning technologies into the education process have a long history. Nowadays, using distance-learning technologies has become our everyday life, so it is important not only to know and use distance-learning technologies but implement them effectively into the interaction with students.

Recently, Ukrainian educational system has started implementing a set of crucial reforms, especially the reform called '*New Ukrainian School*' (game methods, free personal development, competency approach and so on) and the reform of higher education system (academic integrity, internationalization, department independence, educational quality, implementation of new educational technologies).

Thus, using modern technologies and ways of studying is becoming a cornerstone of construction of a quality education system that takes care of needs and demands of main stakeholders (Zhernovnykova, Nalyvaiko, & Nalyvaiko, 2019).

The analysis of some publications and open resources of information, especially syllabi of different higher education institutions in the studied countries, allows us to make some conclusions about the implementation

and functioning of the distance education system (King, 2001; Moore, 2011; Nalyvaiko, 2017; Simonson, 2019).

The main features of distance learning in the United Arab Emirates.

Distance learning in the United Arab Emirates is developing quite rapidly, thus creating the prospects for building a strong education system that will provide getting knowledge remotely from the educational institution at any convenient time.

Most UAE universities offer distance learning as an alternative to full-time (Abu Dhabi University, the United Arab Emirates University and so on). First of all, the process of distance education in the UAE is carried out using special online platforms, websites, applications, TV lessons.

As a result of a partnership with *Etisalat* and *Google*, the United Arab Emirates Ministry of Education has developed a number of *YouTube* curricula for 11th and 12th graders. *Duroosi*, ("my lessons" in Arabic) is a *YouTube* channel with 600 tutorials, covering a variety of subjects.

It is approved by the UAE Ministry of Education, aiming to help students in grades 11-12 during distance learning to reduce the number and the cost of private lessons. It is also planned to develop similar classes for students of other ages (eLearning, mLearning and distance learning, 2020b).

Another educational site, Madrasa, has made a breakthrough in the development of distance and e-learning in the United Arab Emirates.

This online platform was launched in 2018 as a free electronic resource containing 5,000 video lessons in natural and exact sciences. Madrasa also provides a lot of learning materials for students from kindergarten to the 12th grade. The platform is available online to more than 50 million Arab students worldwide. Students can access the platform on their personal computers or mobile phones (Madrasa, 2020c).

During the quarantine imposed by the authorities, the UAE Ministry of Education took several steps to ensure the successful implementation of the distance learning process for schools and students:

- holding weekly distance training for teachers and school administration
- the start of a free online course "Be an online tutor in 24 hours" in order to teach school staff to work with online audience, to implement the distance learning system, to ensure the continuity of the learning process in accordance with the approved mechanisms and plans
- creation of modern operational centers for further control over distance learning processes
- establishing technical communication between parents and teachers for effective work
- coordination with the telecommunication regulatory authorities, providing free mobile Internet for families who do not have a home Internet connection (Distance learning in times of COVID-19, 2020a).

The development of distance learning in the UAE is due to quarantine actions, as well as the desire of students to study remotely from school (due to family problems, obtaining another education). Due to digitalization of this process, the UAE distance learning system can be considered developed and effective.

Distance learning in the United States of America.

Nowadays the United States remains the most advanced country in the field of online research. Since universities and schools in the United States have a fairly broad autonomy in all their activities, we offer you to consider the features of distance

education on the example of Boston University, one of the centres of distance education in the United States. The example of Boston University is quite illustrative for the entire higher education system in the United States.

After Boston University launched its first online program in 2002, it continued to expand its online learning opportunities, allowing students from around the world to study at one of the most prestigious universities in the United States.

Students have access to all advanced course materials, online lectures, discussion forums and interactive multimedia content. Students study at the same faculty of the university, which is taught during the daytime study, they have free access to recorded lectures by professors and invited experts, readings, auxiliary materials, case studies, student services and other resources, most of which are available at any time. These programs are student-oriented, as they allow the student to choose a convenient time to study (Distance Education at Boston University, 2020).

Teachers interact with students through the Learning Management System (LMS). Course content may include online lectures, videos, interactive animations, discussion forums, e-portfolios, web conferences, etc. Students present regular assignments, including homework, projects and work, with the help of the LMS. Some courses include secure, extended online examinations.

Boston University's online courses are conducted through the Blackboard learning management system. To use Blackboard effectively, users must have a computer with high-speed Internet. It is recommended to use a speed of at least 50 MB, as well as a wired connection. Users must also have the latest versions of Adobe Flash Player and Mozilla Firefox.

In addition, users must ensure that their computers meet the requirements set by Boston University in the field of information services and technology (IS&T). Many lectures and classes will be held through Zoom. To fully participate in Zoom classes, users must have Mozilla Firefox, as well as a headset with a microphone and a webcam (Online Learning at Boston University, 2020).

E-mail is the main means of communication with instructors and other students. In addition, most courses require regular participation in online discussions and teamwork with fellow students. Students interact with each other at a distance because they do not have the same personal contact as a full-time student.

Boston University provides qualified support to students throughout their studies. The staff of the distance learning department can answer the students' questions by phone or e-mail and give advice if necessary.

Online courses are intensive, so they can be time-consuming, especially when many of the students try to balance school, work, and family. To receive points on a competitive basis, it should be planned to spend at least 20-25 hours a week in each class.

The majority of courses are held on a seven-week schedule and begin in January, March, May, July, September and November. Although it is possible to complete course assignments at the hours that best suit the student, he or she must complete each course within the set time.

Usually students are divided into groups of 10 to 15 people, a teacher who should monitor the homework is attached to these groups (Boston University Online Learning, 2020).

In other universities and schools, teachers have been given access to a site with methodological guidance on distance learning after the quarantine has been imposed. Some universities and schools have introduced webinars for teachers to teach them to take advantage of additional

educational programmes. The usage of separate services to control the performance of exams and tests (such as ProctorTrack) is also quite interesting. Such services are aimed at tracking the behavior of the learner during the tasks, which to some extent can ensure compliance with academic integrity.

A significant number of universities and colleges have created online campus tours and online teacher interviews.

A large number of schools have switched to tasks through the ClassKick application, which allows teachers to control the performance of tasks by students. Also, a significant number of schools have introduced lessons on local TV channels.

So, as we can see, US education, in our opinion, has withstood the challenges posed by the introduction of quarantine restrictions. It should also be noted that due to the relatively wide autonomy of American educational institutions, such measures are not always effective and are not always taken.

Comparison of distance education in the UAE and the USA. As we can see, two systems of distance education have been described. Despite the seemingly different approaches, they have much in common:

1. Availability of educational materials (Online libraries)
2. Development of special online platforms
3. Communication with pupils, students and / or their parents
4. Control over the technical support of students or pupils.

It should be noted, however, that the implementation of these principles differs significantly between the United Arab Emirates and the United States. For example, in the UAE, students are given access to the Internet, PCs, etc., while in the United States they only check the compliance of the Internet connection, software and hardware, and so on.

In addition, both the United Arab Emirates and the United States of America offer an exhaustive list of programmes and software for distance education, which we believe is quite effective, as it does not leave the teacher with the difficult choice of a learning platform.

Moreover, in both the United States and the United Arab Emirates, most universities have their own platforms for learning and access to educational materials, which, under certain conditions of danger in an online environment, is irreplaceable, because it has been reported that popular platforms such as Zoom, Skype etc. can be hacked.

Quite an important step to ensure adequate distance education is to train teaching staff technologies that are necessary for distance learning. Thus, a number of activities and courses required for it have been carried out in the UAE. In the United States, such training is an indispensable part of the pedagogical training of teachers.

As it was mentioned above, distance education in both countries does not skip another important aspect, knowledge control. At the same time, it should be noted that the control over distance learning, as well as its organization, differs significantly, because in the UAE it is more unified and centralized, and in the United States – vice versa. This is primarily due to the general features of education and training systems in the UAE and the United States.

In addition, the UAE has introduced a hotline for parents and students to ensure that certain issues related to the educational process are addressed.

Despite some directive nature of distance learning in the UAE, private schools have been allowed to use their own resources and systems to provide distance education for their students. At the same time, committees and teams were created to monitor the distance learning process.

In the United States, however, distance learning courses have existed for a long time. It is important to note that in the UAE and the United States, online learning support has become a significant factor in the distribution of funding. In the UAE, families are provided with the Internet, and in the United States, states sign annual contracts to use such services as Blackboard (Natanson, & Strauss, 2020).

However, US educational institutions are quite different in their fields, which, as has already been pointed out, is caused precisely by the peculiarities of education in the US, since educational institutions are usually financed from the local budget.

Proposals for optimizing the distance learning process in Ukraine based on the experience in the UAE and the USA. Based on the study, the authors propose to take a number of important steps to optimize the distance education system in Ukraine:

1. Development of criteria, requirements and recommendations for distance learning based on the following indicators:

- The amount of educational material
- Course duration
- Duration of the lesson
- Technical requirements (e.g., the availability of a headset, a stable Internet connection, etc.).

2. Providing pupils (students) and pedagogical staff with the necessary material and technical resources and checking the compliance of material and technical support with the educational requirements.

3. Establishment of centres for quality control of the distance learning process.

4. Attracting funds for the development of software for distance learning, final tests, etc.

5. Training of pedagogical staff in necessary skills of work with information technologies.

6. Creating online libraries with all the necessary learning materials.

7. Involvement of professional IT workers who will be able to ensure the protection of personal information of students, their secure connection and communication in online lessons.

8. Create a convenient work plan for students that will balance the student schedule (for example, when 4 double periods stretch for the whole day, the first double period is at 11 am., the second is at 2 pm. Students do not have time for hobbies, communication with family and friends).

9. Prepare recordings of small video guides for students, which will help them to master the program quickly and without mistakes, learn about its additional features that can be useful for successful learning.

10. Holding online activities that will allow students and teachers to communicate in their free time. This will help to avoid the feeling of isolation, meet individual needs in the social sphere, increase student activity

RESULTS

Possibilities to implement the experience of the UAE and the United States. The main problem, according to the authors of the study, is the lack of funding for distance learning. As we have seen, a number of steps have been taken in the United States and the United Arab Emirates to optimize the educational process under quarantine.

Thus, the UAE has introduced courses to increase the technological awareness of teaching staff, which, in turn, has a positive impact on the quality of the educational process.

In addition, we need to understand that another problem in this situation is that the Ministry of Education and Science of Ukraine has, in fact, distanced itself by providing an inexhaustible list of programs that can be applied. But it has been also unclear how distance learning is monitored.

Certainly, the problem of financing distance learning is related to a broader problem – the financing of education in general. Therefore, it seems that the implementation of foreign experience in the organization of the distance learning rests primarily on financial problems, lack of recommendations and guidelines, vagueness of existing recommendations.

Despite this, it should be noted that in Ukraine, pupils have the opportunity to find the necessary textbooks online (Electronic versions of textbooks, 2020).

Unfortunately, communication between students and teachers is difficult. This is due to the technical capabilities of individuals. As a result, a significant number of pupils and students who do not have access to high-speed Internet or a smartphone or computer are deprived of their constitutional right for education.

Certainly, all the above problems require the government support and the Ministry of Education and Science support. But, in our opinion, they need financing and particular steps from the authorities, especially, the Ministry of Education and Science.

Therefore, it is necessary to:

1. Increase funding for education in Ukraine (including distance education)
2. Develop clear guidelines for teachers and educators on conducting online classes
3. Review traditional teaching methods and analyze the possibility of wider use of digital technologies in teaching

Only under these conditions, we believe, the process of distance learning in Ukraine will be effective.

DISCUSSION

So, we can make a conclusion that online education is our new future. It is an opportunity to get a quality education and international accredited qualification. Many countries, organizations and people have been investing such technologies as the Internet speed and artificial intelligence, so the platforms for online education are becoming better and may rival the conventional education system.

One of the technological advances is the development of software for analytics and visualization that helps teachers to understand if their students study a subject effectively or not.

In the same way, adaptive technologies, e.g. AI, are showing higher abilities to adapt a study material to individual style of learning and progress of every student. The demand for personalized and cheap education are growing day by day, there are many reasons why distance learning is a part of the future education. It does not mean that conventional schools and universities are going to disappear. The reasons above show that distance learning will become more popular.

It must be highlighted that problems of the distance learning discussed in this article may be solved by some government actions and investments to software development, teaching pedagogues some features of online education and so on.

CONCLUSIONS

Analyzing the experience of foreign countries, we have come to the conclusion that although the system of distance learning in Ukraine is poorly developed, it has some positive aspect and potential, but the implementation of foreign experience seems to be difficult because of lack of finance and indecision of Ukrainian official bodies.

We believe that our research has such perspectives as:

- Developing of future comparative studies of distance learning systems.
- Finding the most effective ways to make distance learning process better.

- Elaborating and reasoning new approaches of teaching under the conditions of distance learning.
- Setting up new platforms, applications, videos and so on in order to provide the process of distance learning.
- Finding perspective directions of developing distance education and so on.

We hope that future research will be able to find the best way to provide the distance education in Ukraine. Since the distance education in Ukraine is poorly developed, it is necessary to pay attention to the best distance learning systems all over the world, highlighting their advantages as well as disadvantages to provide Ukrainian students with the best practices during distance learning.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ПОРІВНЯЛЬНИЙ АНАЛІЗ ДИСТАНЦІЙИХ СИСТЕМ НАВАЧАННЯ В ОБ'ЄДНАНИХ АРАБСЬКИХ ЕМІРАТАХ ТА СПОЛУЧЕНИХ ШТАТАХ АМЕРИКИ

Стаття присвячена актуальній нині проблемі дистанційного навчання. У теоретичному полі розглянуті різні аспекти функціонування дистанційної освіти на прикладі аналізу праць провідних вчених у цій галузі.

*Основними **цілями** дослідження були: аналіз одних з найкращих систем освіти у світі (у т. ч. дистанційної); арабської та американської; описати основні особливості дистанційного навчання у ОАЕ та США; на основі досвіду інших країн надати пропозиції щодо оптимізації дистанційної освіти в Україні; проаналізувати можливість їхньої імплементації та адаптації в умовах українських навчальних закладів. Теоретичною базою дослідження слугували відкриті джерела інформації та освітні портали провідних закладів вищої освіти ОАЕ та США.*

***Методологія** дослідження: у теоретичному блоці дослідження представлений провідний досвід впровадження дистанційного навчання здобувачів освіти в контексті державної та освітньої політики представлених країн, проведений порівняльний аналіз освітніх систем ОАЕ та США у межах запровадження дистанційного навчання.*

*У дослідженні представлені **результати,** які є пропозиціями щодо оптимізації процесу дистанційного навчання в Україні на основі досвіду ОАЕ та США. До основних з них можна віднести: розробку критеріїв, вимог та рекомендацій до проведення дистанційних занять на основі таких показників: а) обсяг навчального матеріалу; б) тривалість курсу; тривалість заняття; в) технічні вимоги (наприклад, наявність гарнітури, стабільного інтернет-з'єднання тощо); забезпечення учнів (студентів) та педагогічного персоналу необхідними матеріально-технічними ресурсами та перевірка відповідності матеріально-технічного забезпечення вимогам навчання; створення центрів контролю за якістю процесу дистанційного навчання.*

*У **висновках** представлені перспективи проведеного дослідження: розвиток подальших порівняльних досліджень систем дистанційного навчання; виділення найефективніших заходів щодо покращення процесу дистанційного навчання; розробка та теоретичне обґрунтування нових методик викладання в умовах дистанційного навчання; розробка нових онлайн-платформ, додатків, відео тощо для забезпечення процесу дистанційного навчання; виділення перспективних напрямів розвитку дистанційної освіти для впровадження в освітній процес закладів освіти України.*

КЛЮЧОВІ СЛОВА: *дистанційна освіта, здобувачі освіти, США, ОАЕ, цифрові технології.*

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THE USE OF CONCEPT MAPS IN THE PROCESS OF INDEPENDENT STUDY OF EDUCATIONAL MATERIAL IN HIGHER MATHEMATICS

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ABSTRACT

*The **purpose** of the article is to analyze the impact of concept mapping on the level and quality of assimilation of learning material in higher mathematics in the process of independent study.*

***Methodology**. Based on a review of the main provisions of modern theory of learning and generalization of research results presented in scientific papers on the scope of application of concept maps in the learning process, such a training experiment was conducted. For students of the two experimental groups on a certain topic of the discipline "Higher Mathematics" were offered to build conceptual maps in addition to the common teaching methods. It considered as an independent creative task. In the other two groups, which were under control, students had to study the same topic of the discipline, using traditional methods.*

***Results**. It was determined that the results of the colloquium composed of students of experimental groups were significantly higher than those of students of control*

groups who did not use mapping as a method of learning during independent work. The average score obtained by students of experimental groups for the colloquium was almost 80 points, while for students of control groups it was only 72 points. Using Student's test, the significance of the difference between the values of the sample averages of these indicators proved. If we compare the average scores for different types of tasks, the most significant was the difference in the performance of heuristic tasks, which reflect the ability to apply the acquired knowledge to solve practical problems of economic content.

***Conclusions**. The positive influence of the use of concept mapping in independent work of students established, which proves the thesis about the feasibility of using concept mapping as a learning tool. Further introduction of concept maps in the educational process should be based on the development of complex theoretical and practical, as well as competency-oriented tasks.*

KEY WORDS: *meaningful learning, independent study of educational material, cognitive activity, group work, learning maps, conceptual map, quality of education, competencies.*

INTRODUCTION

Modern indicators of the quality of mathematical training of future specialists in any field, in addition to knowledge and skills, are also the ability to process large amounts of information, independent creative acquisition of knowledge, their systematization and determining the relationship between new knowledge and those, which formed earlier.

Such connections need to be built not only within the studied discipline. An understanding of interdisciplinary relationships is especially important for applied disciplines. Therefore, the educational process in higher education institutions aimed at developing the cognitive activity of students and their ability to master the methods of organizing personal cognitive activities.

Today, the traditional model of education must gradually restructured. A. A. Verbitsky (2018) described the problem of education in the context of informatization of society. He emphasized the importance of not only mastering well-known scientific laws and regularity, but also the ability to turn this information into personally meaningful ways of activity and thus achieve creative development.

In determining the methods that used in the learning process, the teacher should proceed from the peculiarities of perception and memorization of new material by students. It believed that a person remembers as personal knowledge only 10% of what a person reads 20% of what he heard 30% of what he saw, 50% of what he saw and listened at the same time, and 90% of what a person has reached in the process of their activities.

Therefore, one of the trends in modern higher education is to change the ratio between the volume of classroom and extracurricular workload. It can be applied to all disciplines, taught at the university.

Thus, with a constant number of credits, the time allotted for independent work of students increases, and the classroom time allotted for the study of basic topics in higher mathematics, which was already quite limited, further reduced.

However, it should be noted that for students understanding the basic concepts, techniques and methods taught in the course "Higher Mathematics", in the future it could become an intellectual basis for

research and a significant analytical basis for balanced conclusions in professional activities in any field in general and in economics and management in particular.

Therefore, it is advisable at all stages of the process of studying higher mathematics and other disciplines of mathematical direction to choose various new teaching methods, the use of which would increase the level of mastery of educational material and structure the mathematical literacy.

One of the newest methods of training which application promotes increase of efficiency of mastering and the organization of the obtained knowledge in any branch, is mapping, i.e. drawing up of learning maps (or thinking maps).

In this case, mapping is a type of symbolic presentation that identifies the leading components of the knowledge system and describes the relationship between them. The product of mapping is a person's own idea of the content of the problem, which provided in the form of a formal conceptual model.

The effectiveness of the mapping technique explained by the fact that it allows to activate the intellectual processes of man, to focus his attention not only on the content of knowledge, but also on the process of its assimilation. Creating learning maps (or thinking maps) is useful for improving the learning process for both children and adults; as such, maps can be easily adapted to user needs.

Depending on the purpose mapping are carried out and which system of subordination is described by learning maps, there are different methods of mapping. The most common types of maps used in teaching are mental and conceptual maps. Both of these tools are easy to use and find their application in the education of both young children and students and even adults, for example, in the training of experienced professionals.

These types of maps are diagrams that represent ideas as node-link assemblies. They are similar in their main purpose, but they have their own distinctive features, as these cards have different functions. A detailed comparison of these types of learning maps found in the works Eppler M. J. (2006), Gjorgievska K. (2018), Carpineanu S. (2020) and others. Here we give a brief overview of the general features and main differences of these types of maps.

The term Mind Mapping, itself proposed in the 1970s and developed by an English educational consultant Anthony Peter Buzan (1993). The focus of the mental map is only one idea (topic). Mental maps are always radial, i.e. they have a common center, from which there is a branching into separate subtopics.

Thus, such a map has a hierarchical structure and describes the relationship between parts of the whole. As a rule, mental maps made by one person and reflect his individual vision of the problem, i.e. they can be mainly personal.

Conceptual mapping as a teaching method also was proposed in the 1970s. Its author is American professor and science researcher Joseph D. Novak (1998). Like mental maps, concept maps have a hierarchical structure, but reflect the structure of several complex concepts, as well as the cross-links between these concepts.

Unlike a mental map, a conceptual map considers a system of interconnected ideas. In addition, if mental maps assume a simple relationship between ideas (usually one-to-one), while the conceptual maps assume a many-to-many relationship between concepts. In this regard, the concept map is more suitable for presenting complex multi-level information.

Concept maps are mainly used to organize and visualize implicit knowledge, analyze complex problems, find solutions and measures that need to be taken while implementing them. They encapsulate more

information in terms of volume and of complexity, and are therefore used to explain how these complex concepts relate to each other. It should be emphasized that, in the process of structuring knowledge with the help of concept maps, you can identify gaps in the knowledge system, if such gaps exist, and identify ways to address them.

Let us focus on another significant difference between mental and conceptual maps. If one person develops the mental map, then the conceptual map is the product of understanding a situation by a group of people. One of the first stages of such thinking is brainstorming. In this regard, the conceptual map more objectively reflects the information, while in the construction of a mental map the reflection is to some extent subjective.

We emphasize another advantage of group cooperation in the construction of concept maps. Their creation involves work in small groups. Take into account that it is not just working in groups, but in small groups. It gives all members of the group the opportunity to take an active part in the work, to develop skills of interpersonal communication, in particular, the ability to actively listen, develop a common opinion, and resolve differences that may arise during the discussion.

Therefore, as an alternative method of increasing the efficiency of learning and understanding the links between mathematics and economic disciplines, we consider independent work of students with the use of concept mapping. In the authors' opinion, this approach to the activation of independent work of students can increase their motivation and creativity, promote the actualization of knowledge.

The **purpose** of this article is to study the impact of the application of the method of concept mapping on the efficiency of learning of material in Higher Mathematics by students of economic specialties in the process of their independent study, which was provided by the discipline program.

The subject of assessment was not exact knowledge acquired in the process of studying a particular topic, but the ability to apply this knowledge in solving complex problems, i.e. the mathematical competence of students. The main feature of this study is that: conceptual maps are developed not by the lecturer, but by the students themselves as a preliminary stage of organizing their independent work on a given topic.

THEORETICAL FRAMEWORK

In today's world, people face the need to process and absorb a large amount of information. In this regard, traditional learning methods based on simple memorization, sometimes even without elements of understanding their relationship with other objects or situations become ineffective. This led to the formation of the theory of meaningful learning, the creation of which is associated with the name of American educational psychologist David Paul Ausubel (1968).

The theory of meaningful learning is as follows. The information that a person receives in the process of learning should be fully understandable and only such knowledge can be used in the future to establish links between the acquired knowledge and other knowledge that has been accumulated previously. This approach to the process of cognition helps in the formation of a system of knowledge, skills and abilities that a person can actively use future.

Meaningful learning is contrasted with simple memorization, i.e. rote learning. When using this method, information is conveyed in the form of lectures (the lecturer teaches and the students listen, take notes and memorize) or practical classes or seminars (again, one student reports and the others listen). This method allows lecturer to transmit information without requiring a full understanding of its content

or the relationship between the new information and real objects or situations.

According to the theory of meaningful learning, knowledge is not an entity that is transmitted as a single entity from lecturer to student. On the contrary, learning requires the active participation of the student for the assimilation of new information and already acquired knowledge. Defining the connection between new knowledge and previous knowledge, understanding this connection, this is what makes learning effective. Thus, meaningful learning is not possible without involving the students in the process of forming their own awareness of the phenomena studied.

Conceptual mapping is one of the tools, the use of which allows the implementation of meaningful learning. J. Novak conducted the first experience of using conceptual mapping in teaching within the Cornell University program.

One of the chapters of this program was to study the change in children's knowledge of the natural sciences through the application of new teaching methods. In particular, his research of the psychology of learning and cognition of children was devoted to finding an effective method of teaching educational material and ensuring the quality of learning.

Now a new book by Dr. Novak (2010) "Learning, Creating, and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations", which focuses on the use of concept maps in teaching, has already been translated into several foreign languages.

Initially, concept maps intended as a means of visualizing the presentation of information to children, and then they began used as a tool in adult education, as well as in research and solving practical problems.

Now concept maps are used in pedagogy in a variety of contexts, including teaching and learning strategies, curriculum development tools, and as a tool for fixing knowledge structures and assessing of learning results. In the twenty-first century, there is a spread of mapping in all areas of knowledge, as evidenced by the variety of topics presented at conferences on conceptual mapping.

Most often, mapping is used by the teacher as a tool that allows a more structured presentation of new material in areas of knowledge such as medicine (Daley, Durning, & Torre, 2016), economics (Onuoha, Ejimonye, & Eneogu, 2016), pedagogy (Reiska, & Soika, 2015) and other applied sciences. Less common is the use of mapping in teaching of exact sciences.

There are examples of the use of concept maps in the teaching of sciences such as physics (Taie, 2014) and mathematics (Pushkareva, & Peregudov, 2011). However, such works are few. This fact adds to the relevance of our research.

Possibilities of application of concept mapping in pedagogical practice are various. Thus, the lecturer can use mapping to assess the quality of teaching the discipline through the eyes of students. In the future, this will help him improve his course.

Heinze-Fry J. (2004) cites the experience of working with students, when students at the end of the semester present concept maps as an image of their thinking about the sections of the course and its structure.

Another area of application of concept maps in pedagogical practice may be to test students' understanding of the basic principles of the discipline studied. This direction is just beginning to develop. Thus, Ghorai S. and Guha A. (2018) used the method of conceptual mapping to assess the scientific literacy of students, which formed in the study of natural sciences. Students created a concept map on the topics of exercises similar to PISA, which agrees with international standards.

P. Ruiz-Palomino and R. Martinez-Canas (2013) analysed the quality of the use of conceptual mapping as a powerful innovative teaching method at the university level. Such an educational tool, based on the provisions of cognitive theories, raises the level of quality of education and proves the importance of the difference between learning, that is memorization, and learning, which involves, above all, understanding the content.

This tool allows the student to harmonize the process of acquiring new knowledge through the formation of the structure of the creative solution of the problem of developing theoretical material. David Hay, Ian Kinchin and Simon Lygo-Baker (2008) show that the ability to build concept maps, incorporate new concepts into the structure of one's knowledge, signify complex relationships between new and previous knowledge, and also the ability to understand concept maps provide more deep understanding of the topic under consideration.

Visual display, which is carried out by mapping, not only improves memory and develops creative abilities of the student. It promotes better understanding, simplifies structuring and improves task management. Developing this view, Cooper Y. and Zimmerman E. (2020) proposed an approach to the use of concept maps in the context of understanding and conducting theoretical and practical research in the field of art education.

It should be noted that now the possibilities of mapping have significantly expanded. If at the time when the method of mapping was just beginning to develop, maps created using pencil and paper, now there are powerful computer programs for creating any kind of learning maps. Some of these programs focused on creating maps of a fixed type.

For example, you can use software products such as Xmind, Freemind, MindNode, MindMeister, Mind42 and others to create mind maps. Xebece, CmapTools, TheBrain, Aibase, 3D Topicscape, AXON Idea Processor and others used to create concept maps. There are also modern universal tools such as Inspiration 10, Inspiration Maps software and Webspiration Classroom, which are the simplest but powerful visual tools for creating concept maps, mind maps, block diagrams, charts and more.

In addition, Inspiration, Kidspiration, and Webspiration Classroom include various examples of concept maps, templates, and lesson plans to demonstrate to the user how mapping can be easily integrate into the curriculum.

Based on the analysis of scientific works, the authors put forward a thesis on the feasibility of using concept mapping as a tool for studying the theoretical foundations of higher mathematics for economists and managers.

METHODOLOGY

One of the most important goals of education is to help students gain a conceptual understanding of the subject. In order to do it, the lecturer needs to apply cognitive learning strategies that would help the student to structure information and thus affect learning outcomes. Accordingly, it takes extra effort on the part of the learner to relate the new knowledge to the relevant concepts they already have in mind.

According to the constructivist theory proposed by Jerome Bruner, who is one representative of the modern theories of learning, the teacher must be a coach, facilitator of the learning process and creator of a comfortable educational environment.

Constructivism reflects the view of learning, according to which a person can actively build their knowledge by testing concepts on previous experience, applying these concepts to new situations. The learner

picks and transforms information, looks for answers, and constructs hypotheses, relying on a cognitive structure to do so.

In order to test the effectiveness of the use of concept mapping as a learning tool, we conducted such an experiment. Four groups of first-year students were selected by the average score of the current assessment of learning outcomes was the same within statistical significance.

Students of the two experimental groups were asked to perform a creative task, one of the elements of which is the construction of concept maps, within the framework of independent work on the topic "Differential calculus of the functions of single variable" in the discipline "Higher Mathematics". In the other two groups (control groups), students had to study the same topics, but according to traditional method, i.e. reading theoretical material, answers to control questions, etc.

Analysis of scientific works on psychology (Brown, & Pedder, 1998), pedagogy (Uvarov, 2001) and demonstration of positive experience in creating concept maps by a group of researchers (Shih, & Chang, 2020) show that independent work is more effective if the group consists of three people. In the course of such work there is a group self-check.

The participation of a partner student significantly restructures the psychology of another student, allows to develop not only his communicative competencies, but also to gain autonomy to perform independent work and demonstrate responsibility for its quality. Therefore, students of the two experimental groups were divided into subgroups, the composition of which determined by the students' own wishes.

Then the students of the experimental groups presented with a concept-mapping algorithm, which involves the following stages:

- determining the context of a particular topic of the discipline with the help of focus questions that clarify the plan and objectives of the topic;
- the identification of key concepts that define this topic. It is advisable that their amount was 15-25 concepts;
- brainstorming, the purpose of which is ranking of the list of concepts: from more concepts that are general to specific (the concepts of the topic in the list are grouped according to the theme plan);
- construction of a primary map, which establishes hierarchical connections between concepts related to one issue of the topic;
- building links between concepts that characterize different issues of the topic (these are links between concepts in different segments of knowledge on the map, which help to illustrate how these domains are related to each other);
- checking the map and adjust the map to the "input-output" or hierarchical view (more general ideas are displayed at the top of the map, and related concepts are displayed below according to the hierarchy).

During creation of concept, map the cross-references and multiple connections use to visualize ideas. According to the above algorithm, students of two experimental groups performed independent creative work on selected topics in higher mathematics. Each subgroup of these experimental groups carefully studied the theoretical material and compiled conceptual maps that included concepts (general notions and the relationships between them.

Given the experience of Aşıksoy G. (2019) in improving students' ability to understand material using computer programs, certain computer platforms suggested in experimental groups to display concept maps.

Presentation of the generated concept maps carried out at the last lesson in each experimental group. Students presented their work and explained the basic concepts

and types of connections between them. During the discussion, students argued their answers, which also allowed checking the degree of assimilation of educational material.

It should be noted that the lecturer not only asked questions and controlled the correctness of the answers, but also carefully guided the process of discussing the conceptual maps but not declaratively, only as a moderator. This helped to create a relaxed atmosphere, and the discussion took place with the active participation of students.

It should be emphasize that due to concept mapping clarity of the idea and its visualization are an integral part of the learning process. Experience has shown that visualized learning material assimilated faster and more efficiently than consistent verbal.

Figure 1 shows a fragment of a concept map, which one of the subgroups of students built.

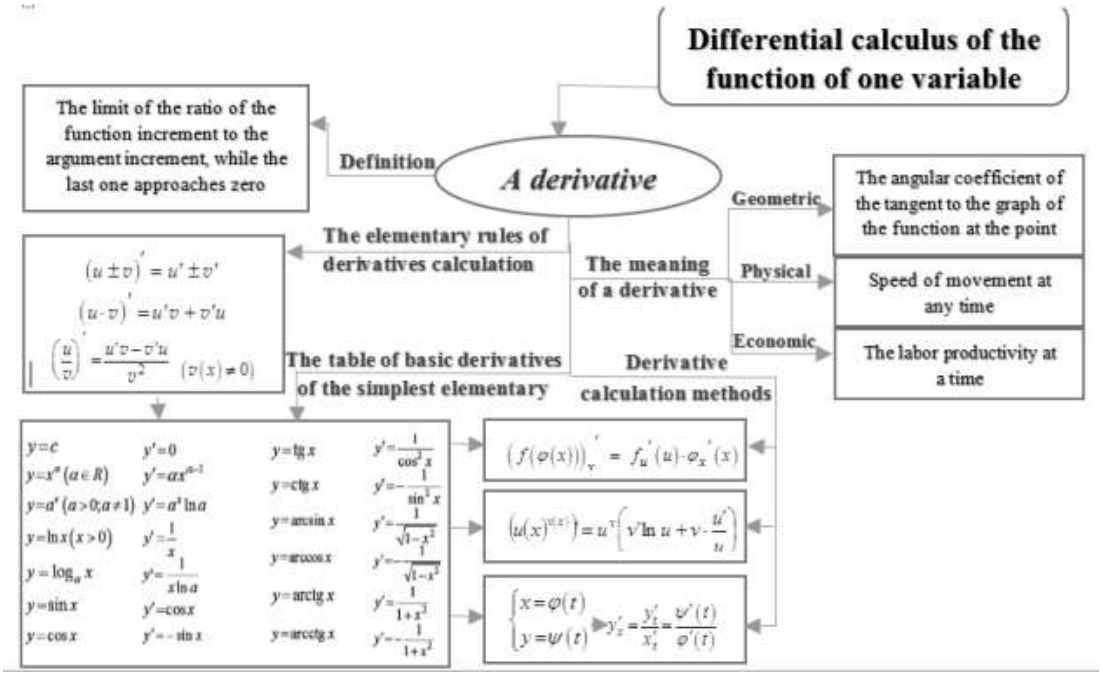

Figure 1. *Fragment of a conceptual map*

This fragment of the concept map shows the concepts and connections between them from the description of the "Derivative" question of the topic "Differential calculus of a function of one variable".

RESULTS

Positive experience in the use of conceptual mapping techniques in the process of group independent work of students gained in the 2020/2021 academic year in classes on higher mathematics of first-year students of Simon Kuznets Kharkiv National University of Economics.

The level of mastering the educational material checked in the form of theoretical and practical tasks of the colloquium on the topic "Differential calculus of the function of one variable". The colloquium questions consisted of three blocks.

The first block contained questions that tested knowledge of the basic concepts of the topic. The answer to the second block question involved understanding the meaning of key terms. The third block

contained heuristic tasks, which tested the ability to use the acquired knowledge on the topic in solving practical problems of economic content. The tasks of each block evaluated on a 100-point scale.

The overall grade that the student received for the colloquium defined as the weighted average of the grades obtained for each block of tasks. The weight of the tasks of the first block was 25%, the second block - 30% and the third block - 45%.

Figure 2 shows a histogram of the distribution of general grades for the colloquium received by students of the studied groups.

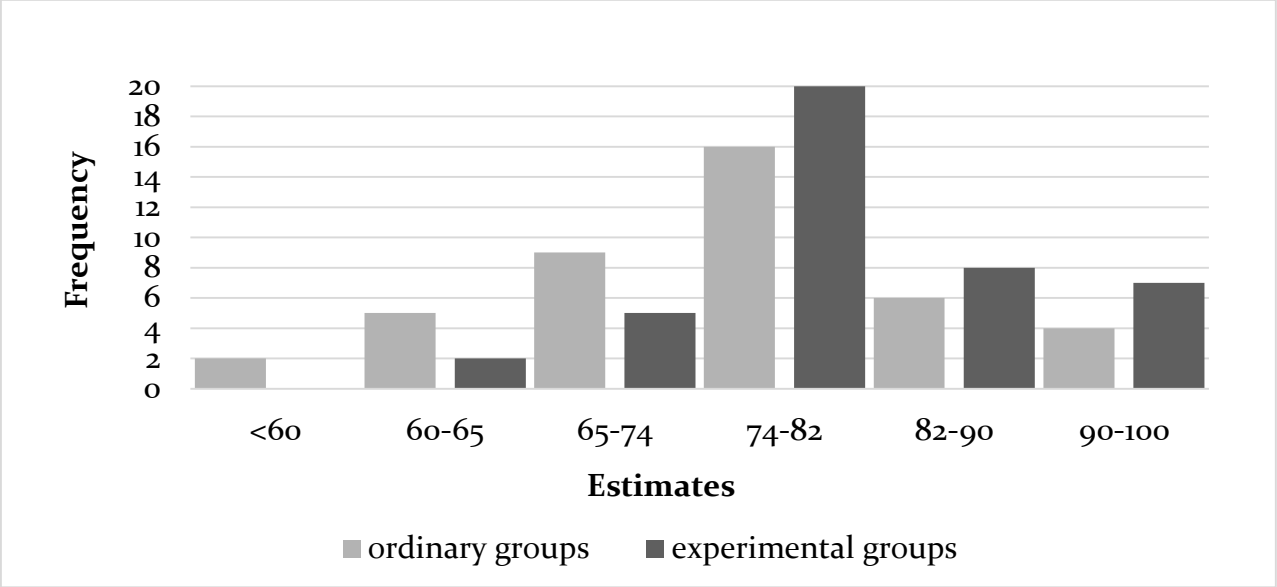

Figure 2. *Distribution of colloquium grades*

Grades received by students for answering the colloquium questions considered as data from sample populations. It established that the average score of knowledge assessment of students of experimental groups is almost 80 points, students of control groups - 72 points.

Average scores are marked:

$$\overline{X_1} = 80, \overline{X_2} = 72.$$

The question arises as to whether there is a statistically significant difference between the values of these sample averages. **Student's t-test** used to answer this question.

The null hypothesis to be tested formulated as:

$$H_0 : \overline{X_1} = \overline{X_2}.$$

According to this hypothesis, two independent random samples have the same mean, i.e. these samples belong to the same general population. It follows that the impact of the use of concept maps on the level of learning is not statistically significant.

On the contrary, the alternative hypothesis emphasizes that the difference between the values of the sample averages is statistically significant:

$$H_1 : \overline{X_1} \neq \overline{X_2}.$$

Accordingly, it recognized that the use of concept maps affects the quality of learning.

Suppose the samples drawn from a normally distributed population when the population standard deviation is unknown.

Since the sample size is small, we use the following formula to calculate the t-score:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

In this formula n_1, n_2 are the sizes of samples, S_1^2, S_2^2 - the variances for samples.

To calculate the t-score, the Two-sample t-test procedure used. This procedure is one of the Analysis tools of the MS Excel software environment. The results of its implementation for two random samples of students are given in table 1.

Table 1. *Two-sample t-test for means*

Statistical indicator	Experimental groups	Ordinary groups
Mean	79,62	71,93
Variance	66,44	99,73
Observations	42	42
Pooled Variance	0,93	-
Hypothesized Mean Difference	0,00	-
df	41	-
t - Stat	13,13	-
P(T<=t) one-tail	0,00	-
t - Critical one-tail	1,68	-
P(T<=t) two-tail	0,00	-
t - Critical two-tail	2,02	-

In this study, the level of significance at which the null hypothesis rejected was 0.05. Since the empirical value of the t-criterion (t - Stat =13,13) turned out to be greater than the critical one (t - Critical one-tail = 1,68 and t – Critical two-tail = 2,02) the null hypothesis should be rejected in favour of the alternative one. It means that the effectiveness of the use of concept mapping in the educational process should be considered significant.

To investigate the structure of the impact of the use of concept maps on the quality of education, an analysis of grades for the tasks of each block of the colloquium performed.

Figures 3 - 5 show the distribution of grades for the tasks of individual blocks of the colloquium.

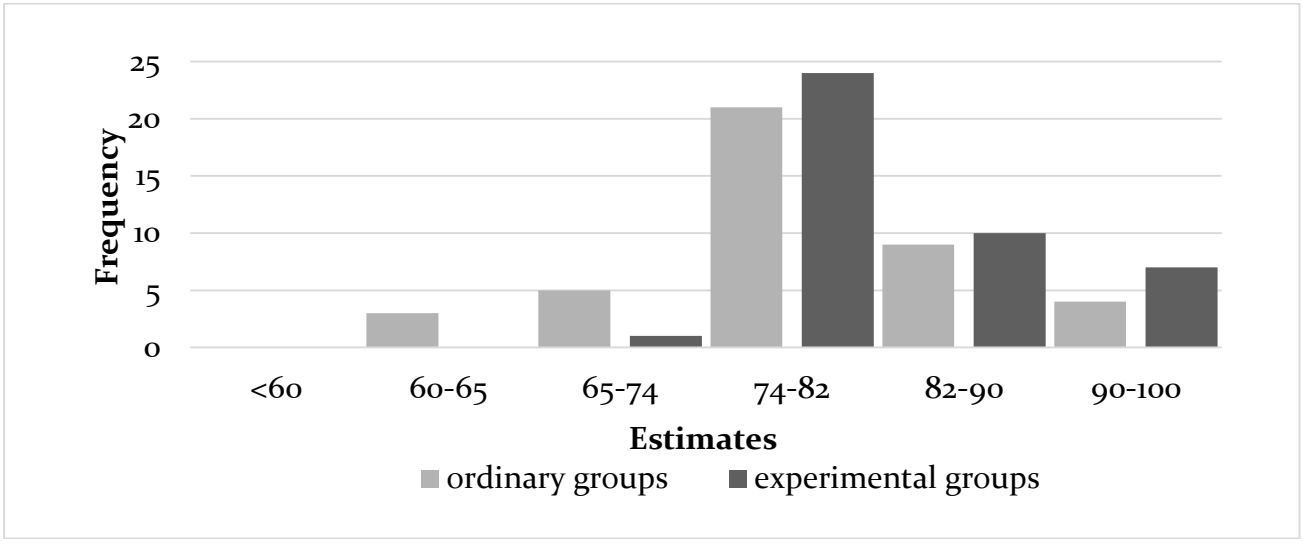

Figure 3. *Distribution of grades for knowledge of the basic concepts of the colloquium*

The tasks of the first block of the colloquium allowed revealing the level of mastering by students of the basic concepts on the topic "Differential calculus of the function of one variable". This is the basic level of knowledge in the discipline that is being studied. Both the students of the experimental groups and the students of the control groups demonstrated practically the same level of knowledge when performing the tasks of this block.

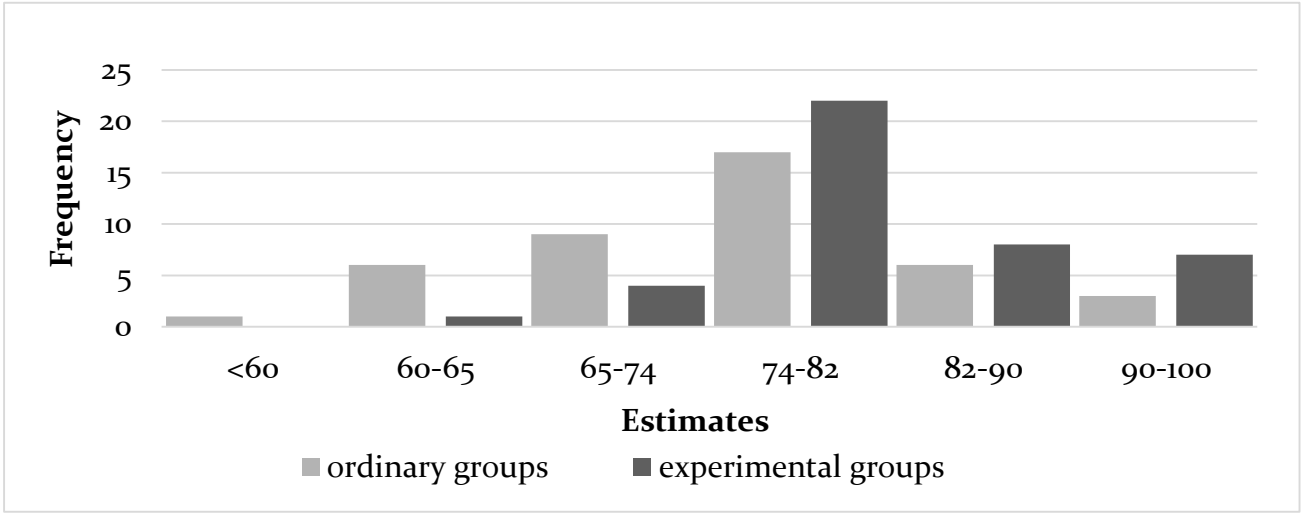

Figure 4. *Distribution of grades for understanding the content of key terms of the colloquium*

The tasks of the second block of the colloquium appeared as diagnostic tasks, which determined the student's ability to use their acquired knowledge and skills to solve typical problems. According to the results of the tasks of this block, we can also say that the differences between the scores obtained by students of the experimental and control groups were insignificant.

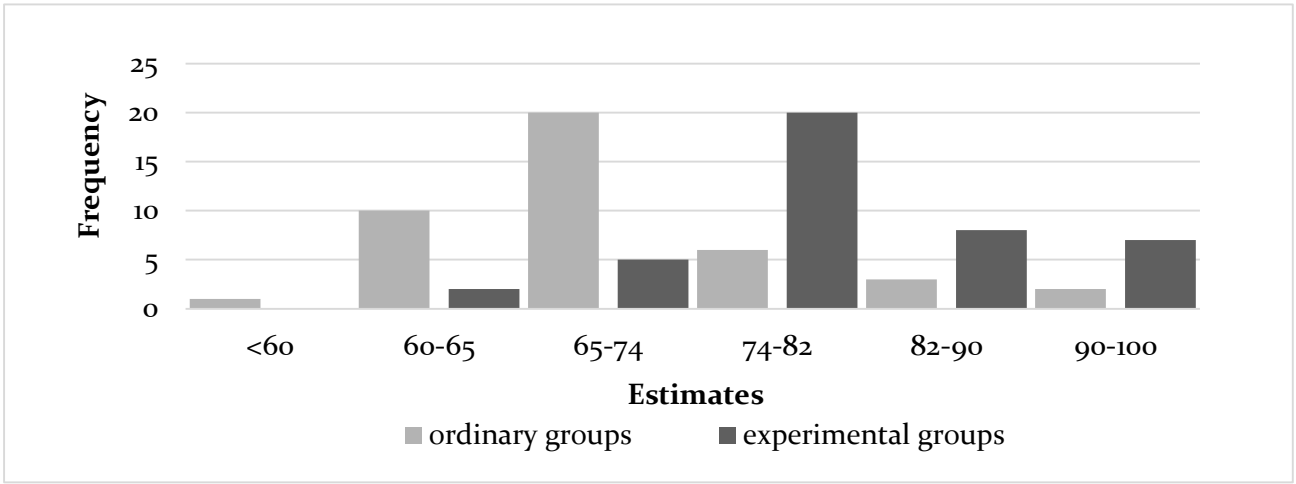

Figure 5. *Distribution of grades for the ability to use theoretical knowledge on the topic of the colloquium in solving practical problems*

The most significant difference between the scores obtained by students of experimental and control groups was found during the test of the ability to use the acquired knowledge in the heuristic problems of the third block of the colloquium. Most students in the experimental groups (83% of the total) successfully solved such practical

problems on a given topic of the colloquium. Among the students of the control groups, only 26% of the total coped with heuristic tasks.

The tasks aimed at establishing creative potential and acquiring competencies, creative activity, independence and efficiency turned out to be too difficult for these students. Thus, in addition to increasing the level of assimilation of theoretical provisions, the use of concept maps in the independent study of educational material helps to form an understanding of the practical application of knowledge and make more effective the ability to apply them.

The peculiarity of using the technique of constructing concept maps in the process of independent work is that the student is given the opportunity to determine their own educational search. That is, he has the opportunity to act as a real subject of personal educational and cognitive activities, which is implemented through a system of various educational, intellectual tasks.

Another positive point is that in the subgroups of control groups there was 100% involvement of students in the creative process. Concept mapping is a collaborative process, so it is the ideal way to build a team that works together to solve a problem. Cooperation of students within the own subgroup in combination with competition with other subgroups strengthened the motivation and intellectual activity of students, contributed to the process of search of reasoned conclusions and theoretical knowledge that were obtained during the construction of concept maps.

DISCUSSION

The authors agree with Guzanov B.N. & Morozova N.V. (2014) that in the new conditions combinations of classroom and extracurricular work can be used in other qualities. A reasonable and creative combination of these types of educational work will allow the student to acquire directed professional knowledge and relevant functional skills independently.

Although higher mathematics is one of the exact sciences, which requires the acquisition of skills to solve practical problems, understanding the theoretical foundations of any practical method is a very important requirement for mastering the material in this discipline. The results of this study confirm the findings of E. Taie (2014), P. Ruiz-Palomino & R. Martinez-Canas (2013), who studied the effect of using concept maps in the learning process.

We propose to expand the range of concepts-mapping application and implement them in the teaching of disciplines of the mathematical cycle.

In addition, the positive experience of the authors in the direction of this study was presented in the work of L. Norik & I. Lebedeva (2020) on the example of independent creative work students in the discipline «Applied Mathematics». In the process of studying this applied discipline, concept maps make it possible to implement the brainstorm to generate new information because of combining new and old ideas.

CONCLUSIONS

The study has some limitations. It covered a small number of students in only one educational program. In addition, the experiment was conducted on only one topic of the discipline and its duration was limited in time. In the future, it is advisable to conduct a similar experiment, using a larger amount of educational material, and compare the effect of the use of concept maps in the learning process of students of different faculties.

Of course, the introduction of concept maps in the process of independent work of students is also of great educational importance. Group work on creating a map

forms leadership qualities and the ability to defend one's own opinion. This should be considered not only as a set of certain skills and abilities, but as also character traits that play a significant role in shaping the personality of a modern competent specialist.

Our research has shown that the use of group independent work in the educational process using the technique of constructing concept maps on the topics of higher mathematics promotes the development of students' ability to organize their learning, the formation of self-development and creative application of knowledge.

The authors see the further development of the introduction of mapping in the educational process in providing students with information about computer programs used to build concept maps. It is also advisable to use concept maps to assess students' perception of topics not only in higher mathematics, but also in other mathematical disciplines, which are taught in the training of future economists and managers.

This would allow students to develop an understanding of the relationship between specific topics of mathematical disciplines and their use in the study of economic processes and phenomena.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ВИКОРИСТАННЯ КОНЦЕПТ-КАРТ В ПРОЦЕСІ САМОСТІЙНОГО ВИВЧЕННЯ НАВЧАЛЬНОГО МАТЕРІАЛУ З ВИЩОЇ МАТЕМАТИКИ

Метою *статті є аналіз впливу концепт-картування на рівень та якість засвоєння навчального матеріалу з вищої математики в процесі самостійного вивчення.*

Методологія*. На підставі огляду основних положень сучасної теорії навчання та узагальнення результатів досліджень, викладених у наукових працях щодо сфери застосування концептуальних карт в процесі навчання, проведений навчальний експеримент. Студентам двох експериментальних груп з певної теми навчальної дисципліни "Вища математика" було запропоновано окрім звичайних методів навчання в якості самостійного творчого завдання побудувати концептуальні карти. В інших двох групах, які були контрольними, студенти самостійно вивчали ту ж тему дисципліни, використовуючи традиційну методику.*

Результати*. Визначено, що результати колоквіуму, складеного студентами експериментальних груп, були суттєво вищими, ніж у студентів, які не використовували концепт-картування у самостійному навчанні. Середній бал, який отримали за колоквіум студенти експериментальних груп, дорівнював майже 80 балів, тоді як для студентів контрольних груп він становив лише 72 бали. За допомогою критерію Стьюдента доведено, що різниця між цими показниками є значущою. Якщо порівняти різницю між середніми балами за різні типи завдань, то найбільш значущою вона була за виконання евристичних завдань, які відображають вміння застосовувати набуті знання до розв'язання практичних задач економічного змісту.*

Висновки*. Встановлено позитивний вплив застосування концепт-картування в самостійній роботі студентів, що підтверджує тезу про доцільність використання концепт-картування у якості інструменту навчання. Подальше впровадження концептуальних карт в навчальний процес повинно ґрунтуватися на розробленні комплексних теоретико-практичних та компетентнісно-орієнтованих завдань.*

КЛЮЧОВІ СЛОВА: *осмислене навчання, самостійне вивчення навчального матеріалу, пізнавальна активність, робота в групі, навчальні карти, концептуальна карта, якість навчання, компетентності.*

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THE PECULIARITIES OF TEACHING FOREIGN LANGUAGES BY MEANS OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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ABSTRACT

The paper investigates the peculiarities of teaching foreign languages by means of Information and Communication Technologies (ICT). In the course of a comprehensive study the most effective for the development of students' linguistic and communicative competence, the following types of ICT were singled out and analysed: Internet-based project work, online correspondence by e-mail, chat, blogs, wikis and podcasts and training programs.

*The **aim** of the article is to identify the peculiarities of teaching foreign languages by means of ICT*

*The theoretical, empirical and statistical **methods** have been used to reach the purpose. To check the effectiveness of applying ICT in teaching foreign languages empirical (diagnostic) methods such as testing, observation and discussion were used. The pedagogical experiment with the fourth-year students of Simon Kuznets Kharkiv National University of Economics was conducted. The pedagogical experiment showed the effectiveness of developing foreign language activity by means of ICT.*

*The statistical methods helped to evaluate the **results** of the research. Using ICT is really helpful to increase students' language competencies and, respectively, it provides the development of foreign language communicative competence in general.*

***Conclusion**: ICT creates a new environment and opportunities for foreign language acquisition; they have become an important educational tool successfully used in foreign language teaching.*

KEY WORDS: *blogs, foreign language, Internet-based project work, podcasts, wikis.*

INTRODUCTION

Times have changed, and, with them, so has education. In the last few decades, new methodologies have been introduced in this field to help meet the requirements of new educational systems. Current information and communication technologies (ICT) have made it possible to work with and analyse large amounts of data and disseminate the results via digital media.

The use of these methodological and innovative changes should be explored in all areas, but might be of particular benefit in the field of foreign language learning, as ICT appears to be a suitable way to improve students' learning and knowledge acquisition in this field (Barr, 2016; Kori et al, 2016; Naqvi, 2017; Sampaio & Almeida, 2016). Altun (2015) suggests that integration of technology into the process of teaching and learning foreign languages leads to increased motivation and, therefore, to a more efficient achievement of learning goals.

Hence, in order to enhance the quality of education, it is essential for foreign language teachers to have a wide range of competencies and to be able to put them to use in the classroom to meet students' needs.

ICT provides a number of advantages for language learning as information and communication technologies help increase the independence and autonomy of students; allow to expand the boundaries of classroom communication with the teacher and introduce problem-oriented types of tasks; implement interactive communication between the participants of the educational process; apply alternative forms of control, including self-control and peer assessment.

One of the major tools of ICT in foreign language learning is a hypertext which is the Internet space for collective creation, editing and storage of documents of various formats with shared access to the history of document changes. Also, hypermedia allows students to focus on the content and use various links to get instant access to various learning materials like grammatical explanations or exercises, vocabulary notes or comments, pronunciation information, questions or prompts.

The appearance of the Web gave rise to the use of the Internet in communication and learning. The Internet-based communication allows users to share not only immediate, short messages, but also create lengthy documents by means of collaborative writing (learning).

What is more, learners are able to share graphics, sounds and video. Even more vital, students while using the Internet can search through millions of files from around the world within minutes to locate and access authentic materials (newspaper and magazine articles, news broadcasts, movie or book reviews), they can use the Web to publish and share both texts and multimedia materials with their partners or the general public.

That is to say, using the Internet we create an environment where authentic and creative communication is integrated into all aspects of the course.

THEORETICAL FRAMEWORK

It should be noted that one of the effective ways to improve the quality of teaching foreign languages is the digitalization of education. The use of ICT in learning a foreign language is a convenient basis to intensify and personalize learning process. In addition, the ICT contribute to overcoming students' psychological barrier to speak a foreign language.

What is more features such as multimedia, publicity, hypertext structure, access to different websites, page privacy settings, shared access to document creation history, communication asynchrony, administrator role and the ability to add content to the site allow students to do a variety of web-based tasks.

Participants do not need special knowledge in the field of computer science to organize

collaboration on the basis of websites. Without a doubt, ICT is a valuable and innovative teaching and learning a foreign language tool. The rapid growth of ICT has naturally influenced every aspect of the language teaching process. Using technology has positive effects on teaching and learning foreign languages. Technology can be applied to teaching practices to enhance and facilitate foreign language learning.

Computer, Internet, smart boards, cell phones, video games, music players and so on are used in the target language learning process to raise students' motivation and language awareness (Altun, 2015). The implementation of ICT will lead to variety in target language content, contexts and pedagogical methods in the teaching environment. ICT makes the language environment interactive, flexible and innovative. (Padurean, & Margan, 2009; Komar, 2020).

The application of information and communication technologies in teaching foreign languages allows to create a student-centred learning process. They give teachers an opportunity to vary learning environment, to motivate students. They also contribute to the systematization of educational information, optimization of the educational process and the organization of students' independent work.

Integrating technology into language instruction reduces teacher-centred understanding and students' language learning anxiety, but encourages them to be risk takers to practice target language as they are digital natives (Houcine, 2011). Jayanthi and Kumar (2016) explain the positive impacts of ICT on ELT under the basic headings such as availability of materials, students' attitudes, learner autonomy, authenticity, helping teachers, student-centred, and self-assessment.

The availability of a large body of authentic materials such as images, animation, audio and video clips facilitate presenting and practising a language. As for students' attitudes, ICT increases motivation. The students feel highly motivated to learn a language as they displayed positive attitudes towards language learning as they use a computer and learn in the stress-free learning environment.

In addition, ICT fosters learner autonomy as ICT tools provide learners to take responsibilities for their learning. Students are free to choose the material convenient for their learning styles. Furthermore, ICT provides authentic situations and real-life learning environment. As ICT offers different types of facilities and availability of teaching materials, EFL teachers only suggest and design these tools as complementary teaching materials.

Contrary to the traditional learning environment, ICT supports student-centred learning together with teacher-student interaction. As for assessment, with the ICT both receptive and productive skills are easily and effectively assessed. The teacher may decide and design relevant materials to test students' achievement in all skills.

A great number of studies have been conducted to examine the advantages of integrating ICT into foreign language acquisition. Therefore, the integration of new ICT tools such as blogs, chats, correspondence by e-mail, ICT, Internet-based project work, podcasts, training programs, wikis in foreign language acquisition was not the investigation subject of a wide range of scholars.

The **aim** of the article is to identify the peculiarities of teaching foreign languages by means of ICT. According to the aim we set the following tasks 1) to analyse scientific literature and to determine the peculiarities of teaching foreign languages by means of ICT; 2) to overview the available Internet tools which are valuable to foreign language teaching and single out the most appropriate and efficient application of relevant ICT; 3) to

check experimentally efficiency of teaching foreign languages by means of ICT.

METHODOLOGY

There were three groups of methods used for achieving the purpose and tasks of the research. They are theoretical, empirical and statistical methods.

So, among general theoretical methods we have chosen analysis and synthesis of psycholinguistic, linguistic, psychological and pedagogical literature since they helped to study and describe the problem of the ICT use in foreign languages acquisition, also to identify specific ICT requirements, which ensure the development of professional competence and increase the interest and motivation of students.

The empirical (diagnostic) methods, namely testing, observation and discussion were used in the pedagogical experiment where we have been checking the use of ICT on the lessons of foreign languages as means of improving the efficiency of teaching foreign languages. The statistical methods (such as students' test) were needed to evaluate the experiment results.

RESULTS

The following impacts seem to be the most obvious ones when using ICT to support foreign language teaching: the possibility to adapt easily the teaching materials according to circumstances, learner's needs and response; ICT allows to react upon and enables the use of recent/daily news; it offers access to authentic materials on the web; the possibility to combine/use alternately (basic) skills (text and images, audio and video clip etc.); lectures become more interesting and less ordinary which boosts learners' engagement; ICT enables to focus on one specific aspect of the lesson (Houcine, 2011).

As a result, a comprehensive study found that the most effective for the development of linguistic and communicative competence of students are the following types of ICT: Internet-based project work, online correspondence, chat, blogs, wikis and podcasts, training programs.

According to the analysis of scientific literature, we can state that Internet-based project work is widely used for teaching foreign languages. Authentic materials of projects captivate, motivate, and help students to get a successful outcome. Project work has a great educational potential and can be effectively used in foreign languages classes or serve as a visual support while speech training.

Internet-based project work involves more extended Internet use over a series of lessons and hence increases the proportion of ICT in the blended course. The benefits of this technology-enhanced teaching are numerous: project work can be planned as a short-term or a long-term activity depending on the group or course profile and goals to be achieved; no specific technical knowledge is necessary to plan or design the project; projects are group activities involving communication/interaction and sharing ideas (which is the principal goal of teaching a language); it can be implemented as a combination of language and subject teaching (language for specific purposes or CLIL); it encourages cooperative work and critical thinking; learners are exposed to real-world situations and authentic materials.

Correspondence by e-mail enables students to communicate with each other and collaborate on the tasks given by the teacher both as part of a blended teaching or traditional instruction. They can be used from home, the Internet café or workplace, thus providing lots of flexibility and freedom for the student environment. E-mailing also is a time-saving tool for student-teacher communication as part of tasks may be set, marked, returned with feedback without face-to-face contact.

Finally, e-mail is definitely one of the most used and useful tools in ICT technology. It allows teachers around the world to keep in touch with each other and share ideas and

materials. If you haven't done it yet, consider joining a teachers' network, mailing list or a discussion club, as part of your professional development process. The search engine will provide a list available if you indicate appropriate keywords.

There are some methods and possibilities offered by e-mail in teaching a foreign language: students submit work as attachments to the teacher to be marked and returned; students share assignments and share roles, responsibilities by e-mail; teacher sends students feedback, assignments, links, sites to be visited or online practice addresses; students discuss language problems, do some peer consultation; teachers provide e-mail consultation on certain language points.

E-mail can be used for collaborative writing (e.g., one group begins a story, another group adds to it, and so on) or during the class to contact real companies or organizations (e.g., as part of project work) since the chances that the message will be answered are higher compared to those sent from a private mail address. E-mails may be also used in Key pal projects (a project between groups of key pals who are learning the same foreign language in different countries) both in and outside the classroom (certainly, teacher's guidance in language accuracy and correctness will have a different degree).

Chat is a tool that allows for real-time communication over the Internet in a text or audio format. Audio chats are becoming increasingly available because of simple and cheap or even gratis software (chat facilities are available from Yahoo, Messenger, MSN Messenger, Google Talk or Skype) and devices (minimum equipment required: a microphone, speakers, headphones).

Blogs, wikis and podcasts are examples of software and communication tools which allow people to collaborate online. Blogs, wikis and podcasts are comparatively easy to set up and use and do not require any specific knowledge. The use of blogs in the language classroom is all about cross-cultural communication, learner participation and collaborative learning. Blogs can be set up and used by a teacher, an individual learner or by a class.

This mode of communication may be used for project-based learning by both students and the teachers as a medium to post news and comments, extra reading, homework, links, study tips, etc. Students' blogs can also be used as a tool for reflection on what they are learning or how they have learnt something. In a class blog, all students post to the same blog. When introducing web blogs in the course, the teacher has to decide on how the language accuracy will be monitored (if at all), which tasks will be moderated, and on feedback pattern.

The advantages of using the blogs in the classroom include: providing a "real world" tool for practising written skills (authentic and broad audience otherwise not available); enabling contacts with students in other countries (identifying cross-cultural differences, developing tolerance); opening more opportunities for developing written skills (more purposeful writing, use of visuals, practising ways of attracting the audience) and assessing them – provided the blog entries are signed and assessment strategies clearly defined; encouraging the quieter and less confident learners to participate (ensuring a degree of anonymity).

Wikis are different from blogs in that they are like a public website set up by one person but subsequently developed by multiple authors who can add, delete, and edit the information posted. The changed parts of the wiki are automatically saved and can be restored or revisited. If you decide to set up a free wiki, visit: www.pbwiki.com.

In language teaching, podcasts can be used in two ways: 1) students listen to podcasts made by others or 2) they produce their own podcast. Podcasts are available on the Internet, so they can be used in class via the computer. An example of the authentic podcast site for learners of English is http://www.bbc.co.uk. Site for teachers and

learners of English is http://www.englishcaster.com/. Podcast site can be set up at http://www.podomatic.com.

At present there are a number of educational computer programs and textbooks that have training programs both domestic and authentic. These applications are easy to apply and they are a convenient and effective tool for individual students' work. Each of these training programs has certain goals to work with grammar, vocabulary, reading, phonetics and require basic computer skills.

The most common programs which might be used in the university: "Living English", "Bridge to English", "All clear", "BBC Learning English", etc. Such programs contain a great number of speaking exercises, exercises to practise pronunciation, grammar exercises, activities and games to practice spelling. The topics of the units make it easy to integrate the course into a learning process.

To summarize, the Internet and the Internet-based technologies offer a variety of modes of learning a language, introducing a different environment, mobility and flexibility in the schedule as well as communicative, collaborative attitudes to acquiring skills. The degree to which these tools will be exploited depends entirely on the complex of teacher-student, teacher-teacher, teacher-institution, student-student, teacher-syllabus, teacher-technology, student-technology relations.

In order to solve the research tasks, the pedagogical experiment was carried out on the basis of Simon Kuznets Kharkiv National University of Economics in 2020. The group of the fourth-year students was chosen randomly to be the sample of the study. The total number of students was 107. The students of this group were divided into two groups. The control group had 55 students; they were taught more traditionally. And the other experimental group had 52 students; they were taught with ICT mostly. All the students included in this study had the same learning experience. Students during the first term were selected to achieve the purpose of this study.

The students run some placement tests at the beginning of the experiment including Reading, Listening, and Use of English, which allowed us to define their level of the main types of English speech activity. After the training course at the end of the experiment the students were tested as well.

To ensure the equivalence of the two groups before starting the study, a placement test was applied. Table (1) shows the results (%):

Table 1. *Students' Academic Results at the Course Beginning*

Types of Activity	Groups	
	Experimental	Control
Reading	26.6	26.8
Listening	32.1	33.2
Use of English	41.3	40.0

Table 1 shows that there were no statistically significant differences between the experimental and control group at the placement test of reading listening and use of English skills. This means that the control group and the experimental group were equivalent before starting the study.

During the second term students of the experimental group were taught a foreign language using different ICT tools, students of the control group were taught a foreign language with using some ICT tools. Are there significant differences in the students' reading comprehension and grammar skills due to the strategy of teaching with the help of ICT? To answer this question final tests were conducted and the results were calculated. Table (2) presents the results in comparison.

Table 2. *Students' Academic Results at the Course Beginning and its End*

№	Types of Activity	At the Beginning of the Course		At the End of the Course		Average Progress (%)	
		Experimental	Control	Experimental	Control	Experimental	Control
1.	Reading	26.6	26.8	47.9	35.3	21.3	8.5
2.	Listening	32.1	33.2	41.6	35.1	9.5	1,9
3.	Use of English	41.3	40.0	50.0	17.0	8.7	23.0

So, the students improved their results in all types of activity. Table (2) shows the progress of the two groups (Experimental and Control). In the Preliminary Reading Test were (26.6) and (26.8) respectively while in the Final Test were (47.9) and (35.3); in the Preliminary Listening Test were (32.1) and (33.2) respectively while in the Final Test were (41.6) and (35.1) respectively; in Preliminary Use of English Test were (41.3) and (40.0) respectively while in the Final Use of English Test were (50.0) and (17).

This means that the students' reading, listening and use of English skills scores in the experimental group were improved in the final test because of the use of ICT.

DISCUSSION

Thus, the study investigated the effectiveness of using ICT in teaching a foreign language. The results showed that there were statistically significant differences in reading, listening and use of English skills due to the strategy of teaching (teaching using ICT and teaching without using ICT) in favour of the ICT teaching strategy. The results showed that using ICT at the lessons of foreign languages contributed to the improvement of students' achievements. Other researchers (Holubnycha et al, 2019), (Kostikova, & Miasoiedova, 2019) come to the same results. Students had the opportunity to receive information from different resources, share their knowledge and skills in an appropriate manner and interact more effectively.

It is evident, the experimental results can be extrapolated for other researchers' data as new means of ICT, Internet recourses, social networking sites are constantly appearing (for example: Nahaev, & Hrynova, 2020). Further practical use of ICT in foreign language acquisition; developing and describing the assessment criteria for the ICT lessons; studying and integrating different approaches, preparation programs for learning foreign languages by means of ICT, also optimization of tasks for students' individual and extra-class activities might be a prospect for further research. Based on the foregoing, it can be argued that the use of ICT is an effective direction in foreign language teaching and needs further study.

CONCLUSION

The importance of using ICT in learning a foreign language is argued and proven in practice. The conducted pedagogical experiment showed that the use of ICT has a positive impact on the quality of teaching a foreign language.

Finally, the study demonstrated that the integration of ICT in the process of teaching a foreign language makes it more dynamic, intensive, helps organize the learning process efficiently, increases the efficiency of communicative competence development, provides a positive learning motivation and cognitive students' activity, and facilitates the activation of students' independent study.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ОСОБЛИВОСТІ ВИКЛАДАННЯ ІНОЗЕМНИХ МОВ ЗАСОБАМИ ІНФОРМАЦІЙНО-КОМУНІКАЦІЙНИХ ТЕХНОЛОГІЙ

У статті обґрунтовано особливості викладання іноземних мов засобами інформаційно-комунікаційних технологій (ІКТ). Наголошено на важливості модернізації змісту навчання іноземної мови з використанням ІКТ, а також окреслено їх переваги для навчання іноземної мови. В ході дослідження було проаналізовано та виділено завдання, які сприяють найбільш ефективному навчанню іноземної мови, а саме Інтернет-проект, онлайн листування, чати, блоги, вікі, подкасти та навчальні програми.

***Мета** статті – розкрити ефективність навчання іноземної мови з використанням сучасних засобів ІКТ.*

*Задля вирішення поставленої мети використовувалися теоретичні, емпіричні та статистичні **методи**. Для перевірки ефективності застосування ІКТ у навчанні іноземної мови використовувались емпіричні (діагностичні) методи, такі як тестування, спостереження та обговорення. Було проведено педагогічний експеримент зі студентами четвертого курсу Харківського національного економічного університету імені С. Кузнеця. За допомогою педагогічного експерименту було доведено ефективність використання ІКТ задля навчання іноземної мови. Статистичні методи допомогли оцінити результати дослідження.*

***Результати.** Використання ІКТ, зокрема у навчанні іноземної мови, є досить ефективним, оскільки сприяє підвищенню рівня різних мовних компетенцій та, відповідно, забезпечує удосконалення іншомовної комунікативної компетентності студентів у цілому.*

***Висновки**: ІКТ створюють нове середовище та можливості для організації процесу засвоєння іноземної мови; вони стали важливим освітнім*

інструментом, який необхідно успішно використовувати в навчанні іноземної мови.

КЛЮЧОВІ СЛОВА: *блоги, вікі, іноземна мова, Інтернет-проекти, подкасти, чат.*

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IMPACT OF THE AUDIO-VISUAL LEARNING METHOD ON THE DEVELOPMENT OF FOREIGN LANGUAGE COMMUNICATION COMPETENCE OF FUTURE INTERPRETERS AND TRANSLATOR

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ABSTRACT

*This article **purpose** is to concern the importance of applying a communicative approach to learning a foreign language by future interpreters and translators. The communicative approach creates situations that are as close as possible to the peculiarities of the real process of communication.*

Therefore, the object of this study can be considered the didactic process of communicative competence formation of future interpreters and translators. This approach is aimed at paying more attention to the functions of language, lexical and grammatical units, which contributes to the development of communicatively oriented mastery of educational material by future interpreters and translators. The author has established the fact that thanks to a communicative approach, future interpreters and translators will be able to master foreign language communicative competence, which is necessary for orientation in the cultural aspect of a foreign language.

*There was used the **methodology** of interdisciplinary research such as analysis of scientific sources and educational materials. It confirmed that a foreign language communicative competence includes a system of knowledge and skills necessary for the effective use for a foreign language in professional and intercultural spheres. It is especially important for interpreters and translators, who must always know the language situation and know the cultural specifics of a foreign nation.*

*Therefore, the **result** of this study can be considered as the following. The most effective way to achieve this goal is audiovisual reproduction of the linguistic and cultural situation, because standards of foreign language samples can come to our*

mind and can stay in long-term memory only with audio and visual perception. In addition, image and visual support is important not only for the semantic understanding of individual words or expressions, but also for the correct transmission of all content.

***Conclusion**: the audiovisual method of learning a foreign language is one of the most effective for the foreign language communicative competence formation for future interpreters and translators.*

KEY WORDS: *audiovisual method, foreign language communicative competence, interpreters and translators, higher education, professional skills, communicative approach.*

INTRODUCTION

Improvement and optimization of the learning process is impossible without choosing the most appropriate methods and forms of learning. The new content of education has accelerated the introduction of active methods and technical means of education into the learning process, which contribute to a better transfer of knowledge, accelerate the learning process and increase its effectiveness, allowing more active use of the educational potential of students. Teaching a foreign language implies mastering the methods of speech activity.

Therefore, it is necessary to speak about communicative competence as one of the main objectives of foreign language teaching, and the process of forming communicative skills is possible with a combination of traditional and innovative methods, but with a strong emphasis on the intensification of the learning process and independent work of students.

Learning a foreign language is especially important for future interpreters and translators. Their main purpose is not only to learn new material, but also to be able to use it effectively in oral and written speech. This aim requires qualitatively new approaches to the content and organizational and methodological aspects of linguodidactic activity.

At the same time, there is no doubt that the principle of communicativeness should remain the main methodological principle of foreign language teaching. The communicative approach in foreign language training of future interpreters and translators consists in creation of situations which are as close as possible to features of real communication process.

This article **purpose** is to concern the importance of applying a communicative approach to learning a foreign language by future interpreters and translators. Therefore, the object of this study can be considered the didactic process of communicative competence formation of future interpreters and translators.

It is important to take into account the specifics of foreign language learning, to focus on the implementation tasks for graduates' future professional activity. To study a foreign language for future interpreters and translators it is necessary to mind the professional-oriented approach. It provides students' ability to communicate in a foreign language, taking into account the specifics of professional thinking.

THEORETICAL FRAMEWORK

The communicative method, competency-based approach, different competencies are studied nowadays (Kostikova et al., 2019; Holubnycha et al., 2019) in learning English. The theoretical basis shows the problems of theory and practice application of audiovisual means in training, the issue was considered by such scientists as I. Dryga, L. Zaznobina, I. Koshman, M. Lyakhovitsky, L. Pressman, etc.

Analyzing a number of scientific works on the classification of audiovisual media, we can underline a meaningful classification by M. Lyakhovitsky, who divides audiovisual means into: visual media, such as drawings, tables, diagrams, banners, slides; audio means such as recording, magnetic recording, radio broadcasts; combination of audiovisual means such as films, TV films and slides with sound.

METHODOLOGY

By using the methodology of interdisciplinary research such as analysis of scientific sources and educational materials, and professionally oriented learning we understand the organization of learning material that provides professional interest, lasting interest of each student in learning a foreign language, formation of skills and abilities necessary for professional self-improvement, promotes the development of such components of professional culture as knowledge, skills, experience, creativity, motives.

This training involves a combination of professionally-oriented mastery of a foreign language with the development of professionally significant personal qualities of students, mastering the cultural aspect of the language being studied, and the formation of special skills based on professional and linguistic knowledge (Bila,2012).

RESULTS

The significance of the State Standard on Foreign Languages is not in proclaiming the interactive intentions, but, first of all, in the practical readiness to base organization of foreign language learning on the students' needs, motivations, opportunities. The main attention was paid to practical skills that are needed for students and they must have them for free communication. The training is based on the formation of communicative competence.

This approach is aimed at paying more attention to the functions of linguistic, lexical and grammatical units, which contributes to the development of communicatively oriented mastery of educational material by students. The focus of the communicative approach is the activities of the student. The teacher involves students in creative collaboration in the classroom through exploratory, creative, student-centered tasks, project activities. The best method of forming communicative competence is using audio-visual activities.

The formation of linguistic and cultural competence of students during the acquisition of a foreign language allows to develop an enriched, more complex personality and strengthens the desire for further language learning and greater openness to new cultural experiences.... (Strelchenko, & Strelchenko, 2012). These skills can only be acquired by future interpreters and translators through the acquisition of foreign language communication competence.

The term "foreign language communicative competence" was introduced by D. Heism. The researcher defines it as knowledge that provides an individual with the ability to perform functionally directed verbal communication to succeed in communication in a foreign-language culture (Hymes, 1971, p. 11).

Therefore, the development of foreign language communicative competence for future interpreters and translators should be targeted not only to have the skills of practical usage of a foreign language in the professional field, but also the skills of intercultural communication. So, we can determine that foreign language communicative competence is a system of knowledge, skills and abilities necessary for the effective implementation of foreign language communication in professional and intercultural spheres.

Foreign language communicative competence contains the following components: gnostic (system of knowledge about the content, features and styles of foreign language communication, including professional); communicative (expressive and perceptual-reflexive skills; speech culture); emotional (positive attitude to communication; developed empathy and reflection); high level of identification with appropriate professional and social roles).

The development of foreign language communication competence in the training of future interpreters and translators leads to the following principles: integration and complexity in the educational process; humanization in the educational process (revealing the potential of a student during his/her professional training); professionally oriented communicative orientation in the process of teaching a foreign language.

There are methods of teaching (communicative, audiolinguistic, audiovisual) and forms (business game, modeling of situations, conversation, round table, discussion, debate), different principles of activating cognitive activity, increasing motivation, interactivity, authenticity in the process of teaching a foreign language.

There are three aspects they can be realized in: the choice of authentic materials, methods, communication, environment, intensive use of students' background knowledge; the unity of theoretical and practical training; ensuring creative activity and students' independence in the educational process (Zimnjaja, 2001, p. 53).

An audiovisual approach to foreign language learning will help to master and improve these skills. That is why it is necessary to highlight the importance of the audiovisual method in the acquisition of foreign language communicative competence by future interpreters and translators. The audio-visual method retains all the basic principles of direct methods, while building on the global listening comprehension of language material and the creation of direct associations between sound and meaning, with the total elimination of the native language from the learning process.

The main methods of learning are imitation, memorization and formation of phrases by analogy. The audiovisual method involves language environment artificially created at a lesson with technical means. The students' native language is not used in this process.

The practical implementation of this method is audiovisual teaching means, it is a special group of technical teaching means that are most common in the educational process, including on-screen and audio means designed to present visual and auditory information.

The analysis of scientific and pedagogical work by A. Gurzhiy helped to distinguish the purpose of audiovisual teaching means (Gurzhij, 2003, p. 26). These are: educational, specially designed for language classes and contain methodically processed educational material (visual books); educational, created for classes in other disciplines, but to be involved as language teaching materials (visual means); natural means of mass communication, which are included in the educational process.

Audiovisual means help to understand the relationship between image, concept and word, to reproduce a word or speech pattern by a visual clue, to imagine a communication situation and to express oneself in accordance with it. The audiovisual teaching means provide figurative perception of the researched material and its visual concretization in the most accessible form for perception and memorization. They most effectively reproduce communication situations and the surrounding reality by reflecting life phenomena by artistic means (videos, movies, art reading, painting, music, etc.).

One of the most effective audiovisual means is multimedia presentations. The basis of any presentation is to facilitate the process

of perception and memorization through vivid images. The presentation can show the most important points of the topic, selection of tables, tasks, illustrations.

The use of presentations allows you to achieve the optimal pace of work of students, increase the level of visibility during learning, learn more material, increase cognitive interest, achieve the effect of quick feedback. Presentations provide an opportunity to use various audiovisual means to enrich and motivate learning, visual and dynamic presentation of material.

However, in order to achieve high results, certain rules must be followed (Paliyenko, 2014): 1. No more than one idea, image, act in one sentence. 2. The maximum number of words from 14 to 18. 3. A small number of adjectives and adverbial inflections, repeated sentences 10 words long. The optimal rhythm of sentences: long, short, very short, a little longer. 4. It *d* sounds no longer than 4-8 seconds.

Cleverly selected and developed audiovisual teaching means are effective means of stimulating students' speech and mental activity.

The basic principles can be expressed as follows:

- Spoken language is usually carried out in dialogues.
- Oral speech, oral form of communication, and its graphical presentation are used.

Understanding is carried out only by ears. A certain resemblance to the ideas can be represented in the audio-linguistic method. Great importance is paid to the sound image in its harmony (sounds, intonation, emphasis, rhythm). Comprehension is carried out by means of object images, actions and context. Their systematic use, along with the traditional means, allows such didactic tasks to be effectively solved:

- ensure scholarly learning;
- to develop learners' cognitive interests and abilities;
- provide students with a stronger and deeper knowledge;
- accelerate the learning and memorization of learning material;
- enhance students' independent work;
- enhance visibility.

The goal of the method is to achieve the same level of language acquisition as native speakers and that is necessary for a professional translator. So, we can see that only with audio-visual teaching means for future interpreters and translators can most effectively acquire basic knowledge of a foreign language, develop auditory skills and abilities, as well as improve the psychophysiological mechanisms of listening.

The most successful implementation of the audiovisual method, the purpose of which is to bring the student to the largest possible number of elements of spontaneous speech, is based on the phased nature of the educational process. According to I. Zimnjaja, the achievement of an effective result is facilitated by the gradual implementation of tasks on three levels: text (before listening), text (during listening) and after text (after listening) (Zimnjaja, 2001, p. 56).

Each of the three stages has its own characteristics.

The pre-listening stage shows the motivational and purpose aspect of the activity. Some tasks are set that must be solved in the process of listening to a message. The task, which is offered to listen to the audio text, promotes the development of attention, memorization in the process of listening.

If the task contains an indication of the purpose for which the audition is performed, it helps to draw students' attention to the preparation for another activity, creates a certain attitude, stimulates post-voluntary attention. This

type of attention, according to I. Zimnjaja, does not cause fatigue, provides optimal conditions for language perception.

The listening setup should be focused on the content of the message rather than its language form. Therefore, the task of this stage is to create a situation of lack of information. A situation of need to obtain certain information for a specific purpose to form an attitude to listening (Rost, 2011, p. 113). The presence of the installation stimulates the activation of mental processes, pays attention to certain objects, and thus ensures the selectivity of perception.

The stage during the listening should be a logical continuation of the previous one and provide attentive and conscious listening, based on analytical and synthetic processing of incoming information. The task of this stage is the gradual development of listening skills and abilities that provide semantic perception of language. At this stage, the ability to overcome various difficulties of listening and achieve maximum understanding is also formed.

Stage after listening. The student's actions following listening to the message are considered as a way of understanding, as a natural communicative reaction that is important both for a speaker and listeners. Actions can be in the nature of message transmission, content analysis, evaluation, addition, and so on. Although each of the three stages has its own task, the effectiveness depends on agreed tasks (Livkutna, 2018, p.341).

It is important to teach listening because the following reasons:

- samples of a foreign language come by ear, which, being standards, are laid in long-term memory, where they are stored;
- heard-speech-motor images are included in all types of speech activity and, accordingly, it is impossible to teach other types of speech activity without the development of an auditory analyzer;
- the listener (student) develops auditory control, which is included in all types of language activities, when a person speaks, writes or reads, he controls himself through hearing;
- develops auditory memory, without which you cannot master a foreign language.

Thus, we can conclude that in a foreign language lesson it is almost impossible to form only one language skill. When you work with audiotext, lexical, grammatical and phonetic skills are practiced at the same time. Video and audio texts provide information for discussion, which involves the further development of speaking and writing skills. In this case, listening is a means of learning. Listening provides students with new language and speech material, acts as a means of developing skills in all other types of speech activity, helps maintain the achieved level of language proficiency. We cannot draw a clear line between listening as a goal and a means of learning, as in real practice two functions are closely intertwined (Bila, 2012).

Didactic features of audiovisual teaching means: high information saturation; rationalization of educational information; showing the language situation in development, dynamics; real reflection of reality.

DISCUSSION

The discussion about the problem is the presentation of the real situation regarding the application of the audiovisual method does not always fully reflect all the possibilities of such a method in foreign language teaching, and especially for foreign language communicative competence formation for future interpreters and translators.

We agree with other scientists (Alonso-Perez, & Sanchez Requena, 2018; Lertola,

2019; Pym, Malmkjaer, & Plana, 2013) that it is necessary to implement widely the audiovisual method for foreign language communicative competence formation for future interpreters and translators.

CONCLUSIONS

The priority of introduction of innovations has first of all to concern development and formation of the student not only as the expert, but also as the harmonious, active, purposeful person.

Therefore, the transition from the monotonous, typical of the present higher school to the implementation of the principles of a communicative approach, and, accordingly, to the diversity of activities during classes can be a step towards achieving the ideal to which the system of modern personal-oriented education aspires.

The proposed audio-visual approach orients the native teachers of the university to pay attention to the individual abilities of students and their development. People will always be different in their mental abilities, but each of us has a certain untapped potential, and if you use it, you can significantly improve your intellectual level.

Individualization of professionally oriented teaching of foreign languages is called, first of all, to develop interest in a foreign language of a professional direction, possible personally favorable perception of the educational material by students, to differentiate the ways and pace of learning to ensure the depth of learning material.

Also, the development of foreign-language communication competence is of very important for future interpreters and translators. The process of formation and development of communicative competence will take place under conditions of ensuring the unity of formation of the main components of communicative competence: language, speech, socio-cultural, sociolinguistic, discursive and strategic. One of the most effective approaches to the formation of these components is the audiovisual method of learning a foreign language.

The result of using this method is an understanding of the statements of the interlocutor in various communication situations, including in the presence of unfamiliar language means; understanding of educational and authentic texts with different degrees and depth of penetration of their content.

Visibility facilitates the perception of language material, allows a deeper understanding of the cultural environment of the people whose language is being studied, arouses students' interest and gives them an impetus to express themselves and, consequently, effectively enables the development of foreign language communicative competence for future interpreters and translators.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

ВПЛИВ АУДІОВІЗУАЛЬНОГО МЕТОДУ НАВЧАННЯ НА РОЗВИТОК ІНШОМОВНОЇ КОМУНІКАТИВНОЇ КОМПЕТЕНЦІЇ МАЙБУТНІХ ПЕРЕКЛАДАЧІВ

Метою *даної статті є виявлення важливості застосування комунікативного підходу у вивченні іноземної мови майбутніми перекладачами. Комунікативний підхід створює ситуації, максимально наближені до особливостей реального процесу спілкування. Тому об'єктом даного дослідження можна вважати дидактичний процес формування комунікативної компетенції майбутніх перекладачів. Такий підхід спрямований на приділення більшої уваги функціям мови, лексичних та граматичних одиниць, що сприяє розвитку комунікативно орієнтованого засвоєння навчального матеріалу майбутніми перекладачами. Автор стверджує, що завдяки комунікативному підходу студент – майбутні перекладачі зможуть оволодіти іншомовною комунікативною компетенцією, необхідною для орієнтації в культурному аспекті іноземної мови.*

Було використано ***методологію*** *міждисциплінарних досліджень: аналіз наукових джерел та навчальних матеріалів. Це підтвердило, що комунікативна компетенція іноземної мови включає систему знань та вмінь, необхідних для ефективного використання іноземної мови у професійній та міжкультурній сферах. Це особливо важливо для перекладачів, які завжди повинні знати мовну ситуацію та культурну специфіку іноземної нації.*

Тому ***результатом*** *даного дослідження можна вважати доведення того, що найефективнішим способом розвитку іншомовної комунікативної компетенції є аудіовізуальне відтворення мовної та культурної ситуації, оскільки стандарти зразків іноземної мови можуть прийти нам на думку і можуть вбудуватись у довготривалу пам'ять лише при слуховому та зоровому сприйнятті. Крім того, наочна та візуальна підтримка важлива не тільки для семантичного розуміння окремих слів чи виразів, але й для правильної передачі всього змісту.*

Висновки*: аудіовізуальний метод вивчення іноземної мови є одним з найбільш ефективних для формування іншомовної комунікативної компетенції майбутніх перекладачів.*

КЛЮЧОВІ СЛОВА: *аудіовізуальний метод, іншомовна комунікативна компетенція, усні перекладачі та письмові перекладачі, вища освіта, професійні навички, комунікативний підхід.*

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PRESENT-DAY CHALLENGES IN HOMESCHOOLING SPECIALISTS' TRAINING IN CANADA

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ABSTRACT

The article deals with the results of the recent scientific research concerning training of experts for homeschooling in general and its today's challenges in particular. Canada has been chosen as a target country due to its specific attitude towards homeschooling and its significant experience in specialist and/or teacher training for homeschooling. The urgency of the problem has recently aggravated because of the present-day situation with covid-19 worldwide restrictions in education and subsequent increase in the number of homeschooling families that need expert advice from certified specialists.

The ***purpose*** *of the article is to highlight the actual state of homeschooling specialist training in Canada in order to decide on a possibility to apply the experience of Canada in those counties which face similar challenges.*

To conduct the scientific results such ***methods*** *as a continuous sampling method and a data classification method were used.*

The present research ***resulted*** *into revealing current challenges in the realm of teacher training for homeschooling in Canada along with possible ways of overcoming of all the revealed difficulties with the help of various institutions that provide pedagogical education or practical support within the process of specialist training for homeschooling. The article considers acquiring skills and knowledge necessary for organizing family (home) education from colleges, institutes, universities, teacher training courses, associations, homeschooling support groups, etc. Some relevant educational programs provided by these establishments are under consideration as well.*

Thus, the following ***conclusions*** *were inferred from the results of the research: the system of Homeschooling Specialists' Training in Canada is highly-developed and well-prepared to cope with the difficulties connected with the Present-day Challenges.*

KEY WORDS: *homeschooling educator/teacher training, homeschooling in Canada, challenges in homeschooling specialists training.*

INTRODUCTION

Homeschooling in Canada has recently been transformed from a rare phenomenon to a widely spread movement. Brian Ray, an American researcher of homeschooling, states that "Homeschooling changed from being a practice of families that some observers opined were the fringe of society to being commonly considered a viable educational option by mainstream American families" (Ray, 2017).

It should be noticed that families turn to homeschooling nowadays due to the present-day situation with Covid-19 which has caused challenges for the educational system of the country. Family education has always been legal and supported by the government. In some provinces home schools are even refunded, i.e. parents receive monthly payment for educating their children at home (see Fig. 1).

	Provisions for funding to parents or providers	Provisions for funding to schools
British Columbia	Students in grades 10-12 who are registered as home schooling and are enrolled in at least one distributed learning course are eligible to have educational expenses up to $600 per student paid directly to the provider	$175 per student
Alberta	Parents may receive up to 50 % of the $1,641.27 per student funding that is directed to the schools (that is, $820.64 per student)	$1,641.27 (but up to 50% of it may go to parent) Also 50% of cost for distance learning courses (grades 7 – 12) up to $ 1,641.27 per student
Saskatchewan	Parents receive up to $1,000 per student, but this varies by board.	

Figure 1. *Provisions for Funding for Home Schooling*

The main reasons for homeschooling in Canada are living in distant areas, religious or national viewpoint, frequent changing of dwelling, etc. However recently the main reason for massive increase in the number of homeschoolers is the situation due to Coronavirus.

As a rule, in Canada parents take time to consider all the advantages and disadvantages of homeschooling, discuss the possibility of switching to family education and have enough time to prepare programs and materials to anticipate and overcome impending challenges. While those parents who start homeschooling nowadays haven not had an opportunity to prepare themselves for such changes that is why they need professional support to a greater extend.

Thus the demand in homeschooling specialists such as teachers, educators, psychologists, coaches, methodologists, advisors and others is observed in Canada nowadays.

The purpose of the article is to highlight the actual state of homeschooling specialist training in Canada in order to decide on a possibility to apply the experience of Canada in those counties which face similar challenges.

To achieve the main purpose, the following tasks should be solved: identify the present-day challenges in the process of training specialists for homeschooling; to investigate the possibilities for teacher training in Canada; to view the ways of overcoming the challenges and to decide whether there is a possibility to apply the experience of Canada in other counties.

THEORETICAL FRAMEWORK

The problem that is under consideration has been studied by such Canadian scientists as A. B. Arai (Arai, 2017), B. D. Ray (Ray, n.d.), L. Bosetti & D. Van Pelt (Bosetti & Van Pelt, 2017) and others. It should be noticed that the problem of specialist training has not been researched enough.

The main attention of the scientists is paid to homeschooling, its challenges and providing support to homeschooling families in general. "Many supporters of homeschooling maintain that parents are in a better position than the state to judge the educational needs of their children, and furthermore, parents should have primary responsibility for deciding how their children ought to be educated" (Ray, 2017).

However, it is evident that families will face difficulties acting without any professional support of highly qualified specialists.

METHODOLOGY

To conduct the scientific results such methods as a continuous sampling method and a data classification method were used. The search of literature with further data analyses enabled us to systemize and classify facts concerning the training of teachers and other specialists for homeschooling (see Fig. 2 – 3).

№	Provinces and Territories	Name
1	**Canada-wide**	French for Homeschool; Homeschool Swap: Canada; Christian Canadian Homeschoolers; Canadian Secular Homeschoolers; Homeschooling Your Unique Learner in Canada.
2	**British Columbia**	BC Unschoolers/Homeschoolers; British Columbia Homeschool Chat and Swap; Greater Vancouver Local Support Groups; Homeschoolers of Northern BC; BC Registered Homeschoolers
3	**Alberta**	Homeschoolers Central Alberta; Alberta Homeschoolers Group; Lethbridge Homeschoolers; Edmonton Homeschoolers; Edmonton West-End Homeschoolers; Drumheller Homeschoolers; Fort MacMurray Homeschoolers; Drayton Valley Homeschoolers; Ponoka Homeschoolers; St. Albert and Area Homeschoolers; Lacombe Homeschoolers
4	**Saskatchewan**	Prairie Spirit Home Educators; Homeschool Potluck in Regina; Saskatoon and Area Homeschoolers; Battlefords and Area Homeschoolers
5	**Manitoba**	Manitoba Association for School at Home; Winnipeg Homeschoolers; Winnipeg Homeschooling Network; Interlake

		Homeschoolers; Steinbach Area Homeschoolers
6	**Ontario**	Ontario Homeschoolers; Heritage Homeschoolers of St. Thomas; Christian Toronto Homeschoolers; Thunder Bay Christian Homeschoolers; Elgin County Homeschoolers; Homeschooling Parents of Ottawa; Durham Region Homeschoolers; Northern Ontario Homeschoolers; Peterborough and Area Homeschoolers; Niagara Area Homeschool Group; Cambridge Ontario Homeschoolers; Sudbury, Ontario Homeschooling Parents Group; Toronto Muslim Homeschoolers; Hastings and Prince Edward County Home Educators and Learners.
7	**Quebec**	Association québécoise pour l'éducation à domicile; Centre Communidée – Montreal Homeschooling Community Centre; Ecole à la Maison de Montreal – Montreal Homeschool.
8	**New Brunswick**	Fredericton Secular Homeschoolers; Moncton Homeschoolers; Moncton Christian Home Educators; Fundy Home Educators; River Valley Home Educators.
9	**Nova Scotia**	South Shore Homeschoolers; Special Needs Homeschooling Nova Scotia; Cape Breton Homeschoolers Antigonish Homeschool Group; Annapolis Valley Community Playgroup
10	**PEI**	PEIHomeschool.com
11	**Newfoundland & Labrador**	Homeschooling Freethinkers in Newfoundland
12	**Northern Canada**	Northern Canada Home Based Learning
13	**Homeschooling Methods Groups**	Charlotte Mason Canada; Classical Education Homeschooling Canada; Montessori Homeschooling.

Figure 2. *Canadian-homeschooling-support-groups-Facebook*

№	Name	Description	Contact
1	**Association of Christian Parent-Educator**	A religious group that offers support to homeschooling families.	http://www.acpeq.org
2	**British Columbia Home Educators' Association**	A registered, inclusive, non-profit society that has been supporting home educators since 1988.	https://bchea.ca/contact/
3	**Calgary Homeschool Activities**	This group facilitates the organization and coordination of homeschool activities, get-togethers, playdates and field trips.	http://groups.yahoo.com/group/calgary-hsactivities/
4	**Canada's Homeschool Directory & Magazine**	Canada's Homeschool has been in home education and alternative learning for over 10 years. It's the only national directory of home education resources in Canada/	http://www.canadashomeschool.ca
5	**Cochrane Home educators**	A support group is inclusive to all and are a volunteer-run group.	http://www.cochranehomeeducators.com/
6	**EMBRACE – Sarnia/Lambton**	A homeschool families' group in Lambton County (activities including gymnastics, skating,	http://embracelambtonkent.weebl

		meetings, coffee night, field trips)	y.com/our-group.html
7	**Greater Vancouver Homelearning Network**	Support groups, events, ideas and resources and for the homes learning community. A non-religious and all-inclusive group.	http://sites.google.com/site/gvhomelearners/home
8	**Hamilton Homeschool Association**	A network of homeschooling families and support groups offering resources, activities, and information for homeschoolers.	http://www.penny.ca/homeschool/
9	**Home Educators of New Brunswick**	A local homeschooling support group.	http://www.henb.org
10	**Home School Legal Defence Association of Canada**	Home School Legal Defence Association of Canada (HSLDA) defends and protects the rights and freedoms of families across Canada in their right to home school their children.	http://www.hslda.ca
11	**Ontario Christian Home Educators Connection**	Enables networking among its members	http://www.ochec.org
12	**Ontario Federation of Teaching Parents (OFTP)**	An inclusive, non-profit group run by volunteers that provides information about home learning.	http://www.ontariohomeschool.org
13	**Prince George Home Educators' Association (PGHEA)**	A non-denominational, Christian group supporting all home educators in our area. We have monthly meetings, a member resource library, information packets, website.	http://www.pghea.com
14	**Saskatchewan Home Based Educators Inc.**	Serves as a link between the homeschooling community.	http://www.shbe.info
15	**South Delta Home Learners (SDHL)**	Diverse in philosophies, religions, and educational needs.	http://southdeltahomelearners.webs.com

Figure 3. *Canadian-homeschooling-support-groups*

RESULTS

The present research revealed current challenges in the sphere of teacher training for successful management of homeschooling in Canada. Besides that, some possible ways of overcoming difficulties were mentioned. The help is often provided by various institutions that offer pedagogical education or practical support within the process of specialist training for homeschooling.

The article investigates the ways of acquiring skills and knowledge necessary for organizing family (home) education from colleges, institutes, universities, associations, homeschooling support groups, teacher training courses, etc.

DISCUSSION

The present research shows that the interest to homeschooling had slowly but steadily been rising till the first lockdown in Canada. Whereas it has got a sharp increase during year 2020. It is obvious that the main reason (and at the same time the main homeschooling challenge) for this phenomenon is the contemporary pandemic

situation which influences dramatically the educational system.

As far as the challenges of homeschool specialist preparation are concerned, it is necessary to mention the following ones:

1. Small number of official programs and courses in pedagogical educational institutions.
2. The lack of confident specialists for homeschooling teacher training.
3. The difficulty in access to educational programs for homeschool specialists in geographically vast Canada.
4. An extensive variety of programs for homeschooling to face the families' needs and preferences due to absolutely different reasons for homeschooling.
5. The quarantine restrictions in higher institutions.
6. The pandemic threats to the participants of the training process.
7. Traditional programs tend to overwhelm the students.
8. Half of parents felt overwhelmed by their responsibilities to educate their children at home and one in four felt they did not have the resources they needed for at-home education (Regents of the University of Michigan, n.d.).

Homeschooling in Canada is decentralized. A state homeschool board only advises and gives recommendations whereas the local educational authorities in provinces and territories deal with the organization and manage all the details concerning homeschool teacher training.

Certainly there is a shortage of specialists in this type of educational process. Thus, a teacher who works with a travelling circus team teaching their children witnesses that: "Coop classes – the last one we did – I organized and I was the only "teacher" – if we do homeschool classes now it's through a homeschool board who organizes them and hires the instructors" (Lisa Marie, 2020).

The possible answer to questions connected with the present topic can be found in numerous colleges, institutes, universities, teacher training courses, associations, homeschooling support groups and other organizations. Some of them are worth a closer attention.

Some of them serve the whole Canada, others spread their attention within certain provinces or territories (see Fig. 2-3).

Homeschooling Your Unique Learner in Canada is a group open to parents who homeschool or are considering homeschooling their children that have unique needs, with or without a formal diagnosis. By unique, we mean those who learn differently than the 'regular' child, and who have academic or behavioural struggles.

The primary purpose of this group is to encourage and support Canadian homeschool families. The group builds a community of Canadian Homeschoolers that help and encourage one another on this journey, share concerns and struggles, successes and accomplishments, curriculum choices and/or therapies that really worked – all with the intention of discovering strategies and creative ideas to help a student continue on the road to lifelong learning.

An experienced homeschooling mother and expert Lisa Marie suggests another perspective to the problem: "If you are looking to connect with homeschoolers in your local area or province (or even country wide), Facebook is a great place to do so. Here is a list of some of the groups I've found that you can join. Remember – these groups are often small and personal – so you will likely need to request membership" (Lisa Marie, 2020).

In Fig. 2 the most prominent Facebook groups are enumerated (The Canadian Homeschooler, n.d.). Though they do not provide official education, they deserve attention.

For instance, French for Homeschool is announced as a "place for Canadian

homeschoolers to share resources, curriculum, ideas, activities, blogs, living books, etc. Also a place to connect with and encourage others pursuing this shared goal. Please indicate if a resource is suitable for French parents or is user friendly for English first parent. Please keep commentary kind, helpful and encouraging. As I am getting more and more requests from individuals outside of Canada, I have added a question to help in the screening process" (Sabo, 2018).

"The Home School Legal Defence Association of Canada (HSLDA Canada) is a national membership-based organization that empowers, protects, and encourages homeschooling families across Canada. HSLDA is working diligently to support homeschool families by providing everything needed to succeed. Expert legal support, insurance coverage, and advice from the experienced staff are just some of the many benefits of joining HSLDA" (Stock, 2020).

They offer a program both for teachers and for parents who intend to take an active part in their children's education. The program supposes that the attendees will:

- "Listen to speaker sessions from homeschooling experts and teachers.
- Hear from homeschooling parents just like you, new and experienced alike.
- Get word-of-mouth recommendations from people who've actually used the products.
- Find homeschool support groups.
- Feel connected to people in your new tribe.
- Browse curriculum and programs in person.
- Enjoy convention discounts on bundles and curriculum purchases!" (Gaddy, 2020)

As far as we can judge they raise urgent questions and provide relevant information and practical support. "These conventions provide a unique opportunity to meet other homeschoolers, learn educational styles and techniques, attend workshops, explore the many resources out there, purchase curricula for the next year, and more. Homeschooling Freebies! Free Student Homeschool Planner, Free Year-Long Copy Work Curriculum (eBook), Homeschool Help Printable Pack, Free Coronavirus Book for Children, What to do if your curriculum is working." (Homeschool.com. The Original Homeschooling Community, n.d.).

These establishments are open and willing to share their experience with those who plan to raise their level of teaching skills. "Find inspiration and advice from homeschool mentors! With dozens of podcast interviews from experienced homeschoolers and education experts you're sure to find answers to your questions (Homeschool.com. The Original Homeschooling Community, n.d.)!"

In Canada the attempt to overcome the challenges is made through organizing various theme events as meetings, conferences, seminars, webinars, workshops and other ventures. One of the most vivid examples is The Mega Homeschool Vendor Hall. It "has partnered with some amazingly-experienced, super-knowledgeable curriculum experts. They are ready to setup a free 30-minute video coaching session with you over Skype or Zoom to point you in the right direction" (Baker, 2020).

Another popular way to acquire a certificate or even a diploma is a teacher training program like, for example, CGMS (the Center for Guided Montessori Studies, n.d.), AMI (Association Montessori Internationale, n.d.), CELTA (Certificate in English Language Teaching to Adults), TESL (Teaching of English as a Second Language) Canadian Educational Foundation, TESOL (Teach English to Speakers of Other Languages), etc.

"CGMS is a new Montessori teacher training program intended to make Montessori teacher education more effective and more

accessible. All CGMS graduates will receive diplomas from the International Montessori Council. We have also begun offering continuing education and refresher courses in partnership with the Montessori Foundation" (The Center for guided Montessori Studies, n.d.).

Montessori Teacher Training Certification Curriculum includes various subjects to choose from as Child Development, Children With Special Needs, Classroom Leadership, Cosmic Education, Early Childhood Orientation, Language Arts, Math, Music, Observation, Peace Education, Philosophy of Montessori, PhysEd and Motor Development, Practical Life, Sensorial, Visual Arts, Pedagogical Approach and many other.

Their educational components include reading materials, videotaped lessons and lectures, both individual and group assignments, discussion groups. They also provide e-learning which takes place on their moodle website, but for some tasks students are required to either use a digital video camera, or to use free voice chat software such as Skype(tm).

As instructors demonstrate materials they take the time to emphasize fundamental principles related to that area as well as drawing attention to the essential qualities of lesson presentations. At their own leisure, students have the opportunity to review lectures and lessons at any time.

A cohort is a group of students learning together and supporting one another's knowledge and skill development. All students within a cohort start and complete the course at the same time, and study the same subject area together.

These same technologies also allow students to collaborate more effectively, and review Montessori theory and practice more thoroughly and with greater repetition over time.

An AMI diploma is respected worldwide for its authenticity, high standards, and quality. The hands-on Montessori training provides the framework and tools for successfully teaching what works for each child, regardless of their socioeconomic status and stage of development.

The principles of Montessori education help foster a hands-on, self-paced, collaborative, and joyful classroom at any school, anywhere in the world. Courses are offered over one academic year, during summer vacations or in study modules according to the format approved by the AMI Scientific Pedagogy Group.

The course programs include lectures, seminars, reading sessions covering Montessori philosophy, child development, and information on the presentation of Montessori materials.

Each course also includes significant components of observation and teaching practice, supervised practice using Montessori didactic materials, classroom material making, and preparation of individual classroom manuals.

TESL (Teaching of English as a Second Language) Canadian Educational Foundation, TESOL is the optimum certification program to Teach English to Speakers of Other Languages, specifically to Teenagers and Adults. Our affiliated institutes offer TESOL with the highest global standards.

Cambridge CELTA is regarded as the gold standard teaching qualification. CELTA is a qualification for teaching English as a foreign language. It focuses on developing practical skills with face-to-face and online teaching practice, which provides the participants with the techniques and confidence necessary to begin teaching as soon as they finish the course. CELTA is the most widely recognized English teaching qualification in the world.

It is the qualification most often requested by employers: three out of four English language teaching jobs require a CELTA

qualification (Cambridge Assessment English, n.d.).

Brian Ray, encouraging parents for homeschooling claimed that "the experience of millennia of humankind in all nations around the world teaching children by parent-led home-based and neighborhood-involved education and research on forty years of the modern global homeschool movement suggest that parents and families are very capable of successfully educating children" (Ray, 2017).

This statement cannot be applied to those countries where the tradition was lost many years ago, like, for instance in Ukraine. Moreover, the scientist declared that "they [parents] are able to do this without institutional or conventional schools, without university-trained and state-approved teachers, and without government-approved or state-selected techniques, ideas, values, and curriculum" (Ray, 2017).

Taking into consideration all the results of the present research it becomes absolutely evident that the process of responsible homeschooling requires professional support.

CONCLUSIONS

Thus, the system of Homeschooling Specialists' Training in Canada is highly-developed and well-prepared to cope with the difficulties connected with the Present-day Challenges.

Some relevant educational programs provided by these establishments are under consideration as well. It can be inferred from the research that revealing current challenges in the realm of teacher training for homeschooling in Canada along with possible ways of overcoming of all the revealed difficulties with the help of various institutions that provide pedagogical education or practical support within the process of specialist training for homeschooling.

CONFLICT OF INTERESTS
The authors declare no conflict of interests.

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АНОТАЦІЯ / ABSTRACT [in Ukrainian]:

СУЧАСНІ ОСВІТНІ ВИКЛИКИ В ПІДГОТОВЦІ ФАХІВЦІВ ДОМАШНЬОЇ ОСВІТИ В КАНАДІ

У статті розглядаються результати нещодавніх наукових досліджень, що стосуються підготовки фахівців для домашнього навчання в цілому, та особливості сучасних проблем. Для проведення дослідження було обрано саме Канаду через її специфічне ставлення до домашнього навчання та значний досвід у підготовці спеціалістів та/або вчителів для домашнього навчання. Актуальність проблеми загострюється через сучасну ситуацію зі світовими обмеженнями через Covid-19 в освіті та подальше збільшення кількості сімей, що навчають дітей вдома та потребують консультації експертів і сертифікованих фахівців.

***Мета** статті – висвітлити фактичний стан підготовки спеціалістів з домашнього навчання в Канаді, щоб визначити можливість застосування досвіду Канади в тих країнах, які стикаються з подібними проблемами.*

*Для проведення наукових результатів використовувались такі **методи**, як метод суцільної вибірки та метод класифікації даних.*

***Результатом** цього дослідження стало виявлення сучасних проблем у галузі підготовки вчителів для домашнього навчання в Канаді, а також можливих шляхів подолання всіх виявлених труднощів за допомогою різних установ, що надають педагогічну освіту або практичну підтримку в процесі підготовки спеціалістів для домашнього навчання. У статті розглядається набуття навичок та знань, необхідних для організації сімейного (домашнього) навчання в коледжах, інститутах, університетах, асоціаціях, групах підтримки домашнього виховання, курсах підвищення кваліфікації вчителів тощо. Також було проаналізовано деякі відповідні освітні програми, що надаються цими закладами.*

*Таким чином, результати дослідження дозволили сформулювати наступні **висновки**: система підготовки спеціалістів для домашнього навчання в Канаді є високорозвиненою та добре підготовленою для подолання труднощів, пов'язаних із сучасними проблемами.*

КЛЮЧОВІ СЛОВА: *підготовка вчителів/викладачів домашнього навчання, домашнє навчання в Канаді, проблеми у підготовці фахівців з домашнього навчання.*

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