ACADEMY OF COGNITIVE AND NATURAL SCIENCES

# 3rd International Conference on History, Theory and Methodology of Learning

## ICHTML 2022

16-17 May, 2022

Kryvyi Rih, Ukraine

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Title, date and place of the conference

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# ICHTML 2022 – Education under attack

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**Abstract.** This is an introductory text to a collection of papers from the ICHTML 2022: 3rd International Conference on History, Theory and Methodology of Learning, which held in Kryvyi Rih State Pedagogical University, Kryvyi Rih, Ukraine, on the May 16-17, 2022. It consists of short introduction, conference review and some observations about the event and its future.

## 1 At a glance

The **International Conference on History, Theory and Methodology of Learning** (ICHTML, https://ichtml.org) is a regular peer-reviewed international conference [1–3], which covers interdisciplinary research on education, learning and training, and applications of theories and philosophies used in the sciences of learning and adjacent sciences.

The ICHTML occupies contributions in all aspects of epistemology, psychology of learning, learning theories, learning technologies and tools, paradigms and models and related fields of interest with a emphasis on human and machine learning. The main problematic field of the conference is the current and future issues of modern pedagogical science: psychological and pedagogical, philosophical, socio-cultural aspects of education, learning and training, modern theories, technologies and teaching aids, the emergence of which is determined by globalization, integration processes, social transformations, humanitarian and scientific and technological development. There is urgent general need for principled changes in postclassic education elicited by current theories, models, tools, services, networks and communications.

This volume contains the papers presented at ICHTML 2022: 3rd International Conference on History, Theory and Methodology of Learning held on the May 16-17, 2022 in Kryvyi Rih, Ukraine.

There were 34 submissions. Each submission was reviewed by at least 3 program committee members. The committee decided to accept 18 papers.

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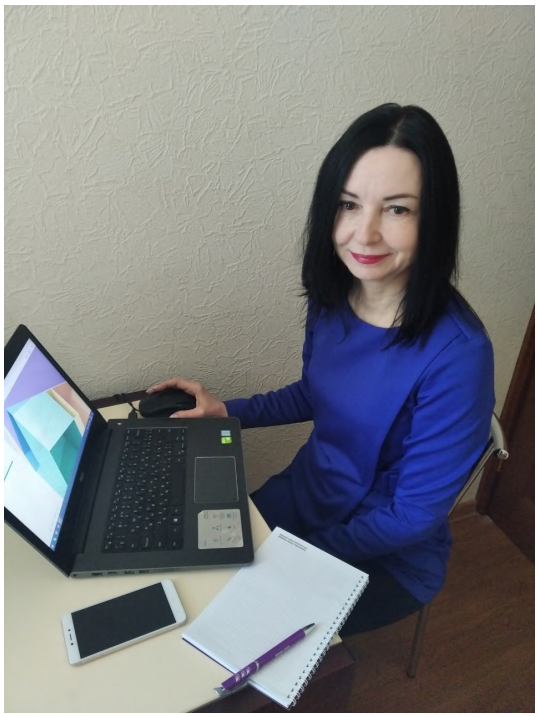

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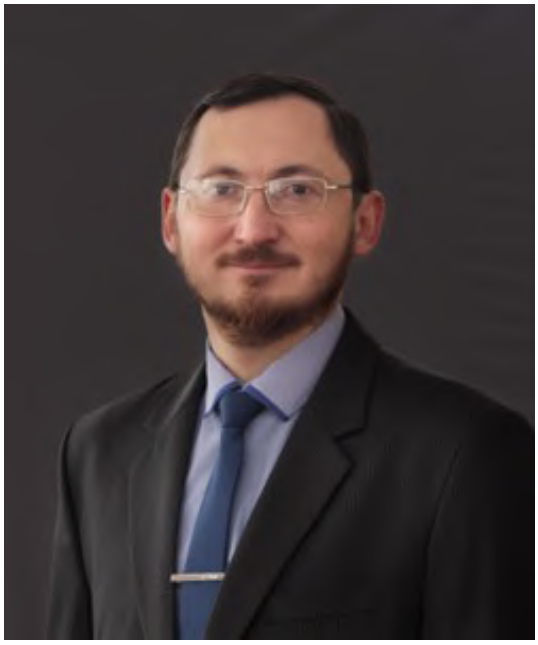

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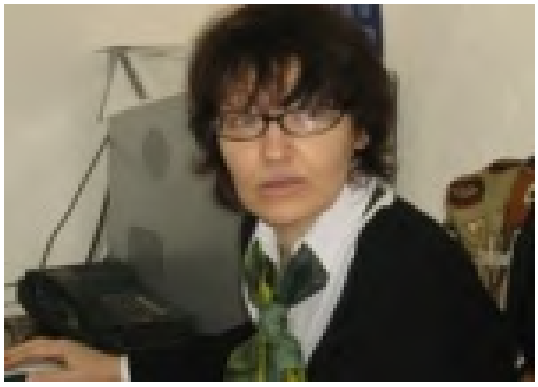

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## 3 ICHTML 2022 overview

**Figure 1.** ICHTML 2022 conference chairs: Vita Hamaniuk, Yaroslav Shramko and Serhiy Semerikov.

### 3.1 History of Learning and Education

5 talks were presented at this section.

The article “Training to professional fulfillment: the history of womens education in Ukraine (at the end 19th early 20th centuries)” [4] by Nataliia Avsheniuk, Olena Anishchenko, Kateryna Hodlevska and Nataliya Seminikhyna (figure 2) is focused on the findings of the research of women’s professional education in the context of their self-fulfillment opportunities in Ukraine at the end of 19th-beginning of the 20th century. The current state of research on pedagogical theory’s chosen topic is outlined. The peculiarities of training women in professional educational institutions of different profiles and

levels were determined considering the socio-economic, socio-political events in Ukraine and specific purposes, tasks and functions, and foreign trends in women's professional education. The government impact, charity and educational societies focus on women's professional education in Ukraine has been analyzed. The main emphasis has been placed on the problem of special education for representatives of national minorities, deprived children, and orphans. The theoretical analysis of constructive ideas of women's professional education experience of the late 19th – early 20th century in the new context of Ukraine's socio-economic development is substantiated.


**Figure 2.** Presentation of paper [4].

This article highlights further research by the authors, begun in [5–7].

The article "To the origins of social education in Ukraine (the 1920s): humanism or proletarian expediency?" [8] by Nataliia Dichek and Oksana Kravchenko (figure 3) analyses the phenomenon of social education (sotzvykh) in Ukraine in the 1920s as a purpose of Soviet power to change the previous imperial system of education. In general, at that time sotzvykh reflected the aspiration of power for upbringing the new generation of educated proletarians with communist views, but in reality, there were efforts to feed, clothe and provide the elementary medical care to the host of different types of children and teenagers under 15. Until the early 1930s, the sphere of education in Ukraine developed differently than in Russia. The emphasis was placed on the imminent death of the family as a social institution, and therefore the education of children and youth should have become the task of the society. In addition, professionalization of school education was recognized as a priority. The aim of the article is to highlight the first in the world's education history phenomenon (sotzvykh) – both the pedagogical and social – of organising life of children in the post-war country. The goals and ways of implementation Ukrainian sotzvykh in the context of social, ideological and pedagogical aspects of the time are analysed. It is considered that sotzvykh carried out both political and life-saving pedagogical tasks of protecting the child population. Within the framework of sotzvykh in the conditions of poverty and ruin of the post-revolutionary period the general 7-year school education and elimination of illiteracy were carried out.


**Figure 3.** Presentation of paper [8].

This article highlights further research by the authors, begun in [9–11].

The article "Non-government organisations as a basis for sustainable development of education" [12] by Kateryna V. Vlasenko, Iryna V. Sitak, Iryna V. Lovianova, Vitaliy V. Achkan and Tetiana S. Armash (figure 4) examines the experience of team work of scientists-members of a non-government organisation (NGO) "Smart Math". The analysis of the advantages of scientists' collaboration and communication are offered in the current research. The paper presents the findings of scientific collaboration and cooperation of researchers, whose activity is represented on the open educational platform "Higher School Mathematics Teachers". The areas of activity of a team of researchers, which brings together teaching staff of Ukrainian universities, and tackling the issue of developing on-line courses are described in the present article. The outcome of such collaboration of the members of "Smart Math" in 2020 is the increase by 4,7 in the average citation index in scientometrical databases publications.

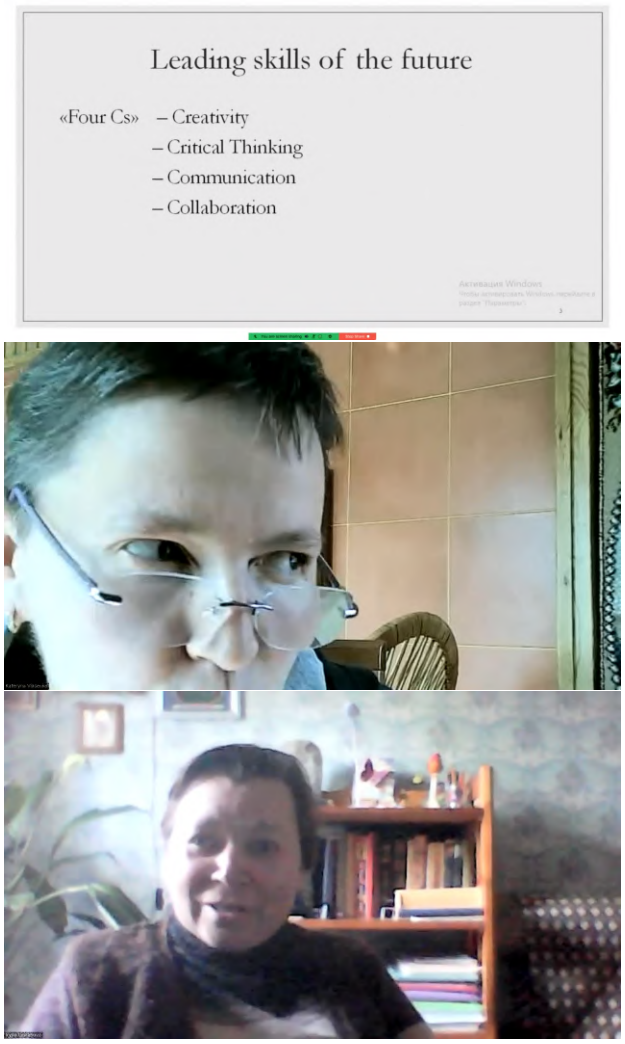


**Figure 4.** Presentation of paper [12].

This article highlights further research by the authors, begun in [13–15].

The relevance of the article "Technologizing youth training for entrepreneurship to fulfil sustainable development goals" [16] by Liudmyla Yershova, Svitlana Alieksieieva, Natalia Kulalaieva, Halyna Odnoroh and Mykola-Oleg Yershov (figure 5) can be justified by the requirements for youth entrepreneurship training defined by sustainable development goals. In particular, these requirements are expected to promote the continuous, comprehensive and sustainable economic growth of the country, as well as full and decent employment for all. The article also presents a modelled algorithm of the simultaneous introduction of the author's technologies (motivating future specialists towards business activity, improving their financial literacy and capacity for project activity and effective self-management) in educational institutions. The effectiveness of this method has been verified during a pedagogical experiment. This experiment aimed to prove the positive dynamics in the levels of future specialists' entrepreneurship competence.

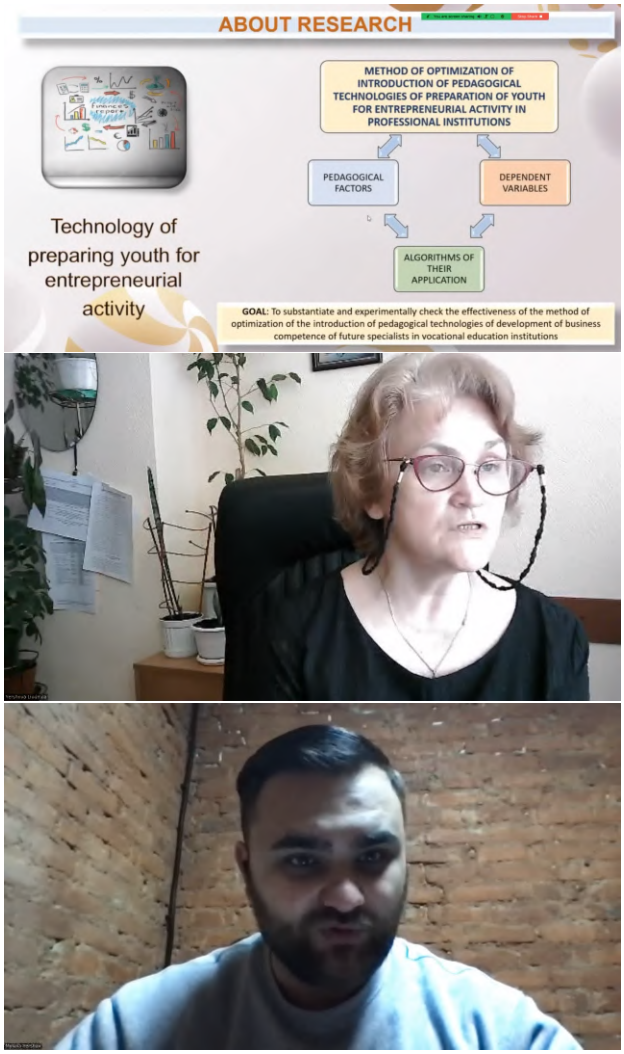


**Figure 5.** Presentation of paper [16].

This article highlights further research by the authors, begun in [17, 18].

The article "New educational space in New Ukrainian School" [19] by Oksana Kravchenko, Tetiana Kochubei and Antonina Shturba (figure 6) reveals the basic princi-

ples of creating an effective renewed educational space in the context of education reform in Ukraine and the creation of the New Ukrainian School. Modern educational environment means multifunctional flexible spaces that promote various forms of work, motivate to learn. An important factor in the renewal of the school is the creation of a modern educational space that will motivate the child to learn something new, stimulate different activities, and evoke positive emotions. Civic competence is one of the key skills enshrined in the Education Law in Ukraine. Along with the social, they are linked to the ideas of democracy, justice, equality, human rights, prosperity and healthy lifestyles, with an awareness of equal rights and opportunities. They include cooperation with others to achieve a common goal, activity in class and school life, respect for the rights of others, the ability to resolve conflict situations. One of the tools used by teachers to develop these competencies in primary school is the creation of "Class Rules" – the first "law" in the lives of first-graders. Creating a motivational educational space contributes to the principles of reforming primary and general secondary education and global trends: personality-oriented education, child-centeredness, competence and activity approaches.

This article highlights further research by the authors, begun in [20–22].

### 3.2 Learning Theories

5 talks were presented at this section.

Spiritual education of a child is one of the most difficult and important areas of educational research. The way of family life has always been reflected in the moral character of a person. The emotional and moral atmosphere reigning in the family, the desire to share responsibility, the level of mutual understanding and mutual respect, parental love and reciprocal feelings of a child, family traditions – all these lay the foundation for spirituality. Teachers who work with younger students often observe their interactions with their parents. Each child and each parent is individual, and relationships between them develop differently. In the article "Cultivating a childs love for parents as a spiritual practice: pedagogical aspect" [23], Luydmyla Moskalyova, Sergiy Gurov and Svitlana Podplota (figure 7) reflect on teachers' role in cultivating love, where the theoretical concept of "from child to parent" is the basis for study. The article identifies the types of a child's love for parents, reveals the markers of manifestation of a child's love for parents, which is positively associated with the cultural and social environment. In addition, the basic pedagogical characteristics for cultivating a child's love for their parents in the context of the school are proposed.

This article highlights further research by the authors, begun in [24–26].

Contemporary challenges of society, its dynamic development cause changes in all spheres of life, particularly in education. To obtain a university education in the Ukrainian state, higher Education Standard in specialty 012 Preschool Education for the second (master's) level

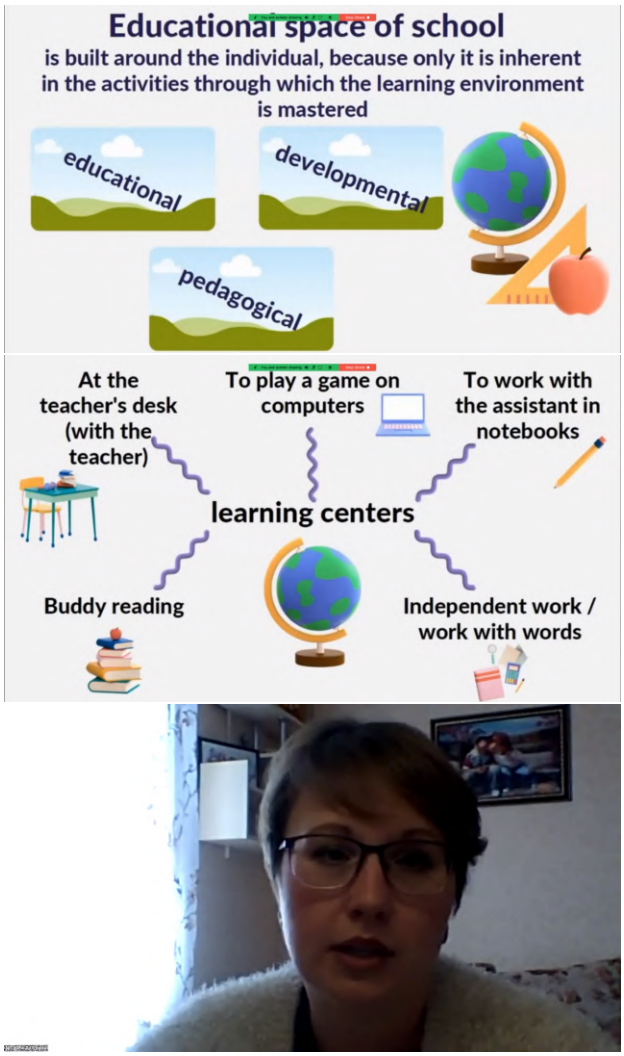


**Figure 6.** Presentation of paper [19].

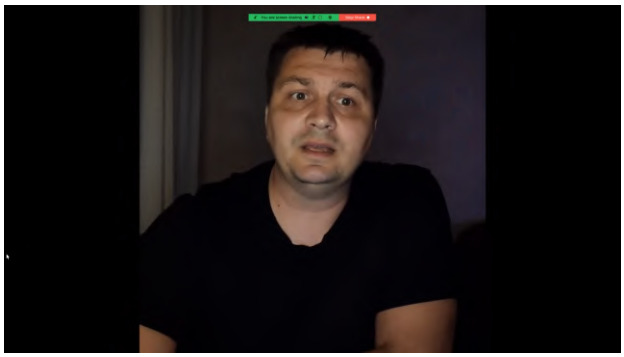

**Figure 7.** Presentation of paper [23].

of higher education (2020) was approved, which provides for the formation of relevant competencies. The purpose of the article "Innovations in professional activity: what students of specialty Preschool Education think about it" [27] by Liubov Lokhvytska and Nataliia Martovytska (figure 8) was to analyze the essence of innovations in the professional activities of teachers of preschool educational institutions (PEI). To find out the attitude of students to the

implementation of innovations in professional activities, a thematic survey was conducted. The selection of questions and respond options is based on all competencies of the Standard and the materials of theoretical analysis. The sample of the online survey covers the students' responses from two state universities of Ukraine ($n$ = 159), who are obtaining the second (master's) level of higher education on the educational-professional program "Preschool Education". Respondents were grouped according to the mode of study. The obtained quantitative and qualitative data revealed the influence of the experience of practical experience in the PEI on the choice of the respond. This determined the necessity to teach students the educational component "Innovation activities in PEI" and the development of corresponding tasks during their teaching practicum in the system of preschool education.

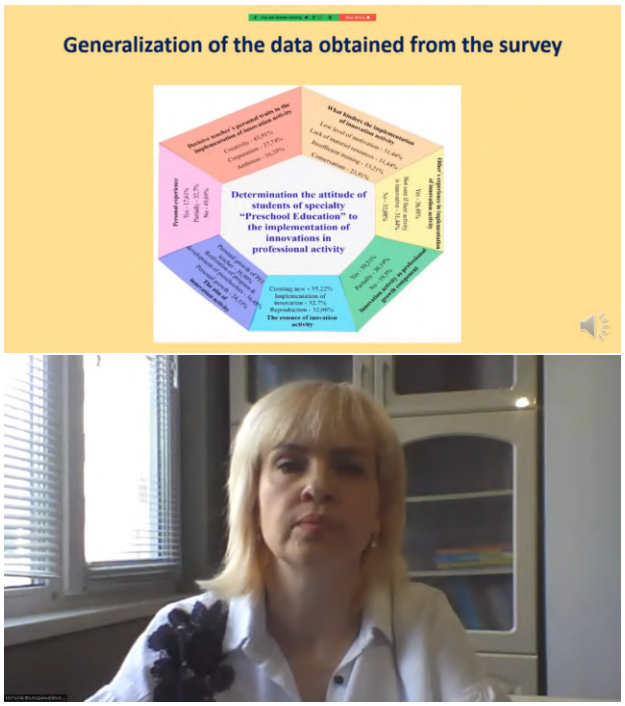


**Figure 8.** Presentation of paper [27].

This article highlights further research by the authors, begun in [28–30].

The role of preventive education in averting negative behaviours in preschoolers has been considered in the article "Preventive pedagogical work on negative manifestations of preschool childrens behaviour" [31] by Tetiana Kochubei, Olha Melnykova and Olha Svyrydiuk (figure 9). It has been justified that preventive work with the children prone to negative behaviours will enhance harmonious development of preschoolers' personalities, provided that effective forms, methods and techniques have been implemented into preventive education of children with negative behaviours during interpersonal communication (preschool teachers – child – family). It has been proved that the realization of the proposed model of interpersonal communication within preventive work with children prone to negative behaviours in preschools provides positive results, indicating the importance of cooperation among all subjects of the education process in these institutions. The need for primary or early preventive work highlights the significance of primary preventive education, since only early socio-pedagogical prevention of children's negative behaviours is an effective means of coping with destructive phenomena in the children's environment. The main factors for children's negative behaviours and the most essential indications of the need to implement senior preschoolers' preventive education have been identified. Methodical guidelines on effective preventive education of senior preschoolers prone to negative behaviours have been outlined. The forms, methods and techniques of preventive work that promote constructive behaviours in children have been implemented and verified; the level indicators of development of a sustainable and responsible attitude towards negative behaviours in preschoolers during interpersonal communication have been determined.


**Figure 9.** Presentation of paper [31].

This article highlights further research by the authors, begun in [32].

The article "Formation of the reading comprehension skill in primary school students by visualization" [33] by Anastasia Hrechka, Olena Pavlyk and Liudmyla Lysohor (figure 10) describe the problem of shaping scrupulous reading comprehension in primary school students through visualisation tools and identifies its key factors. The scientific psychological and pedagogical and methodological literature, the current legal framework of primary education in Ukraine, educational experience of the research problems of foreign and domestic teachers, the results of the PISA research were analyzed. Foreign theories of interpretation of the term "reading comprehension" are reviewed and our own understanding of the essence of

the concept is suggested on their basis. Presents its own classification of modern visualisation tools. It describes the author's organizational and methodological model of shaping reading comprehension by visualization means, as well as the work done by the author on shaping of scrupulous reading comprehension by visualization means among primary school students. The research involved a set of theoretical (analysis of scientific literature, legal framework, synthesis, generalisation, systematization) and empirical methods (expert assessment, modelling; questionnaires, interviews, monitoring of the educational process, method of mathematical statistics).

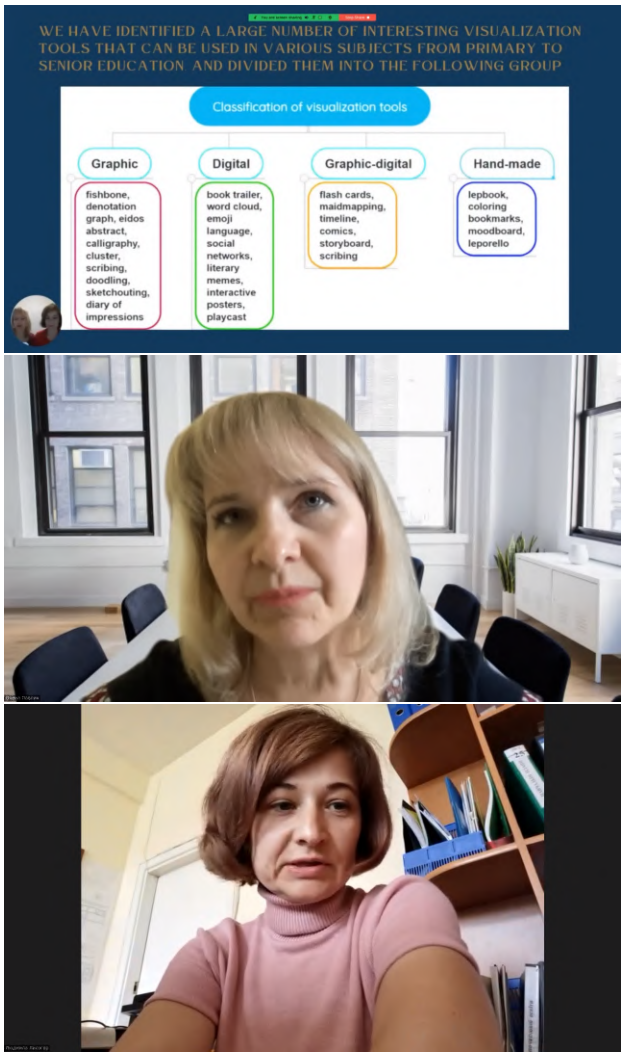


**Figure 10.** Presentation of paper [33].

This article highlights further research by the authors, begun in [34–36].

The article "Development of ecological consciousness of future primary school teachers in the process of professional training" [37] by Valentyna Shpak, Iryna Moysiyenko and Tatyana Ninova (figure 11) emphasizes that among the current and promising problems of modern pedagogical science of particular importance is the need to develop ecological consciousness of future primary school teachers in the process of their training. Focusing on modern theories of primary education, philosophy of education, the authors substantiate the acute general need for fundamental changes in the ecological consciousness of future primary school teachers in postclassical education. This is due to the influence of the latest models, tools and services in the context of primary education reform. The essence and the basic contradictions proving necessity of development of ecological consciousness of the future teachers of elementary school in educational process of higher school are considered. The analysis of the concept of "ecological consciousness" is carried out, the structure of ecological consciousness of the future primary school teacher is defined. The presented results of research and experimental work with the involvement of first-third year students of the first (bachelor's) level of higher education in specialty 013 "Primary Education" present factual data for the diagnosis of levels of development of environmental knowledge and environmental awareness. The pedagogical conditions that will promote more effective development of ecological consciousness of future primary school teachers in the process of professional training in accordance with globalization changes in the ecological sphere, integration of domestic higher education in the European educational space, social transformations on the way to scientific and technological progress are identified.

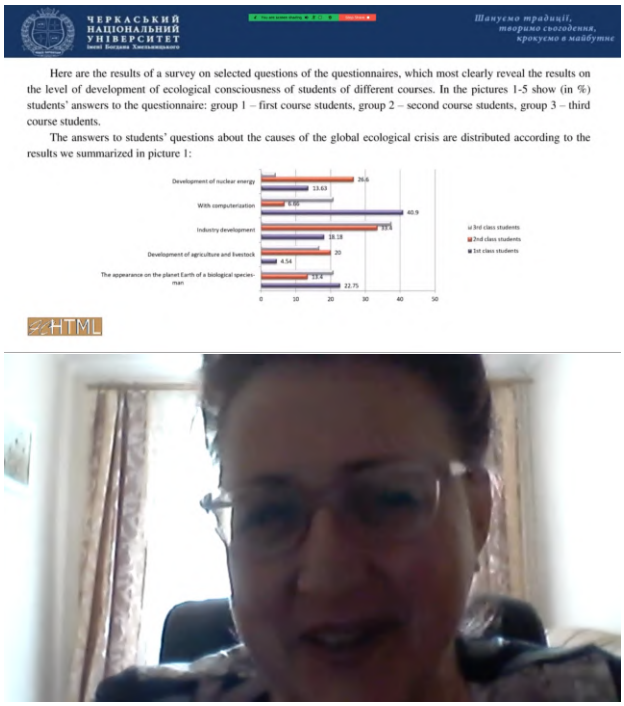


**Figure 11.** Presentation of paper [37].

This article highlights further research by the authors, begun in [38].

### 3.3 Learning Methodology

8 talks were presented at this section.

The article "Remote study for the humanities and social sciences: digitization and coaching" [39] by Inna

Onikienko, Liudmyla Bratchenko, Iryna Mintii and Oksana Chaika (figure 12) analyzes research on remote study in the areas of the humanities and social sciences, which strongly links to formation of key competences by means of digital technologies and coaching. The results of the survey are analysed and presented according to the feedback of students on the emotional and value attitude to remote study associated with the humanities and social sciences, which specify both the advantages and disadvantages of this form in education. The article suggests considering a number of initiatives for remote study in the mentioned connection and strongly encourages their implementation in higher education. The experience of structural distribution of remote study is described, in which the research findings reveal that digital technologies and communication with and between students and teachers in a coaching format enable classes to achieve a significant increase in the social and entrepreneurship competences. It is also proposed to look at feasibility and prospect development of a remote study strategy at Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine, in particular. The development plan includes three-factor support for active learning: assessment support, emotional support and information support. The recommendations accompany the development introduction of such digital and coaching competences for students.

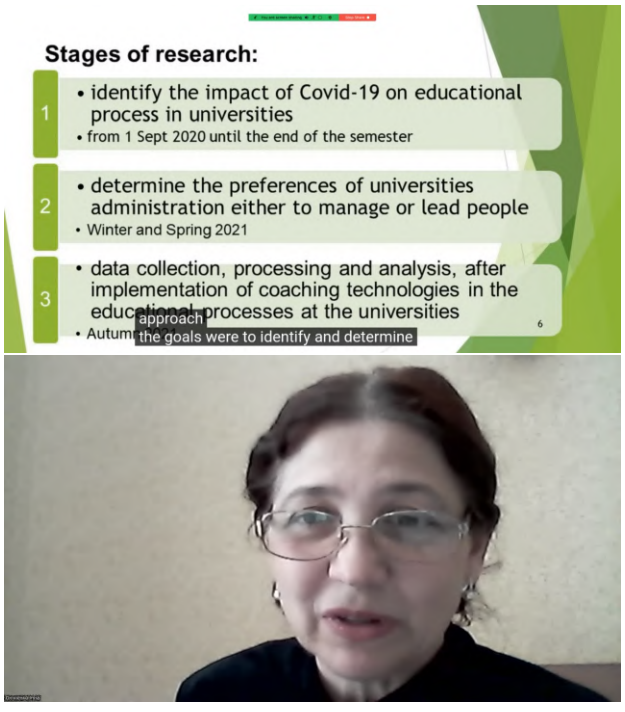


**Figure 12.** Presentation of paper [39].

This article highlights further research by the authors, begun in [40–42].

The article "Training techniques in the education of simultaneous interpreters using specialised equipment" [43] by Svitlana Amelina, Rostyslav Tarasenko, Serhiy Semerikov, Vasyl Shynkaruk and Jan apek (figure 13) deals with the search for ways to improve the training of simultaneous interpreters in accordance with modern requirements for their professional activities. It has been suggested that special training should be incorporated into the training of these professionals to develop and improve a range of specific abilities, skills and attitudes. They are classified into five groups (linguistic, cognitive, psychological, physical, technical). Particular attention is paid to the technological support for the work of the simultaneous interpreters. A training programme for simultaneous interpreters has been developed and its effectiveness has been tested. It is proposed to conduct training sessions under the modelling of real working conditions of simultaneous interpreters.

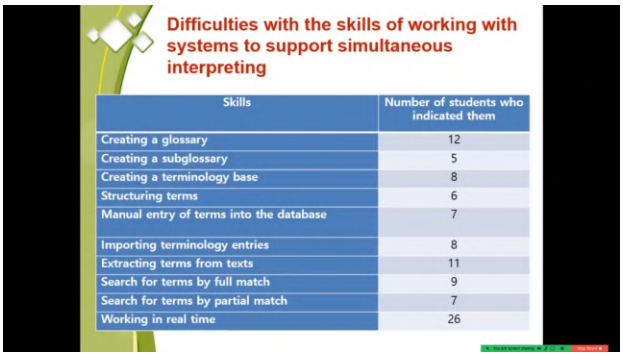


**Figure 13.** Presentation of paper [43].

This article highlights further research by the authors, begun in [44–46].

The article "Computer-assisted interpreting systems in the education of simultaneous interpreters" [47] by Rostyslav Tarasenko, Svitlana Amelina, Serhiy Semerikov and Liying Shen (figure 14) deals with the analysis of the potential of existing terminology support systems for simultaneous interpreting and the experience of their use in universities. Based on the study the possibilities of their use in the educational process of domestic institutions of higher education in the training of interpreters were identified. It is proposed to choose the software products InterpretBank, Interplex, Interpreter's Help for training simultaneous interpreters. It has been found that the proposed programmes contribute to the students' ability to create their own glossaries on specific subjects, fill them in in different ways and use them directly when interpreting. The feasibility of practising CAI tools in a specialised simultaneous interpreting laboratory has been proved.

This article highlights further research by the authors, begun in [48–50].

The article "Future biology teachers training for professional activity on the basis of sustainable development" [51] by Alla Stepanyuk, Halyna Zhyrska, Natalia Mishchuk and Tetiana Olendr (figure 15) deals with one of the possible ways of modernization of pedagogical education in Ukraine in order to train teachers of the new generation and to provide conditions for the formation and development of modern alternative models of teachers' professional and personal growth on the principles of sus-

**Figure 14.** Presentation of paper [47].

tainable development. The ideas and ways of integrating education for sustainable development and Biology teachers professional training have been determined. It has been substantiated the methodological system of Biology teachers training for professional activity on sustainable development ideas. Its system-forming factor is the idea of combining the activity approach to acquiring knowledge with their ethical reflection, comprehension of personal value in professional and everyday life. The content of the suggested methodological system is made up of the following academic disciplines: compulsory – "Methods of Teaching Biology and Fundamentals of Health Studies" and elective. The efficiency of the corresponding methodological system of Biology teachers training on the basis of quality indicators of the knowledge acquisition (completeness, awareness, consistency and systematicity) has been proved.

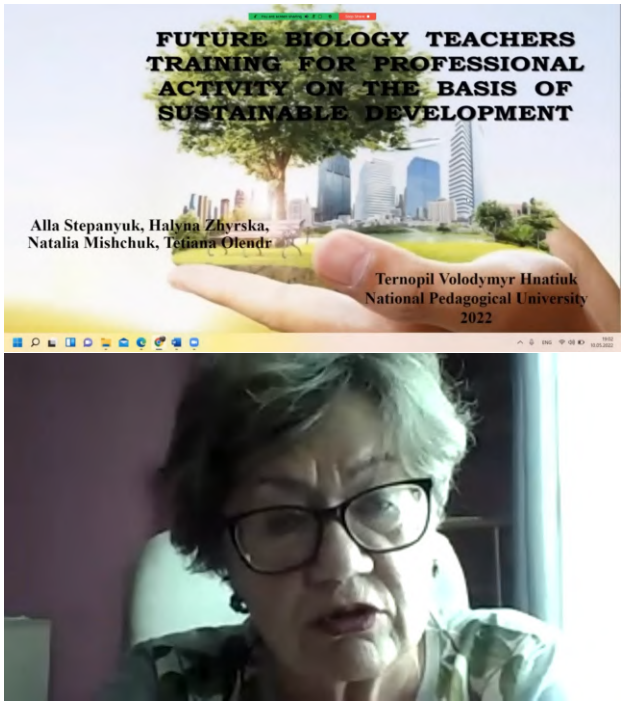


**Figure 15.** Presentation of paper [51].

This article highlights further research by the authors, begun in [52–54].

An important basis for information support of educational activities is the effective presentation of knowledge and standardization of training tasks based on ontological models of learned subject areas. The competence approach to the organization of the educational process and the requirements for the training of specialists from the point view of enterprises and organizations, in which they will carry out their professional activities, requires the development of a comprehensive model of educational processes and objects that are participating in them, based on high-level abstractions. On the basis of the results obtained in the article "Categorical-ontological approach to information support of educational activities" [] by Oleksandr Tarasov, Pavlo Sahaida, Sergey Podlesny and Liudmyla Vasylieva (figure 16), the methodology of informational support of educational activities was further developed on the basis of: organizing the educational process and standardization of education based on a categorical-ontological approach; construction and use of relevant ontologies and knowledge bases; automation of data processing by forming and executing queries to the content of ontological models. The use of the results of categorical-ontological modeling allowed to reconcile the interests of active agents of the organization-technical systems, the subjects of educational activity and the ability of students to acquire the necessary knowledge and skills.

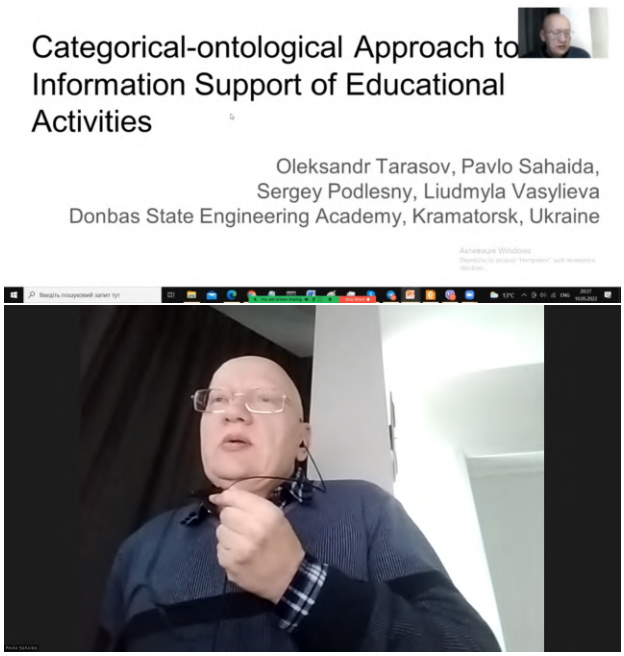


**Figure 16.** Presentation of paper [55].

This article highlights further research by the authors, begun in [56–58].

The article "Modeling of ecophobic tendencies of consciousness of higher education students" [59] by Oksana V. Klochko, Vasyl M. Fedorets, Oleksandr V. Mudrak,

Tamara S. Troitska and Vasyl V. Kaplinskyi (figure 17) reveals the peculiarities of the formation of strategies for the development of ecological consciousness (ecophilic educational strategies) of higher education students on the basis of digital models of ecophobic tendencies (intentions, values). Based on the application of the developed "Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial epoch"" an experimental study of ecophobic and ecophilic intentions and values of higher education students. This mini-questionnaire reveals the environmental aspects of consciousness by actualizing the culture and psychology of everyday life. Based on the application of digital and mathematical modeling, ecological and value comprehension of the results of experimental research conducted using this mini-questionnaire, a model of "Archaic ecophobic intentions and values" was formed. This model contains the following digital models: "Matrix of coefficients (weights) for determining ecophobic intentions and values" and "Cluster model of ecophobic intentions and values". Based on the application of these digital models, the concept of sustainable development and other concepts and approaches, three ecophilic educational strategies have been developed: "Synergistic strategy of personal security through care for the Earth"; "Strategy for harmonization of needs based on care for the Earth"; "Strategy for harmonization of human-Earth interaction". When using the "Matrix of coefficients (weights) to determine ecophobic intentions and values" determines the system-organizing value and the dominant influence of the "Synergistic strategy of personal security through care for the Earth". This strategy has a genetic and semantic connection with the basic vital value – food security (individual and collective). The application of this strategy can be relevant in educational theory and practice and in everyday life (life, work) to optimize and minimize human needs.


**Figure 17.** Presentation of paper [59].

This article highlights further research by the authors, begun in [60–62].

The article "Methodological aspects of revealing the metacognitive potential of a teacher in the context of the development of his health-preserving competence" [63] by Vasyl M. Fedorets, Oksana V. Klochko, Vitalii I. Klochko, Tamila I. Berezhna and Halyna A. Ivanytsia (figure 18) presents the results of a study aimed at improving the methodology and techniques for developing metacognitive strategies in postgraduate education as important aspects of health competence of physical education teachers. The concept of "Logos of health-preserving competence of a physical education teacher" has been developed. The logo of health-preserving competence of a physical education teacher is presented as a developed and professionally oriented metacognitive sphere of a teacher for the effective implementation of student health. An important component of the logo is the development of reflexive, self-reflexive, prognostic, goal-setting intellectual skills and stereotypes. The Logos of Physical Education Teacher's Competence Logos includes the Logos-Narrative constitutive competence. The "Logos Narrative" reveals the main ideas, values, algorithms, interpretations, visions, the purpose of the strategy of professional health care. To study "Methods of integrative use of metacognitive and archetypal phenomena to improve the health competence of physical education teachers", two questionnaires were used to study the meta-cognitive strategies of physical education teachers. All issues had an axiological dimension and are doctrinal and institutional. The issues highlight the role of humanism and charity as determinants of the relevant modern Ukrainian Eurocentric trends in education reform. Wilcoxon's T-test was used to process the test results. The positive dynamics of learning outcomes aimed at updating the goals of cognitive strategies is determined.

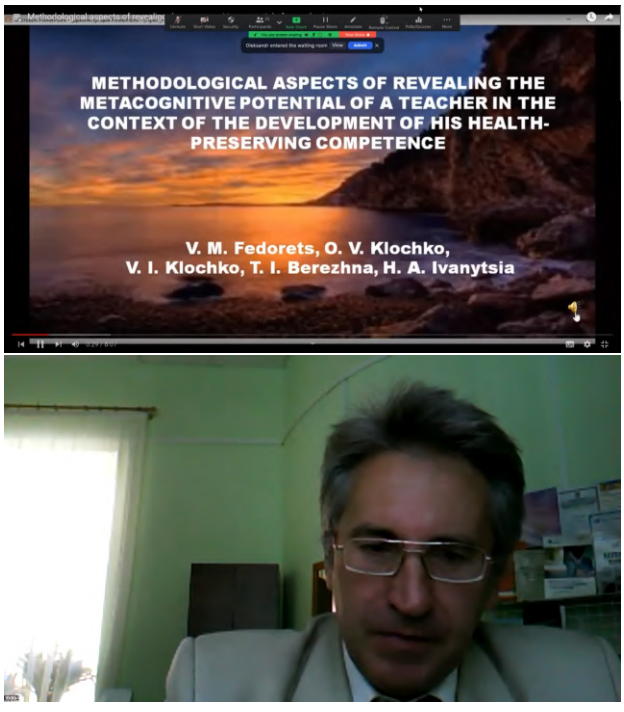


**Figure 18.** Presentation of paper [63].

This article highlights further research by the authors, begun in [64, 65].

Educational emigration of young people is today one of the most pressing topics, taking into account the place and role of this socio-demographic group in the processes of economic and socio-cultural reproduction of society. In

order to clarify the scale and nature of migration sentiments in the field of education, the life plans of young people, Olena Liseienko, Liudmyla Kalashnikova, Nataliia Nikon and Viktoriia Chorna (figure 19), the authors of the article "Analysis of life plans and emigration intentions of pupils and students of border regions of the South of Ukraine (experience of empirical sociological research)" [66] within the framework of the grant project "Common Language: public dialogue on the Law of Ukraine "On Education" in the Odessa region" conducted two empirical sociological research: 1) a formalized interview of students, students and their parents; 2) in-depth interviews with representatives of local authorities and self-government bodies, heads of schools and other educational institutions, school teachers, pupils, their parents, students, representatives of public organizations, ethnic communities, employers and representatives of local political parties. Despite the prevailing migration sentiments among some of the respondents, most of them associate their future with Ukraine. The mood for educational emigration is most pronounced among student youth, this is due to the fact that getting an education in foreign countries facilitates the possibility of their employment, including on the international labor market. The authors emphasize the importance of further scientific understanding of topical problems associated with the implementation of educational reform in Ukraine, which has hidden the development of transnational curricula.

This article highlights further research by the authors, begun in [67–69].

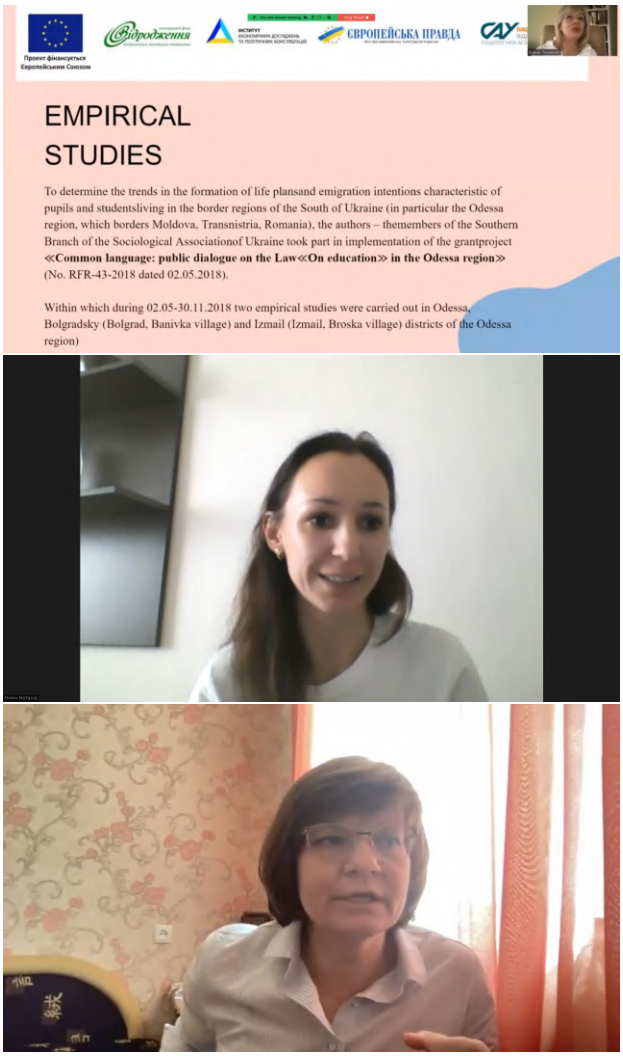


**Figure 19.** Presentation of paper [66].

## 4 ICHTML 2022 Statement on Ukraine

The ICHTML 2022 community appeal to academics from around the world to spread awareness about the beginning of hostilities on the part of the Russian Federation on the territory of sovereign Ukraine, starting on February 24, 2022. This war, unleashed by the political and military leadership of the aggressor country, is aimed to destroy the Ukrainian state, the right of the people of Ukraine to freely choose their own future, the faith of the Ukrainian people in their own strength, courage and, eventually, into their inevitable victory.

At one point, the lives of all Ukrainians were divided into before and after the war periods. Currently, people are resisting the Russian aggression, violence, and mighty blows from heavy weapons and ammunition. At this very moment, it is next to impossible for Europeans to imagine the feeling of fear, despair and anger that does not leave the hearts of the civilian population of our country. The devastating humanitarian situation around the East and South of Ukraine, the main regional centres of Kharkiv, Mykolayiv, Kherson, Mariupol and other Ukrainian cities will be forever engraved in the memory and hearts of our citizens as a nightmare.

Today, most of the population of Ukraine worries about their lives and the lives of the loved ones, hiding in bomb shelters and basements, forced to pray and hope for the best. Thousands of women, mothers and children fear for their husbands, sons and fathers, who must fight on the battlefields for peace in Ukraine.

Every effort must be made to stop this criminal war of Russia against Ukraine as soon as possible. We hope that our country will take its place in the family of free European nations.

EDP Sciences, the voice of the academic publishing industry, strongly condemns the actions of the Russian government against Ukraine, and stand in solidarity with all the people of Ukraine whose lives are threatened by this war: "The global exchange of scholarly knowledge is essential for democracy, and we especially stand by our colleagues, the Ukrainian academics and librarians whose rights are being violated by these actions. Additionally, we pay our respects to the Russian scientific community which opposes the military actions in Ukraine. We support every effort to immediately end this action." [70]

## 5 Conclusion and outlook

The vision of the ICHTML 2022 is to create a leading interdisciplinary platform for researchers, practitioners and

educators, to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of learning.

The conference is a successfully performing forum to transferring and discussing research result among the academics, students, teachers, government, private sector or industries. Participants and presenters from several countries have attended the conference to share their significant contribution in research related to the History, Theory and Methodology of Learning.

We are thankful to all the authors who submitted papers and the delegates for their participation and their interest in ICHTML as a platform to share their ideas and innovation. Also, we are also thankful to all the program committee members for providing continuous guidance and efforts taken by peer reviewers contributed to improve the quality of papers provided constructive critical comments, improvements and corrections to the authors are gratefully appreciated for their contribution to the success of the conference. Moreover, we would like to thank the developers and other professional staff of *Academy of Cognitive and Natural Sciences* (https://acnsci.org) and *Not So Easy Science Education* platform (https://notso.easyscience.education), who made it possible for us to use the resources of this excellent and comprehensive conference management system, from the call of papers and inviting reviewers, to handling paper submissions, communicating with the authors etc.

We are looking forward to excellent presentations and fruitful discussions, which will broaden our professional horizons. We hope all participants enjoy this conference and meet again in more peaceful, hilarious, and happiness of further ICHTML 2023.

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# Training to professional fulfillment: the history of women's education in Ukraine (at the end 19th – early 20th centuries)

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**Abstract.** The article is focused on the findings of the research of women's professional education in the context of their self-fulfillment opportunities in Ukraine at the end of 19th-beginning of the 20th century. The current state of research on pedagogical theory's chosen topic is outlined. The peculiarities of training women in professional educational institutions of different profiles and levels were determined considering the socio-economic, socio-political events in Ukraine and specific purposes, tasks and functions, and foreign trends in women's professional education. The government impact, charity and educational societies' focus on women's professional education in Ukraine has been analyzed. The main emphasis has been placed on the problem of special education for representatives of national minorities, deprived children, and orphans. The theoretical analysis of constructive ideas of women's professional education experience of the late 19th – early 20th century in the new context of Ukraine's socio-economic development is substantiated.

## 1 Introduction

The ongoing changes in various spheres of life in Ukraine raise problems in determining the place and role of women in democratic developments. The status of women in the state is an indicator of its progress, and without giving them access to all areas of human activity, society cannot progress sustainably. Ukraine is a member of the European Council, which has established the objective of fostering gender equality. Furthermore, our country has ratified the International Conventions on the Elimination of All Forms of Discrimination Against Women and Equal Treatment and Opportunities for Working Women and Men, committing itself to making every effort to improve the social status of women, ensure equal educational opportunities, and create the environment for professional fulfillment.

The reform of vocational education, its organization on the principles of specific ideas, education and training programs based on gender principles in the education among both genders. We believe that the study and further implementation of the advantaged ideas of women's educational institutions achievement in the second half of the nineteenth century – the beginning of the twentieth century in Ukraine can contribute to this. The subject is crucial, appealing and little researched. For a long time, it was thought that pre-revolutionary Ukraine did not provide vocational training for women at educational institutions with separate training.

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Our research aims to conduct a historical and pedagogical analysis of the development of women's professional education in Ukraine in the late nineteenth and early twentieth centuries in order to identify rational ideas of the historical experience of women's education and the prospects for their use throughout the development of modern models and concepts of professional education in Ukraine.

## 2 Materials and methods

Our research focuses on investigating rational ideas concerning historical experience of women's education, as well as opportunities to develop contemporary models and concepts of professional education in Ukraine at the end of the nineteenth and turn of the twentieth centuries. Throughout the scientific analysis, the following research methods were used: statistical, comparative-structural, structural-functional, problem-value, and retrospective logical-system analysis enabled us to identify and classify the research material on the development issues of women's vocational education in Ukraine; extrapolation method enabled the dissemination of the findings obtained by analyzing the documents on the performance of individual women's educational institutions to the network of institutions for the professional education of women; chronological method allowed the study topic to be viewed in dynamic changes and time sequence.

The overall methodology relies on philosophical theories of academic knowledge, personality theories, and philosophies of personality development in a multicultural environment. It focuses solely on history, consistency, science, and personality principles to learn the evolution and development of pedagogical systems, ideas, and historical

science of human development assumptions, taking ethnosocial and chronological factors, the conceptual statements of the psycho-pedagogical and public sciences, the ideas of modern educational philosophy, the new paradigm of education, humanisation and vocational education.

We explored the role of women's professional education in Ukraine during the second half of the nineteenth and early twentieth centuries in particular with regard to socioeconomic and sociopolitical events in the Russian Empire as a whole and in Ukraine, and certain foreign trends in the development of women's professional education. The specific aims, tasks and functions of women's vocational education, which, despite lagging behind the development of men's education, was an integral part of the state's educational system, were considered at all stages of the scientific search. Furthermore, the work of women's educational institutions was regulated by a variety of normative legal documents. The scientific research made it necessary to study many archive and literary sources and dissertation research results. The research of O. V. Anishchenko reveals historical and pedagogical features of effective education and self-fulfilment of women in Ukraine [1]. Certain aspects of women's professional education development in Ukraine during the study period are reflected in dissertations of V. A. Dobrovolskaya (specifics of women's education in the South of Ukraine (1901–1910) [2], Zh. Kundiy (experience of women's medical education in the scientific and pedagogical heritage of M. V. Sklifosovsky (1836–1904) [3], I. L. Likarchuk (generalized classification of establishments of lower craft education for women and some features of their management (1888–1988) [4], K. A. Kobchenko (features of functioning of Higher women's courses) [5]. In the context of other research issues, the peculiarities of functioning of women's educational institutions are indirectly considered in the works of N. F. Beniukh (discussions of pharmaceutical education of women in Galicia) [6], N. M. Demianenko [7], I. I. Prudchenko [8], Y. H. Uliukaieva (pedagogical education of women) and in dissertation researches of other scientists [9]. The works of T. Martseniuk (factual education in Ukraine and abroad in historical and pedagogical and gender contexts) [10], T. P. Fazan (women's spiritual world in the Orthodox monasteries of Ukraine 19th – first quarter of 20h century) [11] and others make up the research.

An analysis of a considerable part of the archive and literary sources of historical significance enabled us to conclude that in Ukraine, the history of women's education in the second half of the nineteenth and the beginning of the twentieth century was not the subject of the integral fundamental research of historical and pedagogy context. Relevance is also determined by the focus on the historical sources of the studied period significantly broadens our understanding, particularly about the evolution of educational and spiritual systems in women's vocational schools of different types. The general educational level of the Ukrainian population, including women, and their professional training; the trends in the development of women's professional education in the context of socio-political and cultural upheavals in Ukraine as a part of the Russian empire.

## 3 Results and discussion

Like any other cultural process, the development of women's education in Ukraine has certain peculiarities. Against the changing economic and political background of the society, the issue of women's education was first disappearing from the agenda, then coming back to the fore, disturbing officials, state and public figures, academics and ordinary citizens of different social classes, religions.

In the eighteenth century and the first half of the nineteenth century, women's professional activity was mainly pedagogical work. They worked as domestic teachers and educators and later as public schools teachers. Most women were engaged in housekeeping and acted as housekeepers. During that time, the first Institute for Noble Girls in Ukraine was established in Kharkiv (1812), where students could be engaged in teaching activities [12], as well as one of the first professional institutions of handicraft profile – Odessa Professional Maidens' School (1817) [13].

Until the second half of the nineteenth century, girls received their education mainly in the institutes of noble girls, religious schools, private boarding schools and at home.

In the second half of the nineteenth century, the reforms in the education system became available for the lower classes at all levels, including the university. Regulations and directives on the functioning of certain male institutions acquired legislative status. It was at this time, influenced by the development of industry, shifts in science and technology in the Russian Empire and many European countries, that women began to work in new branches of production, as well as in areas that had previously been considered male: stenographers, engineers, telephone operators, accountants. All these professions required a certain level of education and training [14].

The specific attitude of Russian Empire society to women's issues determined the distinctive approaches to the organization of women's education, including vocational education. Its development was prolonged and began later than that of men's education. General and professional women's education did not meet the educational needs of women, significantly lagging behind the demands of life. At the end of the 19th century in Ukraine, as in other regions of Russia, non-writing women prevailed [15, pp. 58–60, 63–70]. Thus, according to the First General Population Census of the Russian Empire (1897), the average literacy rate of Ukrainian women was about 12%, for men – 31%. Within Ukraine, the lowest literacy of the female population was in Poltava province (6.3%), the highest – in Tavriya province (17.9%).

Alongside the above facts, we note that Russia was ahead of Western European states at the stage of forming educational institutions, creating secondary and higher schools, which became a model for many European countries. However, Russian officials did not hurry to reform the existing educational system. Moreover, almost all

of the projects for the development of women's education developed in the second half of the nineteenth and early twentieth centuries by individuals, separate departments, and specially formed commissions remained unimplemented. The daughters of wealthy parents went abroad and received vocational education in Germany, France, Switzerland and other countries. Thus, at the end of the nineteenth century, Russian Empire found itself far behind the countries that had taken some of its ideas for developing women's education as exemplary.

At the same time, in spite of the government passivity, the number of educational institutions for women on the territory of Ukraine, as well as in the Russian Empire as a whole, was growing. They were under the authority of various institutions and agencies (table 1).

**Table 1.** Educational institutions (women's and co-educational) by field of study and departmental subordination in Ukraine (the end of the 19th century – the beginning of the 20th century).

| Educational institutions field of study | Departmental subordination |
|---|---|
| Handicraft (applied) | Ministry of National Education, Ministry of Trade and Industry, Ministry of Internal Affairs, General Directorate of Land Management and Agriculture, The Office of the Orthodox Confession |
| Agriculture and housekeeping | Ministry of National Education, General Directorate of Land Management and Agriculture, The Office of the Imperatrix Maria's Institutions |
| Culinary | Ministry of National Education, The Office of the Imperatrix Maria's Institutions |
| Art | Ministry of National Education, Ministry of Trade and Industry, Ministry of Internal Affairs, Ministry of the Imperial Court |
| Pedagogical | Ministry of National Education, The Office of the Orthodox Confession The Office of the Imperatrix Maria's Institutions The Religious Office |
| Medical | Ministry of National Education, Ministry of Internal Affairs, The Office of the Imperial Philanthropic Society |
| Financial and economic | Ministry of Trade and Industry |
| Polytechnic | Ministry of National Education, Ministry of Trade and Industry |
| Law | Ministry of National Education |

As table 1 shows, at the end of the nineteenth century and before the 1917 revolution women in Ukraine obtained professional knowledge in pedagogical, financial and economic, medical, technical, agricultural, handicraft, culinary and art educational institutions. They constituted a rather extensive network of lower, secondary and higher educational institutions for women. Private ones predominated among them. Unfortunately, the fragmentary and, in some areas, lack of statistical data on women's educational institutions makes it impossible to carry out a comprehensive quantitative analysis of their activities.

It is noteworthy that women attended purely women's institutions and institutions where boys and girls were educated together.

*In the institutions of lower vocational education*, predominantly children from low-income families studied. Girls were trained as seamstresses, dressmakers and craftswomen in various kinds of needlework (needlework schools, colleges and workshops; appropriate departments and classes at general and vocational educational institutions and asylums). The needle-working schools were the most popular vocational establishments, among others. With the help of needlework, an enormous number of Ukrainian women earned their living. Considering the data of the First All-Russia population census of the Russian empire, in 1897, over 40000 women were engaged in needlework in the Poltava province and over 25000 women in Chernihiv province.

Based on incomplete archive data, in 1910, there were 80 needlework educational institutions in 9 provinces of Ukraine [6]. According to our calculations, there were more than 40 private needlework schools and dressmakers in Kyiv alone in 1915. Here are the names of the most famous of them: A. Gogotska and O. Kulitskaya (Kyiv), Olga and Serafima Kurdyumov (Kyiv), L. Lontkevich (Zhytomyr), G. Mashkovtseva (Simferopil) and others.

In our opinion, the vast demand for sewing and needlework craft products is due to many reasons. In particular, a bourgeois class was forming, whose representatives had no opportunity to compete with the generous aristocrats, emphasizing their importance with the external attributes of affluence. Furthermore, the emergence of modernism in the late nineteenth and early twentieth centuries led to shifts in art and fashion. Women were quick to respond to changes in tailoring, filigree needlework and fine art. The increased demand and mainstreamed the problem of training skilled needleworkers in professional women's educational institutions.

The latter included culinary schools and courses: M. Bychkovskaya's Kharkiv cooking school, K. Poltovych's housekeeping school (from 1902), M. Mariuza-Gryneva's household and cooking courses in Kyiv (from 1899) and others [16, pp. 38–44], [17].

It is worth noting that among women vocational education, the oldest is medical. However, it is noteworthy that women have been caring for the sick and injured for a long time, working as nurses, midwives, and later physicians. The training of lower medical personnel – nurses and midwives were carried out in nursing schools and courses. Moreover, nursing students were also trained at secondary and higher educational institutions. These professions were significant. For instance, all Russian provinces' ancestral history books required the names of all medical professionals (full-time and part-time) to be listed with their corresponding home (!) addresses.

The history of Ukraine has preserved facts of the use of the professional potential of women medics under challenging times for the country. Thus, during the Crimean

War (1853–1856), namely during the siege of Sevastopol, N. I. Pirogov, the famous physician and scientist, for the first time in the history of military field surgery, took a squad of women united in the Sisters of the Cross for the wounded and sick. A total of 120 sisters worked in the war in Crimea. They fought against economic disorder, took part in operations, and cared for the sick and wounded. During Pirogov's stay with a cohort of nurses and doctors in Sevastopol, 10,000 operations were carried out [18, pp. 295–296].

In the late 19th – early 20th centuries in Ukraine, institutions of lower agricultural education (schools, colleges and courses of housekeeping and agriculture or its certain branches, children's agricultural asylums) were widely spread. They predominantly trained skilful housewives, housekeepers or specialists in particular branches of agriculture (M. Mariutsy-Grineva's Zozulinskyy Practical School of Agriculture and Housekeeping (since 1888, Kyiv province), the Preobrazhenskaya Women's School of Agriculture (1891). (Chernihiv Province), the Eigenfeld Women's School (Tavtiya Province), the Kyiv-Lukyanov School of Housekeeping).

In 1914 in Ukraine, up to 200 girls were trained in lower agricultural schools, colleges and courses [19, pp. 15–16].

The problem of economic education in Ukraine sharply arose with the reform of 1861. Abolition of serfdom, the industrial revolution created the material, technical and social prerequisites for further economic development, which largely influenced the educational policy in the empire (1872 – approval of the Charter of real schools, in 1886 – the drafting of a general standard plan for industrial education in Russia).

In April 1896, the Ministry of Finance of the Russian Empire approved a new Regulation on commercial, educational institutions, under which, along with commercial secondary schools, were created lower types of commercial educational institutions – trade classes and schools, commercial skill courses [20, pp. 604–607]. In these institutions, with a duration of training from a few months (courses) to three years (schools), girls learned elementary knowledge related to trading (Kyiv Merchant School named after P. G. Tereshchenko, Commercial Classes of Kharkiv Merchant Society). In addition, commercial courses trained male and female professionals in certain specific subjects – accounting, bookkeeping, "office work".

Graduates in particular from lower commercial, educational institutions experienced enormous difficulties in finding employment in their speciality, so the curricula of some of them envisaged studying subjects of the household cycle (P. G. Tereschenko's trade school, 1903) [21, p. 19].

At the beginning of the 20th century, some lower women's vocational schools trained girls for professional activities in postal and telegraphy and stenography. The first village telephone network in Russia came into operation in Kharkiv Province (1899). At the end of the XIX century, the profession of a telephone operator was considered prestigious.

In the second half of the nineteenth century, girls in Ukraine actively enrolled in art, theatre and music schools, drawing classes, art workshops, numerous institutions of stage skills, schools of "light genre", and "ballet and drama schools". In 1910 there were ten music schools of the Russian Musical Society and 25 private musical schools and theater schools [22, pp. 312–313]. As of 1914, there were 25 private lower artistic institutions in Kharkiv alone [16]. Thus, lower female vocational schools equipped women with "basic" vocational skills for working in the service sector, various branches of the household, and medicine. In addition, artistic, educational institutions developed female pupils' aesthetic taste, artistic, musical, and acting abilities.

Women of different estates attended *secondary and higher professional education*.

*Women's vocational secondary schools* had various specialities (pedagogical, medical, technical, economic).

An important place in the network of secondary educational institutions belonged to female gymnasiums (from 1870, the first and second rank female schools were renamed into gymnasiums). In addition to a fairly thorough general education. Girls who received an education in the 7-year pro-gymnasium school or graduated from progymnasium had the right to receive the title of "primary teacher", and the graduates of the eighth pedagogical class had the title of a house teacher and teacher.

It is to be noted that in 1914 in the Kyiv province under the supervision of the Ministry of Public Education, there were 37 female gymnasiums with 9775 pupils, in Kharkiv – 43 female and five gymnasiums with coeducation [16, 23]. In Galicia 1911–1912 there were 32 female gymnasiums and lyceums [24, pp. 5–6]. We can acknowledge that at the end of the 19th century and the beginning of the 20th century, knowledge in the Gymnasium was a prerequisite for entrance to secondary vocational schools and institutions of higher education.

We consider it of academic interest that women's gymnasiums in Ukraine organized courses for the training of handicraft teachers (handicraft courses at the Kharkiv gymnasium and the progymnasium of Illichowyi-Menchyts, the Kyiv progymnasium of N. Baykovaia) [16, 25]. In 1905 the "Regulations on vocational courses at female gymnasiums of the Imperial Admiralty Institution of Maria" received legislative confirmation. According to these regulations, it was allowed to organize also commercial courses, which allowed acquiring the title of "scilled office worker" [26, pp. 1–4].

In addition, teacher training was provided by such secondary educational establishments as diocesan women's colleges and teachers' seminaries. As of January 1, 1917, there were four female and 13 male teachers' seminaries in the Kyiv district, 2 and 9 in Odesa district respectively, and no such institutions in Kharkiv district, which had 16 male ones [27, pp. 94–97]. As of 1911–1912, there were 28 female teacher training seminaries in Galicia (of which 24 were private) and five male ones [24, pp. 5–6].

Specialists in pre-school education were trained at the Kharkiv Frobelyov Courses, the Frobelyov Women's Insti-

tute (since 1908) and the Babysitting School (since 1905 in Kyiv).

In the pre-revolutionary period, the pedagogical externship was widespread.

The training of specialists in financial studies was carried out by commercial schools (7-year institutions), which provided commercial knowledge and general secondary education. In 1910 in Ukraine, girls had the opportunity to study in 32 commercial schools [28].

It should be emphasized that there was only one secondary agricultural school for women in Ukraine from the late nineteenth century until 1917 – the three-year Lyudmyla Secondary School of Housekeeping and Homestead Farming, founded in 1903. (This school was considered the first of its kind in Chernihiv province.) It was the first school of its kind in the Russian Empire [29, pp. 1–19]. The girls were trained professionally, mostly in cookery, dairy business and gardening, and also the general education disciplines were taught there substantially. In 1909, there were 29 girls in the school. In 1911, the Women's Teacher Seminary was established to train future primary schools teachers.

Secondary art educational establishments trained both teachers (art music schools with pedagogical courses affiliated to them) and specialists in artworks, specially trained according to the "requirements of applied art" (Mirgorod Artistic and Industrial School named after N. V. Gogol, 1896).

The enormous urge for women to receive medical education and, at the same time, the small number of higher medical schools determined the necessity of establishing many medical schools which approached the higher ones both in terms of requirements for applicants and in terms of their programme. Among them were 4-year Samaritanskyy female courses of paramedics and midwives in Kyiv (their statute was adopted in 1909). After graduation, the students had the right to work as midwives.

Dental schools also belonged to the secondary medical institutions of the studied period. A decree granting women access to the "profession of the dentist" on an equal footing with men had been published as early as 1820 [30]. According to incomplete data, in 1913–1914. 12 dental schools existed in Ukraine [22]. However, the current level of lower and middle vocational education already did not meet the needs of women, and they tried to attend universities (we looked at some aspects of the development of higher female education at the beginning of this study).

As E. P. Fedosova, a scholar of women's higher education history, mentions, women first attended lectures at Kharkiv and Kyiv universities in 1859 [31]. Later on, in 1870, the Society of Naturalists in Kyiv established at St. Vladimir's University, organized "systematic public courses in natural sciences" for women. Similar courses were in Odesa and Kharkiv.

It is worth mentioning that, in 1878, the paid Higher Women's Courses (HWC) were opened in Kyiv as part of the Words and History Department and the Physics and Mathematics Department. They provide women graduates of secondary schools with higher education of "university nature" and train them for a pedagogical profession. However, in May of 1888, the admission of female students to HWC was discontinued (they were re-opened in Kyiv only in 1906).

Along with the higher women's educational institutions mentioned above, the Higher Women's Pedagogical Courses were also operating in Odessa (in 1906, they were reorganized into the Higher Women's Pedagogical Courses at the Ministry of Public Education). In Kharkiv, from 1907, HWC of the Kharkiv Society of mutual assistance of working women worked; in Kyiv, there was a private HWC of Professor M. Dovnar-Zapolsky. Evening HWCs of A. Zhekulina, created in 1905, provided training at three faculties: History and Literature, Natural History and History and Economics. In 1906 A. Karnitsky, a privat-docent of St. Volodymyr University, founded the "Mother and Child" Kyiv Higher Medical-Pedagogical Courses.

Our research has revealed that in 1916 The Ministry of National Education allowed the HWC to be opened in Ekaterinoslav. The Higher Women's History and Philology Courses in Nizhyn, established in 1916 on the initiative of P. Tikhomirov as a private course, allowed women to receive education within the scope of the programmes and plans of the history and philology departments of universities. Although the Ukrainian Higher Women's Courses trained highly qualified specialists, women were not able to put their skills into practice under the education they had acquired. For example, women with higher education could teach in male secondary schools only since1906 [32].

The higher art schools in Ukraine were represented by the Kyiv Higher Opera and Drama Courses of M. Miodzev, M. A. Kotelnikov, M. A. Kremenko and M. V. Kuznetsov. These included the Kyiv School of Opera and Drama by Mikhail Miodyedev (1910), the Kyiv and Odesa Schools (from 1913) of the Imperial Russian Music Society and the Kharkiv Conservatoire (from 1917). As of 1914, the Kyiv Conservatoire was attended by 590 women (68.4% of the total number of participants). In addition, a music school was founded in Lviv in 1903 (the Second Music Institute since 1907). Graduates of conservatories were eligible for the title of free artists and were able to work as teachers and open their educational institutions. The results of the research indicate that medical women were able to attend courses for practical training in chemistry and microscopy, and bacteriology methods at the Bacteriology Institute of Dr. N. F. Gamaleya. Gamaleya in Odesa, a one-month course in bacteriology and bacteriological techniques in Kyiv. A three-month course in chemical-bacteriological research was also launched at the Chemical and Bacteriological Institute of Dr. M. Benyash in Kyiv to train physicians, pharmacists, chemists and veterinarians [32].

Women could obtain higher medical education at the Odesa Higher Women's Medical Courses (from 1910) and the Kyiv Higher Women's Courses (1907). In addition, women could acquire such skills at the Faculty of Medicine at the Lviv University (women were allowed to study there in 1900), the Kharkiv Women's Medical Institute, founded in 1911 and the WTC Medical Department

Katerinoslav (from 1916). It should be added that since 1907 women with secondary education have been admitted as volunteer listeners to the Kharkiv Veterinary Institutions.

The number of female graduates of medical schools was insignificant. According to our calculations, at the Medical Faculty of Kharkiv University in 1884, 67 women received the title of midwife (8.1% of all graduates). Sixty-seven women received the title of midwife (8.1% of all graduates) in 1890 – only 29 (5.2% of the total number). As of 1897, there were one woman doctor and 140 midwives (16.6% of all graduates), in 1901 – 12 and 143 respectively (26.3%), in 1903 – 18 and 210 respectively (53%), in 1904 – 7 women doctors and 40 midwives (8.8% of all graduates) [33, pp. 130–131]. Female medical students did not receive the title of "doctor" but "female doctor". In 1880 a badge with the letters "W.D." ("woman doctor") was approved for them [30]. In 1898 a government decree granted women doctors the rights of civil servants.

In 19th century society, there was still a prevailing view that women's primary, and sometimes the only, sphere of activity should be the family. It was believed that the problems of their rights and responsibilities were not relevant for women. Others – caretakers, parents, men – could think about it. However, some women were owners of the estates, businesses and real estate in general, trustees and guardians of children, supervisors and simple public and private institutions employees. They were often helpless in business documents, transactions and many other situations precisely because of their limited or lack of legal literacy.

For a long time, women's professional legal activities were limited by several factors, in particular, the lack of professional training institutions and regulations concerning women's public service.

One of the supporters of women's legal education in Russia, T. Shishkin, noted that women could harm themselves and their families through ignorance of the basic concepts of jurisprudence. Due to ignorance of the laws of their state, women could not fully exercise their rights. This negatively affected their "civic development and pushed them out of the midst of public life". He proposed to provide for the study of law in women's educational institutions of all types and levels, to manage public lectures on jurisprudence only for women (such a fact was found in Odessa) and to publish popular literature on the law.

Women in Ukraine received their legal education at the law departments of the Odesa and Kyiv HWC (the outstanding poetess A. A. Akhmatova studied here in 1908), as well as at the Kyiv private courses called the "Law Institute" by V. Sinaisky and M. Mitlin (1917).

The Ukrainian population's eagerness to develop polytechnic education at the end of the nineteenth – beginning of the twentieth century prompted the opening of many technical schools and accelerated the development of projects in this field of vocational education. During that period, the railways needed qualified personnel – engineers for road maintenance, architects and builders – employees and assistants in architectural design and for the supervision of construction work. In addition, the development of industry required many engineers – mechanics, technicians, electricians and other specialists. However, women in Ukraine were deprived of technical education for many decades. It was only at the beginning of the twentieth century that they entered technical schools.

Scholarly societies and private individuals contributed an essential role in establishing technical-vocational institutions. It is known that the Korobochkin Technical School for men and women was established in Yekaterinoslav in 1911. The training lasted for three and a half years. These courses were designed to provide full technical education in mechanical and electrical engineering. In autumn 1912, the society for disseminating technical education opened its first courses. In autumn 1912, the Polytechnic courses were opened in Kyiv by the society for the dissemination of technical education. Similar institutions were located in Odesa (polytechnic courses of I. Khoina and the technical school (courses) of engineer G. Uteshev), in Kyiv (technical courses founded by Professor V. Perminov). These educational institutions, with the full training of students in the electrical, mechanical, construction and engineering-melioration (in Kyiv) departments, trained specialists with a full technical education in "responsible specialities", which allowed them "to be the closest assistants to engineers... and to carry out work independently" [32]. Women could also study together with men at the Kharkiv Institute of Technology of Emperor Alexander III, the Kyiv Polytechnic Institute of Emperor Alexander II.

The Minister of Public Education later approved the Charter of the Kharkiv Women's Polytechnic Institute in 1916. The Institute was founded under the initiative of the Russian-Southern Association of Technology. Girls with secondary education were admitted to the Institute. Upon successful completion of the course of study, they had the right to acquire the title of building engineer and architect-engineer. Another polytechnic institute in the Mechanical and Electrical Engineering Departments opened in Katerinoslav (1917). It trained male and female students of the "Jewish persuasion". It should be noted that the number of women in polytechnic educational institutions was very insignificant. According to our estimations, among the students of the Kyiv Polytechnic Institute of Emperor Alexander II in 1908–1909, there were 34 female students (1.4% of all students) at V. Perminov's courses in 1914 there were one woman (0.2% of all students). At Ekaterinoslavsk courses of S. Beilin in 1916, there were 14 girls (15% of all students), and at technical courses of V. Korobochkin, according to 1914 data, in the lists of students, women were absent at all [23, 34].

In our opinion, polytechnic education institutions were not prestigious and popular among young women. Even at the First Russian Women's Education Conference held in St Petersburg (December 26 1912 – September 4 1913), the lectures on women's technical education were read by empty audiences despite their novelty and importance.

A literature study revealed that the university's doors were open to women in the early twentieth century, in-

cluding the Kyiv Commercial Institute with a four-year course of study, established in 1898 (formerly known as the Higher Commercial Courses). There the graduates of commercial-technical and economic departments were awarded the titles of candidates of economic sciences and commercial engineers of the first and second categories with the right to occupy the posts of staff teachers and lecturers of special educational institutions of the Ministry of Trade and Industry [32]. In 1913, a special zemsko-town subdivision with a two-year training period was opened at the Institute. It was the first and only Russian "school of public municipal knowledge". According to 1914 data, 188 female students (5.1 per cent of all students) studied at the Kyiv Institute [23].

The Higher commercial courses of the Kharkiv Merchant Society with the commercial and Faculty of Economics in Kharkiv, evening courses of A. Zhekulina (History and Economics department) and Kyiv HWC (Economics and Economics department) also trained highly skilled specialists in the field of commercial and financial sciences. Moreover, in 1912 it coordinated the opening of the financial-economical department of Odessa Polytechnic Courses (Technical School) of G. Uteshev. Later, in the autumn of 1913, the Society of Commercial Schools in Lviv established the "Women's Commercial Academy". Female trainees were studying new languages, history, mathematics, natural and commercial sciences for four years.

It is worth mentioning that agricultural courses for women and men were created in Kharkiv in 1912 (private Kharkiv higher schools). It should be noted that agricultural courses for women and men were created in Kharkiv in 1912 (N. Neviandt's private Kharkiv higher courses), in Odesa in 1915 (higher courses in winegrowing). (higher courses of winegrowing and winemaking at the Odessa winemaking station) [32].

Thus, at the end of the nineteenth and beginning of the twentieth centuries, lower, secondary and higher female education of different specializations evolved in Ukraine. Children from different strata of the population studied in vocational schools. In addition, special institutions were created for the vocational education of disadvantaged children. Thus, a school of housekeeping was opened in Kamenetz-Podolsk orphanage (1890), cooking schools operated in the Odesa orphanage (1894), Chernihiv orphanage (in 1899, the school opened a restaurant that served orphanage residents) [35, 36]. In 1882 in the named orphanage in Chernihiv, training in bookbinding and laundry skills was introduced for children. These skills of these specialities were mastered only by senior pupils who had mastered the necessary knowledge and skills so successfully that they took the orders from Chernihiv female gymnasium for book and notebook bindings and did laundry work better than other Chernihiv washerwomen.

Records show that charitable societies took part in establishing vocational schools for orphaned children. This fact is confirmed by the opening of the Kremenchuk Society for the Promotion of the Poor craft school in Kremenchuk, Poltava Province (1898) at a shelter for young orphans, which during four years trained teachers of needlework, dressmakers, seamstresses, cooks, washers and generally as for the household, and to earn money [37].

In the Kyiv Orphanages of the Degterev families, along with religious, moral and physical education, the children received "required practical training" [37]. Special work studios were set up at the orphanage for older children to encourage girls to love and cultivate a habit of work: a needlework class (from 1910), a bookbinding class (from 1909) and a stocking and knitting class (from 1913). The girls were also engaged in silkworm manufacture and horticulture (in a greenhouse). In all, there were ten manual labour classes at the orphanage.

It is worth mentioning that some of the Ukrainian orphanages allowed their inmates to learn the pedagogical profession by means of special government directives. Thus, at the Chernihiv children's shelter of the Institution of Empress Maria in 1893, was created a teaching department in order to prepare the most capable pupils to work as teachers in village schools [35]. In 1905 came into force on the government decree, according to which the older orphanage pupils could learn to perform the duties of nannies, and in 1913 there was a guideline of the trustee of the Kyiv school district on granting the rights of "primary teacher" to pupils of the orphanage N. Kharitonenko in Sumy. Since 1906 the women's school at the named orphanage was transformed into a 5-year women's teacher's seminary [16].

As known, representatives of other national minorities lived and worked alongside Ukrainians in the territory of our state. As a result, special educational institutions were created for them in Ukraine. We believe that the development of vocational education for national minorities constitutes a separate page in the history of the development of women's education in Ukraine.

Our study showed that the vast majority of vocational educational institutions for national minorities were created either by private individuals or by societies that had charitable and educational purposes, in particular: the Roman Catholic Children's Shelter Society, the Kyiv Polish Women's Circle, the Zhytomyr Women's Workers' Movement, Czech and Jewish societies.

Craft schools and colleges were a fascinating group of professional establishments for women of national minorities. For example, in 1901, the School of Tailoring and Sewing was created at the Armenian Gregorian church-parish school in Simferopol, which was under the authority of the Ministry of Public Education. The course of training lasted for a year. In 1910 15 girls obtained vocational education in it. [36].

The opening of the Polish schools (the so-called "secret schools", with the Polish language of instruction) was very closely monitored by the government. There were only a few professional Polish-language schools for girls. For example, in 1908, J. Stankunowicz opened a sewing and needlework workshop in Kamyanets-Podolski. Girls of 11–13 years old, mostly Catholic, studied there. Schoolgirls practically mastered knowledge. In 1909 the boss of the school had planned to open a dormitory for poor orphan girls of the Roman Catholic faith. How-

ever, the governor of Podolsk refused. He "took into account that Stankunowicz, by opening a shelter only for Roman Catholic children... was probably guided not so much by philanthropic ideas, as by narrow nationalistic aims...". The inspection of the functioning of vocational educational institutions was also harsh.

Almost all Jewish women's vocational schools (both independent and general educational institutions) had a practicable (applied) orientation. The Berdichev Jewish Female Professional School with a general education department opened in 1907 provided free education services.

According to the records, the Rivne Private Female 2-class Jewish School in 1914 established a vocational department, where the girls studied general subjects and "the handicrafts for the ladies." [38].

It is of academic interest that elements of professional education were even introduced into pre-school curricula. Yes, the Czech Charity and Enlightenment Society named after J. Comenius in Kyiv had the aim of "providing the necessary education for the children of Czechs living in Russia". In 1913, the J. Comenius Czech Philanthropic and Educational Society in Kyiv, with the aim of "giving the necessary education and training to Czech children living in Russia", opened a private school of the third class for male and female children with a kindergarten attached to it [39]. Besides comprehensive courses they studied needlework, fashion design, and other disciplines accessible to pre-school children, with instructions in the mother tongue. Consequently, since their childhood, Czech children could learn and communicate in their mother tongue. They also acquired elementary professional knowledge, which was a prerequisite for the broader development of their personality.

The efforts of the German Society of Southern Russia led to the foundation of a women's commercial school in Odessa (Ministry of Trade and Industry) in 1908. For ten years, female students of the school mastered the subtleties of commercial science. In 1910, there were 43 female pupils [25]. This school, like others of its kind, offered its graduates the opportunity to teach, work in commercial and industrial establishments or run small commercial establishments

During that period, a sufficiently widespread phenomenon was the opening of commercial departments at general educational institutions. In 1917 at the private "S. Zhukevich Polish Female 8th Grade College" in Kyiv, a department was established to introduce subjects of a commercial nature. Polish language and literature were also taught. In the Real-Commercial Department, as well as general subjects, special subjects were taught: law, merchandise science, political economy, commercial geography, correspondence and arithmetic. The language of instruction was Polish, and school leaving certificates were issued in the same language.

Members of national minorities received their education together with Ukrainians in general educational institutions, although there were certain restrictions for them. Thus, the admission of Jews to medical and maternity schools was "subject to 5% of the norm in the cities, 10% in other locations outside the sedentary area, and 15% in the area around that boundary".

The Samaritan (Jewish) Women's Medical Courses were established in Kyiv in 1909. Various cities in Ukraine were the mediums for creating lower medical courses for the training of the Sisters of Mercy. Graduates of these schools have made significant contributions to the medical treatment of Ukraine's and other nations' populations. Together with physicians, they cared for the sick and wounded in the hospitals of Jewish communities during military operations. The periodicals of 1915 reported that Jewish community hospitals were established on the territory of the Russian Empire during the war, and nurses and doctors of Jewish nationality worked there. The hospital for the wounded and ill soldiers of the Mykolayiv Jewish community in Mykolayiv. We obtained data about female physician F. Gasnik-Placka, who passionately responded to the appeal for help to the Serbs and went to Serbia in the autumn of 1914 with Mrs Hartwig's army. She was the first and only "dentist" in the main hospital in Nisci (Serbia).

The teachers of general and vocational schools were predominantly trained in the gymnasiums and teachers' schools of national minorities. In this framework, we must remember the "alien" Tatar teacher's school in Simferopol (1890) with a 4-year course of study. There was also the "Polish Female 8-class school of S. Zhukevich" in Kyiv, numerous Jewish private female gymnasiums in Poltava, Zhytomyr, Kyiv and other cities of Ukraine.

The M. Merelli Women's Private French Secondary School in Kyiv began its work in 1917, following the programmes of the Ministry of Public Education's Female Gymnasiums. The education here was conducted in Russian, with general subjects and modelling being taught. Pupils studied their mother tongue and arithmetic in the mother tongue. According to historical sources, similar institutions with French education also functioned in Moscow, Petersburg (French Gymnasium Kapronier) [40].

The Polytechnic Institute in Yekaterinoslav, founded in 1917, trained men and women of the "Jewish faith" in electrical engineering and mechanics departments. After the revolution in 1917, the education system practically abolished the system of separate education (in the post-war years, female and male schools were re-established). Since 1953, women's education in women's schools in the USSR has been terminated legally.

## 4 Conclusions

A study of archival and literary sources gives grounds to conclude that from the second half of the 19th century to 1917, women's educational institutions of professional conjugation were under the supervision of various ministries and departments. There was no public authority responsible for women's vocational education. All women's educational institutions of different profiles and levels formed a distributed network of educational institutions that operated separately. The public authorities supported the private initiative in women's education and supervised the publishing activities of women's institutions

and the teaching and educational process of the respective educational institutions [14].

Leading concepts of constructive historical and pedagogical experience of women's professional educational institutions in Ukraine can be used to create a new type of educational institutions, legislative and normative base for professional education. Furthermore, it is advisable to introduce book printing to meet the needs of women's professional education, to initiate a special scholarly and methodological journal on the issue, to revive exhibition activities as an opportunity to disseminate the results of girls' professional education through exhibition units (in intellectual, manual labour), to engage government agencies, the public in organizations.

Since the performed academic research does not cover all the aspects of the study, we have determined the perspective directions of further research of this multi-aspect issue. Among them, we determine peculiarities of women's professional education development in the Western Ukrainian regions; foreign dimension of women's professional training in the professional educational institutions in Ukraine in the second half of the 19th – beginning of the 20th century.

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[39] *Derzhavnyi arkhiv m. Kyieva (DAK) (State Archives of Kyiv (SAK))* (Fund 292, 1/52, pp. 1-52)

[40] *Tsentralnyi derzhavnyi istorychnyi arkhiv (Ukrainy TDIA) (Central State Historical Archive of Ukraine, Kyiv (CDIAC of Ukraine))* (Fund 707, 167/246, pp. 57)

# To the origins of social education in Ukraine (the 1920s): humanism or proletarian expediency?

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**Abstract.** The paper analyses the phenomenon of social education (herein after abbr. sotzvykh) in Ukraine in the 1920s as a purpose of Soviet power to change the previous imperial system of education. In general, at that time sotzvykh reflected the aspiration of power for upbringing the new generation of educated proletarians with communist views, but in reality, there were efforts to feed, clothe and provide the elementary medical care to the host of different types of children and teenagers under 15. Until the early 1930s, the sphere of education in Ukraine developed differently than in Russia. The emphasis was placed on the imminent death of the family as a social institution, and therefore the education of children and youth should have become the task of the society. In addition, professionalization of school education was recognized as a priority. The aim of the article is to highlight the first in the world's education history phenomenon (sotzvykh) – both the pedagogical and social – of organising life of children in the post-war country. The goals and ways of implementation Ukrainian sotzvykh in the context of social, ideological and pedagogical aspects of the time are analysed. It is considered that sotzvykh carried out both political and life-saving pedagogical tasks of protecting the child population. Within the framework of sotzvykh in the conditions of poverty and ruin of the post-revolutionary period the general 7-year school education and elimination of illiteracy were carried out.

## 1 Introduction

Turning to the history of the formation of the phenomenon of social education (hereinafter referred to as "sotzvykh") in Ukraine, it is necessary not to miss the main factor that gave rise to it – the collapse of the Russian Empire (1917), whose part Ukraine was. The establishing of Soviet power on the lands of Ukraine (1918–1921) took place in difficult conditions of Civil war, instability of power, material deprivation and economic decline. Despite this, the Ukrainian Bolsheviks declared a difficult for realization task – to fundamentally change all the political, economic and cultural institutions of the previous imperial power that implied the creation of a new, socialist in spirit, educational system. It was based on the idea of replacing the upbringing of the younger generation "in a semi-patriarchal family and school" with "social upbringing" [1]. It meant the upbringing in collectivistic ideology oriented towards the interests of the working class. Until the mid-1920s the issue of the dying out institutions of family and school in their original forms in the proletarian state was being actively debated. However, the traditional approach to the important role of the family in the upbringing of the child prevailed.

The purpose of education and the task of the Soviet state "to educate in children institutions of sotzvykh harmoniously developed members of the collectivist society under construction" [2] was proclaimed.

We'd like to emphasize that in 1918–1923 the sotzvykh in Ukraine was "simultaneously" a means of protection of a child and included "education, upbringing, providing food and clothing" [1] for children and adolescents who suffered the consequences of war.

As early as in 1920 O. I. Popiv, one of the inspirers of the pedagogical process' renovation and the ideologist of the sotzvykh in Ukraine, wrote the program work, that formed the basis of the state document "The Declaration of the People's Commissariat of the Ukrainian SRR on Social Education of Children", outlining the intentions of the workers' and peasants' power: "The educational system of social education (sotzvykh), sets the task of fulfilling the pedagogical dream: to embrace the entire life of each child with a properly organized upbringing" [1].

This in many aspects innovative and humane document, although rather utopian one, was called by M. M. Kuzmenko "a specific program for implementing the basic principles of modernization of cultural and spiritual life" [3].

Another important feature of the sotzvykh was the official proclamation of protecting all children (under 15 years) as a concern and commitment of the state. The implementation of the first-ever state governing bodies, such as the People's Commissariat of Education of the Ukrainian SRR (hereinafter referred to as PCE) and the People's Commissariat of Health Care of the

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Ukrainian SRR (hereinafter referred to as PCHC), which was recorded in the Code of Laws on Education of the Ukrainian SRR (1922) [2]. Note: this decision had no analogues in the political history of the state, had an indisputable humanistic focus, although, as time showed, it largely remained an idealized project.

## 2 Research aims and methods

The purpose of our article consists of several goals.

Firstly, to spread knowledge about the historical and cultural processes in Ukraine, as the educational sphere is a vivid reflection of the nation's image and intellectual history of the country.

Secondly, on the basis of a discursive analysis of authentic sources and documents of the 1920s, to reveal the presence in the history of the Ukrainian education such a phenomenon as "sotsvykh" ("social education/upbringing"), having no analogues in the world history of pedagogy. Authorities proclaimed the necessity to cover all over the child population of Ukraine with possible social care, elementary education, despite the extremely difficult post-war social and economic circumstances. It was proclaimed as the task of the authorities at the level of state-approved laws and regulations. It was conducting the initial quantitative and age child and youth population count for organizing different types of state institutions for primary medical, psychological and pedagogical help according to the vital needs of children. For the first time, the upbringing, education, treatment, care of "defective children" (now – children with special needs) were recognized as a state task, not an individual philanthropist's affair.

Thirdly, the studied phenomenon "sotsvykh" ("social education/upbringing") concerned the origins of those processes in education that are defined as humanistic. Let's remember: experimental studies of the child's nature began only from the second half of the 19th century), and the historical and genetic reconstruction of the phenomenon "sotsvykh" at the same time makes it possible to reflect the movement of humanistic ideas and their practical realizations: from sporadic philanthropic examples of assistance to various types of disabled children (19th cent. – early 19th cent.) to state differentiating care and education of them (1920s), the origin and development of such branches of science as defectology (special education) (1920–1930), social rehabilitation, and finally transition from high-level differentiation of disabilities (1950–1990) to the recognition of inclusive education as the most humane approach to solving the problem of children with special educational needs.

*Research methods*: the study adopts the method of document analysis, analysis of texts terminology in connection with discursive analysis [4]; narrative method, a structural method according to which the studied phenomenon is broken down into components for the attempt to search links between them which are not always explicit.

## 3 The roots of social education (sotzvykh)

It is worth noting that the key ideas of education reforming were not an absolute innovation in the humanitarian sphere of Europe. The problem of protecting children in broad general pedagogical context has been raised repeatedly, especially after the start of the First World War. For example, the founder of genetic psychology, E. Claparède, in a report at the Congress of the League of Psychological Hygiene (Paris, 1922) introduced the following provisions to the resolution, which were unanimously adopted by delegates, namely: "... 4. The school should protect the nature of childhood. ... 6. School must awaken activity. It should be a laboratory rather than an audience. 7. School must evoke the love of labour" [5].

The above-mentioned conceptual ideas were reflected in the first Soviet documents of Ukraine on education [6, 7], which determined the strategic directions of social education, child protection, and the creation of a general labour school.

Also at the very beginning of the 20th century both in Europe and imperial Russia they raised the issue of a "mentally impotent and morally dangerous child" [8, 9], which was connected with the growth of juvenile delinquency and the need for its "social treatment", as well as with the problem of protecting the mental health of children. In 1910, at the III Congress of Russian Psychiatrists, V. P. Kashchenko described 4 types of defective (disabled) children: mentally retarded at various degrees, children with mental instability, epileptics and mentally ill children. And emphasized that "... organizing assistance to children of all these types it is important to observe the principle of differentiation. One needs hospital or family care (guardianship), another needs both care and treatment, and for others, specially organized upbringing and training is necessary" [8]. In the imperial time the mentioned social and pedagogical problems did not find a solution at the state level.

In the 19th – at the beginning of the 20th century the term "defective childhood" was officially used by European psychologists (C. G. Jung [10], E. Claparède [11]) in relation to children with subnormal intelligence or behaviour, as well as in relation to juvenile delinquents and even street children. In relation to the last two group of children, the more specific term "morally defective" was also used. Such views were based on the biologizing theory of "moral defectiveness" or "moral insanity" (J. C. Pritchard [12], P. G. Belsky [13], A. N. Graborov [14], G. Ja. Troshin [15]), according to which such abilities as learning and fulfilment of moral standards were considered innate. Behavioural deviations, violations of the law were considered as the result of genetically determined degenerative processes, which can be intensified or weakened under the influence of environmental factors. Similar views led to the fact that the term had a broad interpretation, and the category of "morally defective" included the juvenile criminals and hundreds of thousands of children who were "in the street" due to social disasters. After 1925 the term "morally defective" is not fixed in Ukrainian publications. Consistent with the specific of historical ap-

proach to the analysis of the past, the term "defective children" and its derivatives are used in our text.

To the prerequisites and movers of the organization of the Ukrainian differentiated sotzvykh we relate, firstly, the development and significant achievements of the national experimental pedagogic, begun as far back as at imperial time. The foundation was laid for the implementation of scientifically grounded differentiation of children, taking into account the physiological and age characteristics of the formation of their organisms, their ability to learn, the peculiarity of temperaments and characters. The individualization of the education and upbringing of children at that time became widespread in the form of the psychologisation of the educational process [16] due to the research of V. M. Bekhterev [17], A. F. Lazurskiy [18], N. N. Lange [19], P. F. Lesgaft [20], A. P. Nechaev [21], N. E. Rumyantsev [22], I. A. Sikorskiy [23, 24], as well as the works of A. Binet [25], E. Claparède [11], E. Meumann [26], G. S. Hall [27], whose ideas were actively disseminated and introduced into Ukrainian educational practice. The subjects covered in their studies concerned the individual physiological, mental, socio-psychological features of the child's development and its adaptation to the learning process; identifying child's genetic opportunities; specificity of the upbringing of children with impaired psychophysical development and the possibilities of their compensatory education.

Although a lot was done in investigation and implementation of the results of experimental psychological and pedagogical research on the issues mentioned, the efforts of individual scientists lacked systematization and coherence.

## 4 Protection of childhood as an important attempt to realize the Utopian project in the field of Ukrainian sotzvykh

Note that in the early years of the Soviet power in Ukraine an attempt was maid to solve a titanic complex problem – to involve every child under the age of 15 in education and provide social protection to everyone who was left out of family care or needed a specialized medical and pedagogical approach. That is, almost from scratch, the state system of social protection of the most disadvantaged part of the child population was created.

The urgency of introducing the system of revolutionary activities in Ukraine's education in the context of social protection of children was due primarily to the socio-economic consequences of the First World War and Civil War, such as: destruction of families, famine (especially tragic in the Volga region in 1921, from which the masses of the hungry rushed to the southern Ukrainian lands), devastation. As a result, numerous orphans and half-orphans from poor families, refugees without shelter, that is, a large number of homeless and neglected children in need of help and protection appeared. For example, in the Poltava newspaper "Voice of Labour" dated November 28, 1922, noted: "There is information about the plight of starving children from various counties. Their mass extinction is threatening" [28].

According to official data (primarily the 1920 census) [29], children under 11 years made up 11.7 per cent of the population (approximately 2,860,000 people), there was also a significant decrease in the "junior cadres of the population (six years or less)" [29], which is the evidence of extinction from hunger and disease of the most vulnerable category of children – pre-schoolers and infants.

The uniqueness of the multidimensional idea of child protection as the leading component of educational and social state policy in the young Soviet Ukraine is seen in the fact that childcare was recognized as possible only through the combined efforts of teachers and doctors. Such an approach was supposed to promote mass qualified distribution of children in accordance with of their physical and mental health in order to provide each category of children with appropriate medical and psychological assistance and education in relevant educational institutions.

The diversity of the contingent of children and the importance for them to get targeted assistance dictated the need to keep records of child's population. Such inventory was also considered as the "task of social protection of minors" [2], course made it possible to conduct an initial examination of large masses of children, identify problems and deviations in their development of various kinds in order to further distribute children to various types of educational institutions – for normal children, for children with vision and hearing problems, mental disorders, as well as for child offenders.

Since 1924 in line with sotzvykh general (primary) education of children was legislatively introduced in the Ukrainian SSR [29]. According to official data (primarily the 1920 census), children under 11 years old accounted for 11.7 per cent of the population (approximately 2.860.000 children), while there was a significant decrease in the "younger cadres of the population (from six years old or less), which should have been to go to school during the period of general education" [29]. This indicated a high mortality rate for children under school age.

The educational policy of the authorities, which discard the possibility to "move towards general education in a natural way" [30], was oriented not at all toward "school-age children, not at a gradual increase in the percentage of school-age children, but at their most complete and differentiated education coverage". Therefore, at the same time as 8-year-old children, 9-10-year-old children, who for some reason had not yet attended school, were accepted into the first grade. It planed to do so "each subsequent school year" [29]. However, in the official report of the Ukrainian deputy People's Commissar of Education (PCE) A. Ganjiy (data as of 1925) it was noted that "the school in Ukraine never served more than 50 per cent of the total number of children", and therefore the older contingents of 10 years old and older children left out of school should have been covered by the system of illiteracy liquidation (herein after abbr. *likbez*) [29].

In the 1920s penal facilities for juvenile delinquents were changed to educational and labour institutions – labour colonies or labour communes. Some of them were open-type facilities but most of them were closed-type ones. A. S. Makarenko became one of the founders of the

Soviet Penitentiary Pedagogy. Note that the term "penitentiary science" was used already in the 1920s, for example, in 1923 the monograph "Foundations of Penitentiary Science" by S. V. Poznyshev was published [31].

Within the implementation of the Laws on Social Education special establishments on "investigating and distributing minors" were created in the Ukrainian Soviet Socialist Republic. These special establishments included reception centres or temporary 24-hour shelters for homeless children under 15 who required social protection or who committed misconduct. According to the appointment of the juvenile commission, children were sent to the reception centres or handed over to their parents or guardians. In such centres, where children were kept for up to 5 weeks, "the children were studied individually with the aim to resolve the issue of their further distribution" [2]. In accordance with official documents there were three types of reception centres, namely: for normal children who were to be sent to orphanages, for juvenile delinquents and for mentally retarded children of all categories whose upbringing had to be provided by special orphanages [2]. Before sending children from the reception centre to the next social and educational institution, they had to be examined in medical and pedagogical departments (or treatment and prophylactic centres).

In accordance with articles 255–261 of the Law Code the Ukrainian Soviet Socialist Republic on Public Education, the aim of the Treatment and Prophylactic Centres was to provide "the proper organization of social education and the promotion of ideas and achievements of social education" [2]. Treatment and Prophylactic Centres were to provide the necessary "state assistance to mentally retarded children" and had to serve appropriate institutions for mentally retarded children as research and support institutions of social education, namely: "1) to investigate physical and spiritual nature of the children who enter the consulting room; 2) to develop research questions on practice and organization of institutions for mentally retarded children" [2]. The tasks of Treatment and Prophylactic Centres also included training for the staff of social and educational institutions concerned aimed at proper understanding of the nature of mentally retarded children and developing "methods and manuals" [2].

Thus, the main responsibility for the correct placement of children with differentiated needs within the different categories was laid on Treatment and Prophylactic Centres, considering the fact that both in reception centres and in collecting centres the primary medical and pedagogical selection was carried out by their representatives.

The analysis of documents and materials on educational practice in the first decades of the Soviet regime leads to the conclusion that in fact social education was gradually identified with the education provided by the state.

According to the mentioned articles of the Code, four regional Treatment and Prophylactic Centres were opened throughout the republic – in Kharkiv (at that time – the capital of the Ukrainian Soviet Socialist Republic), in Kyiv, in Odessa and in Dnipropetrovsk. Their activities, firstly, influenced the way of implementing and disseminating the pedological approach aimed at investigating childhood among educators in the region concerned, initially – children with special needs; secondly, these activities differed on priority directions of scientific and practical work. But what was more important was that in the 1920s Treatment and Prophylactic Centres became the implementers of an innovative, socially significant idea of individualizing the approach to the organization of children's lives in Ukraine [32, 33].

From the legislative and guidance materials of the Ukrainian SSR in the mid-1920s, in particular from the operational plan of the Department of Social Education of the People's Commissariat for Education of the Ukrainian SSR for 1925–1926, it appears that they had a separate section "Auxiliary School", which stated that "one of the moments which determine the normal functioning of schools, is the formation of a network of auxiliary schools" [34]. Considering Western European statistical estimates, children who required such schools made up 3 per cent which meant that at that time there were more than 50,000 children who required them in Ukraine [34]. The document also singled out the category of children who were "between norm and pathology and who could not be called abnormal in the literal sense [34], but when they started attending a mainstream school, they hindered the "normal flow of labour".

The authors of the document emphasized that at the end of the 19th century in Western Europe, and later in Russia special classes at schools and even separate schools for such children began to appear, and "since 1914 in Ukraine a network of such schools not only did not develop, but even a small number of these schools which existed before the World War I in Kyiv and Kharkov disappeared by 1922" [34]. That's why, acknowledging the urgent need for organizing special classes at schools at the state level, "the Department of Social Education considers it necessary and possible to start organising auxiliary classes as of the next year, and in large centres to start organising entire schools – for about 7,500 children" [34]. But due to the lack of funding, this task "at the local level" was not fully fulfilled.

And the Ukrainian Psychoneurological Institute (UPI) in Kharkiv became the centre for scientific and practical activities in the field of psychoneurological pedology in the Ukrainian SSR. Together with People's Commissariat for Health UPI was responsible for organising and disseminating a special psychoneurological network of children's institutions – schools-sanatoriums for psychoneurotics, schools-hospitals for children with epilepsy, schools-departments for mentally ill children and profound oligophrenics at psychiatric hospitals, out-of-town schools-labour colonies for antisocial psychopaths, speech therapy schools etc. [35]. This way, the differentiation of children with disabilities was deepened in order to provide them with possible medical and rehabilitative assistance in a specially organised health and educational environment.

The activity of Ukrainian pedagogical and medical-and-pedagogical state institutions, which first of all cared for the primary differentiation of the child population on the basis of its examination and identification of children

with normal and abnormal development also involved: the purposeful development of medical and pedagogical support, protection and laying the foundations of scientific and pedagogical study of abnormal children, contributing to the formation of the domestic branch of pedagogy – defectology; making recommendations on organising education and socialization, adequate to the peculiarities of the development and opportunities of children and adolescents; spreading new psychological and pedagogical ideas among teachers and educators and forming a view on an abnormal child not only as a person who needs care, but also as a person with his/her own individual and social needs that can and should be socialized. Due to scientific research, first of all, of representatives of Treatment and Prophylactic Centres and the Ukrainian Psychoneurological Institute, a professional division in the training of specialists in the areas of children's developmental anomalies – deaf pedagogy, typhlopedagogy, oligophrenic pedagogy gradually began to be introduced in Ukraine. These newly established medical and pedagogical institutions significantly supplemented, and sometimes replaced the activities of higher education institutions concerning the process of training, and especially the retraining of defectologists (educators of children with special education needs hearing impaired child [36].

Socially significant and, first of all, humanistic was the deepening in the process of implementing the project of mass education (for all citizens) in the Ukrainian SSR, especially in the 1930s, the differentiation of abnormal children into categories in terms of determining the degree of their disabilities. Thus, after the resolution "On the Introduction of General Compulsory Education for Physically and Mentally Disabled and Speech-Impaired Children and Adolescents" [37], the annex to which provided special explanations concerning the categories of late deaf and hard of hearing children, the latter fell into three categories, depending on the degree of deafness – mild, moderate, severe. Since their education was planned within general secondary schools, pedagogical work was based on general principles and methods used in these schools. At the same time, recommendations on considering the peculiarities of their education and the requirements for attending short-term courses on "facial reading and speech correction and constant supervision of ear specialists" [38] were developed. While implementing the project of mass education, one of the aspects of differentiating education began to be embodied – an attempt to cover the education of all children with hearing problems was made; on the basis of existing diagnostic approaches, children were divided into hard of hearing children, deaf and mentally disabled children, and hard of hearing children were taught in separate classes which increased the efficiency of learning and the possibility of their full-fledged socialization.

We strongly believe that report devoted to the state of childhood in Ukraine at the beginning of 1924 at the meeting of the Board of People's Commissariat for Education of the Ukrainian SSR by doctor Feder was an example of the eloquent evidence of the situation connected with social education. He participated in a special study covered "44 regional and 9 provincial centres". The conducted study revealed the "image of extremely difficult state of childhood" [39], in particular, only 50 per cent of orphanages were housed in adapted buildings with minimum sanitary standards, and the worst situation was in Katerynoslav (Dnipropetrovsk region) and Donetsk region [39]. It was also noted that 46 per cent of orphanages were extremely overcrowded, along with "extreme overcrowding and oxygen starvation there was a problem of chronic malnutrition," so there were 36.2 per cent of starveling children who suffered from anaemia and pretuberculosis". Comparing the functioning of children's boarding schools and schools providing labour education, the situation concerning children from orphanages was recognized as much more difficult.

On the example of the review of children from "boarding schools of normal type" (500 people) conducted in Katerynoslav the following conclusion was formulated: "Children of normal intelligence – 64.9 per cent, mentally disabled children – 45.2 per cent" [39]. Moreover, according to the data obtained, 6-9 year-old children (70 per cent) fell into the group which presented the largest percentage of mentally disabled children. Experts believed that the adverse circumstances of life of young citizens, first of all related to inadequate sanitation, malnutrition and disease had a direct impact on the deterioration of their mental health (increase in the number of nervous children) and on the reduction of their ability to learn school subjects [39].

## 5 "Defective children"

Among scientists of that time who were studying the problems of childhood, it was widely believed that "the study of the children's problems should begin with the most essential, with the most crying question – with defective (disabled) children and homeless" [40]. It was believed that the data on the development of a subnormal child were needed in order to better understand the patterns of development of a normal child (I. A. Sikorskiy [23, 24], A. F. Lazurskiy [18], V. P. Kashchenko [41]).

Describing the overall state of affairs with children's defectiveness in the Russian Empire, psychiatrist and pedologist I. Levinson wrote in 1923 that for the solution of this problem: "The best representatives of psychiatric science and pedagogical knowledge for decades led a stubborn struggle, advocating the creation of a system of educational and special institutions for various categories of "special" children. ... study of such children is practically an untouched field for diverse educational and medical-psychological activities" [42].

According to his approximate calculations, the number of defective children and those "balancing on the brink of abnormality, morally degenerated under the influence of heredity and adverse social conditions and yielding a significant number of juvenile offenders" reaches several million [42], and all of them need "individualized methods of education".

In June 1920, the Ukrainian government adopted the resolution on the coordination of functions of PCE and PCHC related to the care of children with developmental disabilities. It said: "Nervous, mentally ill, mentally

immature, and physically disabled children (deaf-mute, blind and crippled) are brought up in the appropriate special institutions of the PCHP (sanatorium schools, school–hospitals, auxiliary institutions). Education of morally-disabled adolescents is carried out at the relevant institutions of PCE and PCHC (centres for observation and study, colonies for treatment and upbringing and health care of disabled children)" [43].

Subsequently, these provisions were specified in the Code of Laws of the Ukrainian SRR (1922). To clarify, the PCE was engaged in the social development of normal children under the age of 15, and the PCHC patronized children up to 4 years old.

As we have already indicated, in the early 20th century the term "defective (disabled) children", as well as "difficult children", "moral defective children', "abnormal children" denoted a large different-type group of children, whose development and behaviour for various social and psychophysical reasons did not fall under the generally accepted norms. Such children were characterized either by antisocial behaviour, or they experienced difficulties in socialization, or in learning the curriculum, etc. In 1930 there was created in Kharkiv (Kharkiv was the capital of the Ukrainian SRR till 1934) the first in Ukraine Scientific Research Institute of Defectology, which studied the problems of children with anomalies of psychophysical development [44]. It was headed by I. A. Sokolyanskiy, who later became widely known for his development of methods of correctional education and training blind-deaf-dumb children.

Note that, starting from the 1990s, the more humane term "children with special educational needs" began to be used in relation to such children in the Ukrainian pedagogy.

## 6 Homeless children

In the 1920s economic disruption and drought, famine, epidemics and difficult political situation exacerbated the problems of homelessness and caused a significant increase in juvenile delinquency. There were about a million orphans and street children in Ukraine in 1922–1924 [45, 46].

On the whole, the realization of the goals of sotzvykh was complicated primarily by the presence of large-scale children's homelessness, which could not be quickly eliminated, as evidenced by official materials. Thus, the Decree of the All-Union Central Executive Committee and the Council of People's Commissars of the Ukrainian SRR dated November 23, 1927 "On measures to combat child homelessness in the Ukrainian SRR" stated: "Homelessness has not yet been eliminated" [47], but "to the homeless who are under 18 years old and in living conditions that are dangerous for their physical and socio-labour development, the state applies ... measures of social and legal protection, material assistance and education" [47].

The organization and controlling of sotzvykh was carried out by the sector of the Ukrainian PCE – the Main department of sotzvykh (Golovsotsvykh). It was responsible for developing "the main provisions of the social education system and planning the activities for each type of children's institution, depending on the nature of the various groups into which the child population was divided" [2].

According to the level of development of the pedagogical, psychological and medical ideas of that time, there were distinguished: a) children hard in educational sense, b) juvenile offenders, c) homeless children (street children) in Ukraine [35]. Such division led to application of the different psychological, pedagogical and legal methods of influence, taking into account the life and educational needs of these groups of children's population, and therefore to organization of the relevant specialized educational institutions [48].

The Ukrainian practice of social education in the 1920s testified that "attempts to incorporate socially neglected children (even in small numbers) into the groups of normal childhood... did not produce the desired effects: homeless children were negatively affecting other children, but were little exposed to good influence themselves, or ran again outside to the street life" [49].

At the initial stage of social development in Ukraine there was no clear idea how to organize the life of homeless children, orphans and offenders, so that it did not look like the "old-fashioned" models, but obeyed the ideas of socialist education. The most common options to organize the life of such children became the orphanages, agricultural child labour colonies and labour communes [50]. There were also reformatories as a facility for "the re-education of juvenile offenders" [51] who have committed the serious crimes. They also were the part of general network of sotzvykh in Ukraine [52].

At the I All-Ukrainian meeting on the "fight against juvenile delinquency" (October 1924) [52], A. S. Makarenko [53], the head of Poltava labour colony for juvenile offenders named after Russian writer M. Gorky, was the co-reporter of inspector of the Main committee of sotzvykh I. A. Sokolyanskiy – the prominent Ukrainian researcher in the field of training, educating blind deaf-mute children in 1930–1950s [54]. A. S. Makarenko was defending pedagogical expediency of organizing work of the labour colonies for offenders not on a craft approach, as sotzvykh proclaimed, but on the basis of creation of the "considerable enterprises" where youth would be involved in producing the products for the benefit of themselves and society. He advocated creation of the atmosphere of play and cheerfulness in the communes' activity. The main condition for success in the re-socialization of the young offenders A. S. Makarenko identified pedagogical tact – ignoring the illegal past of children, refusing coercion to stay in a colony and even using the terms "criminal", "juvenile offender", complete separation of the communes from guardianship by all the punitive and judicial authorities [53].

As for the number and social composition of homeless children and adolescents in Ukraine and according to N. Veletska who was the pedologist and the employee of the Kharkiv district reception centre, although in 1927 the number of such young people decreased greatly compared to 1921–1922, according to various sources, it still num-

bered from 6000–7000 to 23000 homeless children and adolescents [55]. However, the author emphasized that these figures were very raw, and there were no exact figures on the number of homeless children in Ukraine in 1921–1922 [55]. According to the M. I. Levitina, there were about 100,000 homeless children in Ukraine in 1924 [56].

N. Veletska came to the following conclusion: although "the state strengthened, and war, famine and destruction stayed in the past", there was a significant number of homeless people in Ukraine who continued to pose a complex social problem, considering the fact that about 59,000 children lived in boarding schools [55].

Summarizing the reasons for the emergence of homeless children in Ukraine N. Veletska reached the important conclusions that were essential for understanding the origin and spread of this antisocial phenomenon. She stated that "homeless children who became delinquents because there was no other way to live, were replaced by children who had families and who studied at schools, and it became much more difficult to raise homeless delinquents" [55]. According to her, the number of such children – about 60 per cent – exceeded the "hungry" homelessness, which reached only 38 per cent [55]. Therefore, she strongly believed that social education should be focused on two areas – "the elimination of the heavy legacy of large homelessness and the prevention of new homelessness" [55].

Among the main reasons for emergence of a negative social phenomenon, the researcher called conflicts in the family (father's drunkenness, indifference to raising children, conscious abandonment of children, family instability), lack of "proper care", false "labour education" which in fact was an exploitation of child labour and caused the escape "on the loose" [55], "excessive mobility of children", caused by the fact that "during the huge challenges and changes in life mental health of both adults and children get used to them, ... shifts in public life cause a tendency to change in personal life as well" [55].

However, N. Veletska did not single out such significant sources of homelessness and delinquency as unemployment and starvation in peacetime, about which M. I. Levitina (Maro) wrote back in 1924. According to her study, concerning the state of homeless childhood in Ukraine, the percentage of offences committed by children depended on their parents' earnings and the largest number of illegal actions was committed by children whose parents were unskilled workers [57]. Similar data were given by A. N. Graborov [58].

Analysing the social and educational situation in the 1920s concerning homeless children, we have to state that they were also regarded as difficult-to-raise children (I. Levinson [42], N. Veletska [55]), as juvenile delinquents (V. I. Kufaev [59]), and as normal children in difficult life circumstances (A. S. Makarenko [60], M. I. Levitina (Maro) [57], A. B. Zalkind [61]).

## 7 Education code of the Ukrainian SRR and the differentiation of the child population as a realization of sotzvykh

As it follows from the text of the Code on Education of the Ukrainian SRR (1922), three main groups of children were distinguished – normal children, juvenile offenders, defective (disabled) children, resulting in creation of various types of educational institutions in the system of sotzvykh. The classification determined the individualized vectors of life organization and teaching children. So, normal children should have attended a children's home-boarding school, a day–time children's home, a general 7-years labour school, a kindergarten (summer playgrounds, clubs); juvenile offenders against the law (or "moral-disabled children"), later the homeless children who committed minor offenses in order to somehow survive) had to attend the main orphanage, an auxiliary orphanage, labour colony, labour home for girls; children with developmental defects were sent to the main orphanage ("for children from 4 to 18 with noticeable deviations from the norm in the moral or mental sphere, capable of being influenced by pedagogical measures for development" [2]). The Code separately stated social institutions for deaf and blind children.

Note that the reflected in the Code idea of dividing all children in the country into certain groups had also been recorded in the earlier document "The System of Social Upbringing of Children of the Ukrainian SRR" dated June 25, 1921, according to which, along with institutions for normal children in the Soviet republic, institutions were established for physically, mentally and morally-disabled children, because "normal and defective children should be brought up in institutions of various types" [2]. The need to ensure the interests of representatives of each of the above groups of children was noted as well.

It seems undeniable that the declared approach meant taking into account the diversity of children's characteristics and ensuring social interests of children and adolescents in established educational institutions. Planning to reach the child with "social and educational influence" [1], the organizers of the Soviet educational system considered that "meeting the diversity of the vital needs of children is the goal of the educational process" [2]. Therefore, the idea reflected in the "Declaration of the PCE of the Social Education of Children" that care should be provided to all children, including the sick, defective, "juvenile offenders" and all groups of children in need of a special educational approach, became crucial [1].

The mentioned provisions of the early Soviet legislative documents are considered as the intentions of the authorities to implement an individualized approach in education, which we consider positive. Using the definition of "positive", with which we subjectively assess the essence of the phenomenon, we want to emphasize that at that time there were manifestations of a "negative" differentiated approach in the organization of education or social development. So, with the establishment of Soviet power in Ukraine, the course was set for class differentiation of the population and it found its reflection in school education.

In particular, already in the Resolution on the organization of a general 7-year labour school (June 1920) stated: "When distributing vacancies among those who want to go to school, the decisive factors are: 1) growth; 2) gender (to ensure equal distribution between boys and girls, 3) class and social position (priority is given to children of the proletariat and the poorest families; 4) belonging to professional and political associations that stand on the platform of Soviet power; 5) level of knowledge" [6].

Article 18 of the Code of Laws on Public Education stated legally: "For the full implementation of the general compulsory upbringing and education, the proletarians and the poor are credited to cultural and educational institutions" [1].

Consequently, in the Ukrainian socialist state legislatively fixed the differentiation of students according to class basis, which we attribute to the negative aspects of a socially differentiated approach in education.

Under the conditions of the first years of creation of a proletarian state, circumstances arose that were favourable for conducting not local but mass psychological and pedagogical experiments surveying the nature of normal and anomalous childhood, studying various children's groups, with the approbation of new teaching methods. But this is a topic for a special paper.

## 8 Conclusions

In the historical period under consideration in Ukraine, for the first time at the state level, such important large-scale educational initiatives were proclaimed and implemented as the introduction of "general, compulsory, free education" [6] in the institutions of sotzvykh; accounting of the total child population of the republic; providing protection (social and pedagogical aspects) to all categories of children, including those with deviations in the psychophysical and moral-legal spheres, for which they actively created new educational institutions for various categories of children and adolescents. The nature of those undertakings was distinguished by humanism and a desire for pedagogical innovation. For the scientific support of those activities in 1926 in Ukraine, for the first time in its history, there was created "a special state scientific institution, called upon to carry out systematic, targeted research in various areas of pedagogy" – the Ukrainian Research Institute of Pedagogy [62].

But the idealized, populist ideas proclaimed by the first Ukrainian Soviet documents, which did not take into account the difficult financial and economic situation of the country, as well as the underestimation of the complexity of the pedagogical issues raised, made it impossible to fully implement the ideas that the Bolsheviks proclaimed [63]. For example, A. Handzhii, one of the leaders of the Ukrainian PSE, wrote about the introduction of general 7-years education in 1926: "The enthusiasm of the first revolutionary era in educational work was reflected not only in the transformation of the educational process, but also in an excessive increase in the number of sotzvykh institutions, including labour schools. ... But the iron laws of economics quickly stopped this spontaneous growth of the school network, and not only stopped, but also rolled back the educational cart beyond the achievements of the pre-revolutionary era" [63].

At the same time the organizational, medical and pedagogically reasonable foundations were laid in the 1920s to ensure individualization in the education and take care of various categories of children, although in the spirit of proletarian collectivism. We are convinced: "The reflection on educational past is never finished" [64].

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# Non-government organisations as a basis for sustainable development of education

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**Abstract.** The article examines the experience of team work of scientists-members of a non-government organisation (NGO) "Smart Math". The analysis of the advantages of scientists' collaboration and communication are offered in the current research. The paper presents the findings of scientific collaboration and cooperation of researchers, whose activity is represented on the open educational platform "Higher School Mathematics Teachers". The areas of activity of a team of researchers, which brings together teaching staff of Ukrainian universities, and tackling the issue of developing on-line courses are described in the present article. The outcome of such collaboration of the members of "Smart Math" in 2020 is the increase by 4,7 in the average citation index in scientometrical databases publications.

## 1 Problem statement

Developing a successful country and a constitutional state is impossible without developing public awareness. Non-government organisations (NGOs), which are one of the key social institutes of a person's development and social integration, play a key role in this process. For a scientific community, participation in a professional NGO is an opportunity to fruitfully communicate with like-minded people from different cities and institutions, to implement joint projects, to raise funding for research and publication, etc. Moreover, creating NGOs in a social sphere, in science, culture and education, in innovations and technological development, provides for a development model for civilisation, based on innovations. This way the basic needs of the present generation, along with preserving the environment, strengthening personal and societal health – all the factors, defining sustainable development of the society are met.

## 2 Analysis of the recent research papers and publications

Among the key skills for the future, scientists single out 4 core ones, the so called "Four Cs" – Creativity, Critical Thinking, Communication, and Collaboration. Collaboration and team work play an important role for teaching staff and scientists. Team work for Ukrainian scientists is is usually implemented through team projects and scientific research on-the-job, but such collaboration in our opinion does not give an opportunity to realise a scientist's full potential. A solution to this problem is establishing professional non-government organisations, which contributes to strengthening partnership and collaboration among teaching staff; gives them opportunities to work on scientific projects in teams; allows to p scientific, social and other interests. Moreover, Para. 19 of Art. 38 in "Licensing Terms for Educational Service Provision" [1] contains a requirement concerning "activity in accordance to the speciality in a form of participating in professional and/or civic associations", which gave rise to founding professional civic associations in Ukrainian educational sphere. Thus, an all-Ukrainian NGO "Civic Council of Educators and Researchers of Ukraine" (CCERU) [2] is aimed at contributing to renaissance of a high social profile and a status of an educator and a researcher; to strengthening the role of education and science in economic, moral, cultural development of the society, the state, the citizens and a personality, as well as protecting the joint interests of its members. Non-government organisation "PROSTIR Foundation" [3] was established by students, teaching staff and alumni of East-Ukrainian National University named after Volodymyr Dahl in order to improve the standards of living of the residents of Luhansk region through social partnership, development of leadership in communities, promotion of sustainable development as a lifestyle, support for innovations. Non-government organisation "Educational Era" [4] created one of the most popular domestic educational platforms – a studio of on-line education Ed-

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Era. The participants thereof aim at making on-line education in Ukraine accessible and of high quality. The team creates on-line courses, special projects, interactive books and educational blogs. "Kharkiv Mathematics Society" [5] is a local NGO, which brings together on a voluntary and equal rights basis its members – citizens, who do fundamental and applied research in Mathematics, and /or teach the subject. Non-government organisation "Education of the 21-th century", based in Kharkiv [6], runs advanced training courses for teachers of project classes; implements the project "Intelligence of Ukraine"; arranges trainings for trainers to work in the project with primary school students. The above mentioned proves that the social movement of establishing non-government organisations is becoming more active among teachers and scientists in Ukraine.

International experience of NGOs' work in educational domain is much vaster, than it is in Ukraine. Thus, The American Association of University Professors (AAUP) [7], which was founded back in 1915, contributes to shaping the American higher education, designing standards and procedures, which maintain the quality of education and academic freedom in colleges and universities. Members of the organisation identify fundamental professional values and standards for higher education, advocate for the rights of scientists, for instance, academic freedom and joint management, as well as contribute to the interests of teaching and research in higher education. The National Education Association (NEA) [8] brings together more than 3 million people – educators, students, activists, employees, parents, neighbours, friends, who advocate for equal opportunities for all the students and help create a more fair and inclusive society. The American Association of State Colleges and Universities (AASCU) [9] is a collective voice of about 400 public colleges, universities and systems, which unite the student community. The Association works on increasing students' access to new opportunities; contributes to teaching career development on the international level; supports field studies and the provision of services, that facilitate sustainable development and improvement of the living standards in communities all over the country.

**The objective of this paper** is to examine the experience of team work of researchers-members of the NGO "Smart Math"; to show how joint effort of educators results in creativity, critical thinking, communication and collaboration.

## 3 Methods

The analysis of the international communication experience of scientists, the synthesis of such analysis and own experience resulted in a decision to bring together experts, working in Mathematics and teaching methods. Upon stating its objective, the NGO "Smart Math" was founded and registered on September 27, 2019 (registration number in the Unified Register of Organisations 1503698 [10]) by Professor Kateryna Vlasenko and Associate Professor Iryna Sitak. Currently the organisation consists of 16 members, scientists from technical and pedagogical universities of the centre, east and south of Ukraine.

According to the articles of association of the NGO "Smart Math" [11], its "... main purpose is to meet the social, economic, cultural, ecological and other needs of the Organisation, teaching staff and student community; to facilitate exercising rights and freedoms, collaboration and partnership (on the international level including), in developing mathematical education and culture through efficient implementation of social initiatives".

The key areas of interest for the Organisation are: "Impact on the development processes in mathematical education through collaboration of experienced university teaching staff, whose joint effort will facilitate tackling the issue of engaging wider audience into developing and promoting Mathematics; efficient usage of internal potential of educational institutions; introduction and protection of intellectual property of the members of the teaching community; bringing together communities, public for-profit and non-for profit organisations in the domain of education and culture; support for state and local authorities in dealing with issues that relate to the rights and legitimate interests of the Organisation's members; contribution to shaping the societal awareness of the priority of the educational culture units development and drawing attention of the society to their problems; participation in designing and implementing local education and culture development programs; comprehensive support for educators through providing informational, methodological and organisational assistance, engaging them into the work of the Organisation; raising awareness of the society of the problems in education and culture, developing solutions to those problems; representation of the Organisation's members in their relationships with enterprises, institutions and organisations of different form of ownership; promotion of the mathematical education development, including extracurricular activities; popularisation of the mathematical education attractiveness; creating and supporting educational on-line platforms for Mathematics teachers, which will facilitate exchanging and sharing international experience within the life-long learning framework; arrangement of study visits in order to learn about specificities of teaching Mathematics in different regions of Ukraine and around the world; foundation and popularisation of Mathematics clubs or societies in educational establishments of different levels of accreditation; implementation of mathematical projects; contribution to developing standards and increasing quality of education and culture; fostering and engagement in international collaboration in the domain of education and culture, arranging and holding non-for profit educational events, courses, on-line courses, congresses, workshops, festivals, seminars, lectures, round tables, exhibitions, forums, other social and cultural public events, involving national and international experts and specialists, members of the public, state and local authorities, representatives of educational establishments; contribution to enhancing the legal awareness of both – the Organisation's members and members of general public; advocating for rights to safe and healthy natural environment and comprehensive fostering of safeguarding flora

and fauna; promotion of healthy lifestyle; arrangement of printing activities for the sake of pursuing the purposes, stated in the articles of association, and facilitation of publishing and disseminating printed, audio, video products, photos, related to the Organisation's purposes; foundation of mass media in pursuit of the Organisation's purposes and objectives, stated in the articles of association; coordination of the activities of its members for the sake of achieving the Organisation's purposes and objectives; participation in implementing international, all-state, regional, local and own development programs in the domain of education and culture; engagement in the work of associations and other voluntary unions, which facilitate achieving the Organisation's goals, stated in the articles of association, including international partnerships; participation in the work of advisory and other subsidiary bodies, established by the state and local authorities in order to hold consultations with public associations and draft guidance on issues, related to their sphere of interest".

## 4 Findings

Upon establishing the NGO "Smart Math" in September 2019, several teams were built, each of them focussing on doing research in the following domains: development of on-line courses, project work, cloud computing, etc. An open educational platform "Higher School Mathematics Teacher" was also developed [12]. Content on the platform is placed in two languages – Ukrainian and English in order to attract international partners. Target audience of the platform are undergraduate students and teaching staff of pedagogical universities. The platform helps each of them to solve one of the most complicated tasks – how to teach a student majoring in engineering to learn Mathematics. The platform became a venue for scientists, who are willing to share their practical skills in teaching Mathematics. As of June 01, 2021 the following educational and methodological courses were published on the platform – "Methods for Teaching Mathematics to Students in Technical Universities" [13], "Project method in Teaching Higher Mathematics" [14], "Differential Equations" [15]; work on such courses as "Personal e-Learning Environment of the Maths Teacher" [16], "Creative Thinking Through Learning Elementary Maths" [17], "Operations Research Oriented to Cloud Computing in the System CoCalc" [18] is ongoing. The researchers described their experience of developing such courses in their papers [19–21].

Scientific communication and collaboration resulted in the research works, which were published, are included into the scientometrical databases Scopus and Web of Science, as well as into reviewed specialised domestic journals. The number of citing of publications by scientists-members of NGO in the the scientometrical database Scopus (table 2) in 2020, compared to 2019, increased by 4,6 times (figure 1), namely in Google Scholar – an increase by 2,7 times (figure 2), in Scopus by 44,4 times (figure 3) and in scientometrical database Google Scholar (table 1). In 2021 this movement towards the increase in the number of citing and Hirsch index for teaching staff is on the rise as well.

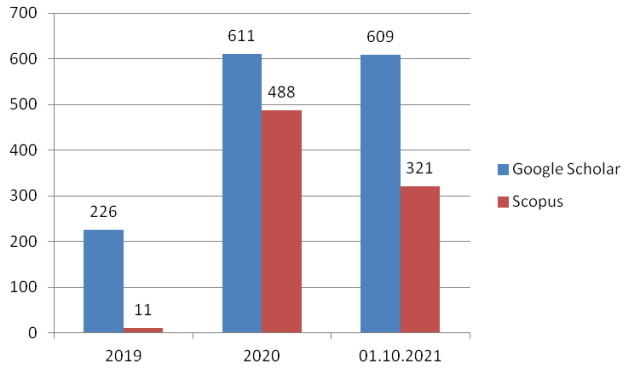


**Figure 1.** The total number of the publications by members of the NGO "Smart Math".

The outcome of the collaboration of scientists within the NGO was discussed at the 7th Workshop on Cloud Technologies in Education (CTE 2019) [19], XII International Conference on Mathematics, Science and Technology Education (ICon-MaSTEd 2020) [20], XIII International Conference on Mathematics, Science and Technology Education (ICon-MaSTEd 2021) [21] and others.

## 5 Discussion

The number of non-government professional associations is growing in Ukraine and worldwide, societal interest, which the scientific community takes in participating in such associations, is on the increase. Thus, a scientific research by Volkova [22], dedicated to a comprehensive analysis of the current situation and prospects for harmonizing the Ukrainian constitutional legislation on non-government organisations with the European standards for non-government organisations. Kobziev [23] and Bezverkha [24] put consideration into the role, which NGOs play in scientific and professional training of students. McGinn [25] examines the experience of supranational organisations in decentralisation and privatisation of education, an opportunity for non-government or-

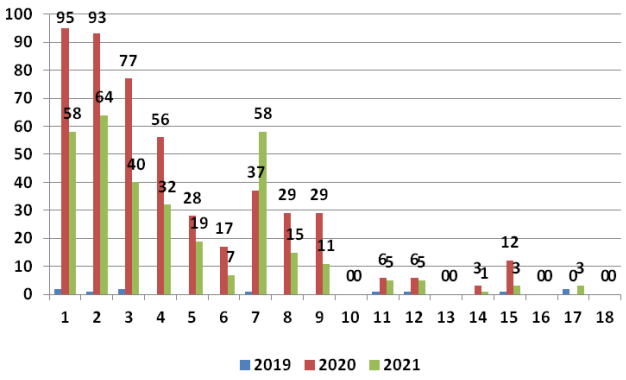


**Figure 2.** The number of citing of the publications by members of the NGO "Smart Math" in Scopus.

**Table 1.** The number of citing of the publications by members of the NGO "Smart Math" in the scientometrical database Google Scholar.

| Scientists | Scientific title | Total | 2019 | 2020 | 2021.10.01 | h-index |
|---|---|---|---|---|---|---|
| Vlasenko K. | Doctor of Education | 577 | 45 | 125 | 127 | 13 |
| Lovianova I. | Doctor of Education | 465 | 34 | 125 | 129 | 12 |
| Chumak O. | PhD in Education | 195 | 16 | 83 | 85 | 8 |
| Sitak I. | PhD in Education | 190 | 20 | 68 | 53 | 8 |
| Kondratyeva O. | PhD in Education | 31 | 5 | 1 | 1 | 1 |
| Achkan V. | Doctor of Education | 94 | 13 | 21 | 5 | 5 |
| Bobyliev D. | PhD in Education | 95 | 3 | 34 | 49 | 4 |
| Volkov S. | | 57 | 1 | 27 | 24 | 5 |
| Kovalenko D. | | 53 | 0 | 28 | 25 | 3 |
| Beskorsa O. | PhD in Education | 28 | 6 | 5 | 7 | 3 |
| Havrilova L. | Doctor of Education | 254 | 47 | 70 | 61 | 7 |
| Ishutina O. | PhD in Education | 39 | 3 | 13 | 16 | 3 |
| Oriekhova V. | | 4 | 0 | 2 | 1 | 1 |
| Khizhniak I. | PhD in Education | 58 | 19 | 5 | 15 | 4 |
| Armash T. | PhD in Education | 12 | 3 | 4 | 1 | 2 |
| Dziuba M. | PhD in Physics and Mathematics | 6 | 5 | 0 | 1 | 1 |
| Khilkova L. | PhD in Physics and Mathematics | 23 | 6 | 0 | 8 | 3 |
| Kaluhin R. | | 1 | 0 | 0 | 1 | 1 |

**Table 2.** The number of citing of the publications by members of the NGO "Smart Math" in the scientometrical database Scopus.

| Scientists | Scientific Title | Total | 2019 | 2020 | 2021.10.01 | h-index |
|---|---|---|---|---|---|---|
| Vlasenko K. | Doctor of Education | 160 | 2 | 95 | 58 | 8 |
| Lovianova I. | Doctor of Education | 163 | 1 | 93 | 64 | 7 |
| Chumak O. | PhD in Education | 120 | 2 | 77 | 40 | 7 |
| Sitak I. | PhD in Education | 90 | 0 | 56 | 32 | 6 |
| Kondratyeva O. | PhD in Education | 47 | 0 | 28 | 19 | 5 |
| Achkan V. | Doctor of Education | 40 | 0 | 17 | 7 | 4 |
| Bobyliev D. | PhD in Education | 66 | 1 | 37 | 58 | 4 |
| Volkov S. | | 44 | 0 | 29 | 14 | 4 |
| Kovalenko D. | | 42 | 0 | 29 | 11 | 3 |
| Beskorsa O. | PhD in Education | 1 | 0 | 0 | 0 | 0 |
| Havrilova L. | Doctor of Education | 12 | 1 | 6 | 5 | 1 |
| Ishutina O. | PhD in Education | 12 | 1 | 6 | 5 | 1 |
| Oriekhova V. | | 0 | 0 | 0 | 0 | 0 |
| Khizhniak I. | PhD in Education | 4 | 0 | 3 | 1 | 2 |
| Armash T. | PhD in Education | 16 | 1 | 12 | 3 | 2 |
| Dziuba M. | PhD in Physics and Mathematics | 0 | 0 | 0 | 0 | 0 |
| Khilkova L. | PhD in Physics and Mathematics | 7 | 2 | 0 | 3 | 2 |
| Kaluhin R. | | 0 | 0 | 0 | 0 | 0 |

ganisations to compete with the national ones for control over public education. Rowan [26] studied specific features of political control over education, educational non-government organisations, team work of scientists. Lai et al. [27], Nganga [28], Happ [29] state that persons with highly developed collaboration skills and team work achieve better results in studying and more recognition from employers.

Highlighting the importance of establishing non-government organisations by university teaching staff, we determine their special application effect as collaboration practices and claim, that core skills of the 21st century, such as communication, collaboration, critical thinking, and creativity, are considered central for achieving success in the modern world in general, and in the context of key subject areas, contributing to sustainable development of the society. Focussing attention on the non-government organisation "Smart Math", there is ground to believe, that communication gives teachers an opportunity to promptly obtain new information, findings of research work and educational experiments; collaboration contributes to the increase in the scope of research and the speed of processing

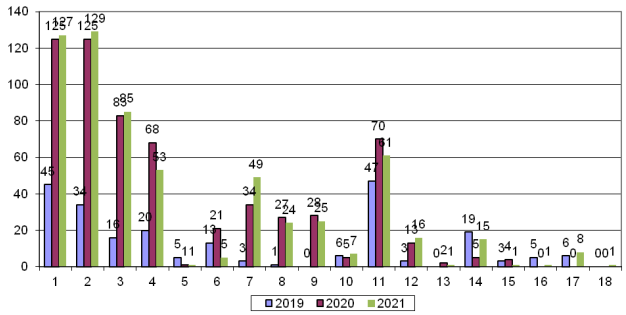


**Figure 3.** The number of citing of the publications by members of the NGO "Smart Math" in Google Scholar.

thereof, which in turn increases the number of scientific publications; critical thinking helps to objectively analyse each proposal and scientific hypothesis, allows to "sift through" the ideas before bringing them into the open; creativity makes the results of joint work more unconventional and varied. Hence, continuous development of scientific communication within a non-government organisation affects positively the sustainability of the development of scientific environment and society.

## 6 Conclusion

Hence, organisation of teachers into a non-government organisation is an important means to develop a fundamentally new attitude to a teacher-researcher – for one thing, as to a subject of social and scientific system, for another – as to a main goal of the development. Systemic character of such an activity is a prerequisite for a sustainable development of the society. Participating in the work of the non-government organisation "Smart Math", scientists get an opportunity to communicate internationally, to receive funding for their research work, to upgrade their skills. It also creates absolutely new networks of social and scientific relationships, which is proved by the number of international conferences, in which the members non-government "Smart Math" participated. A non-government organisation helps researchers to share internationally their scientific achievements; to put into practice promising findings; to establish international collaboration with scientific and educational institutions, organisations and associations through publishing materials on an open educational platform "Higher School Mathematics Teacher".

The non-government organisation "Smart Math" plans to develop new on-line courses, to implement a project in promoting mathematical education, to engage foreign colleagues into participation in the Organisation.

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# Technologizing youth training for entrepreneurship to fulfil sustainable development goals

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**Abstract.** The relevance of the article can be justified by the requirements for youth entrepreneurship training defined by sustainable development goals. In particular, these requirements are expected to promote the continuous, comprehensive and sustainable economic growth of the country, as well as full and decent employment for all. The object of the research is the technologization of youth training for entrepreneurship. The aim of the research lies in justifying and experimentally verifying the author's method of introducing pedagogical technologies in youth training for entrepreneurship in vocational education institutions. Results: the author's method of introducing pedagogical technologies is defined as a system of dependent variables, pedagogical factors and algorithms of their application. The article also presents a modelled algorithm of the simultaneous introduction of the author's technologies (motivating future specialists towards business activity, improving their financial literacy and capacity for project activity and effective self-management) in educational institutions. The effectiveness of this method has been verified during a pedagogical experiment. This experiment aimed to prove the positive dynamics in the levels of future specialists' entrepreneurship competence. Conclusions: In the short run, the author's method of introducing pedagogical technologies in youth training for entrepreneurship allows one to optimize teachers' activities (by simplifying the choice of pedagogical influence factors and isolating dependent variables), strengthen the systematicity, controllability, reproducibility and effectiveness of the author's technologies. In the medium run, it will promote the technologicalization of vocational education and help achieve sustainable development goals. Experimental verification of the author's method has shown a significant increase in students' levels of entrepreneurship competence. Furthermore, it has proved the synergistic effect of the systematic use of innovative forms and methods of pedagogical influence on personality.

## 1 Introduction

Ukraine's Sustainable Development Strategy was created under "The Sustainable Development Goals: Ukraine" national report [1, 2]. Besides, it was updated taking into account the specifics and needs of national development which should facilitate Ukraine's transition to integrated economic, social and environmental development. Emphasis is placed on youth entrepreneurship training as defined by the following sustainable development goals: decent work and economic growth (goal 8); industry, innovation and infrastructure (goal 9); sustainable consumption and production (goal 12); peace, justice and strong institutions (goal 16).

The current stage of Ukraine's market transformation shows that the country's economy is not fully suitable for effective functioning in today's market environment. Promoting small businesses can be an effective way to create new jobs quickly, eliminate unemployment and overcome negative processes in the economy of depressed regions. Entrepreneurship can mark the beginning of a business career for young specialists, help them unleash creative potential and motivate them towards professional fulfilment and success [3]. Nowadays, entrepreneurship competence and activity of young people provide the appropriate economic and social effect which will improve living standards, reduce unemployment and create new jobs. It will also make it possible to form a middle class as the basis of socio-economic reforms and the guarantor of political and social stability of democratic development [3, 4].

Youth entrepreneurship should be viewed as a factor in increasing youth employment and a condition for creating new jobs. The development of youth entrepreneurship is one of the most important areas of economic policy. However, the process has been rather slow in Ukraine. Only 10% of young people aged between 18 and 35 are engaged in entrepreneurship [5]. In recent years, youth

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employment in the public sector has declined and outlined the shift towards the private sector. Besides, one can observe growing social tensions among young people, owing to the rising overall unemployment.

In this regard, creating favourable conditions for developing youth entrepreneurship and revealing their entrepreneurship potential can lead to a positive socio-economic effect. Thus, education technologization should become the priority. In turn, the technologization of youth entrepreneurship training involves the following: optimizing the simultaneous introduction of various pedagogical innovations and coordinating actions of all the actors in pedagogical influence on the development of competences in demand in both society and economy due to systemic, effective, supervised and repeated use of innovative pedagogical technologies. This highlights the relevance of the optimizing method of introducing pedagogical technologies as a system of dependent variables, pedagogical factors and algorithms of their application which should lead to the synergistic effect from the systematic use of innovative forms and methods of pedagogical influence on personality.

The research concept relies on the provisions of relevant international and national documents, which have identified new landmarks in global development, as well as in Ukraine's economy and education system. They are as follows: "Transforming our world: the 2030 Agenda for Sustainable Development" [6]; "The Sustainable Development Goals: Ukraine" [2]; Decree No 722/2019 of the President of Ukraine dated September 30, 2019, on Sustainable Development Goals of Ukraine for the period till 2030 [7]. These documents recognize sustainable development as the only possible way for the economy, civic society and government to increase the standard and quality of life of the population, respecting constitutional human rights and freedoms. When developing innovative pedagogical technologies and mechanisms of their introduction in educational institutions, the authors of the article have adhered to the USAID Leadership in Economic Governance Program [8], United Nations Development Program and other documents, which prioritize youth entrepreneurship in terms of the country's economic development and social harmony in society.

According to the UN, improving employment through entrepreneurship is an important part of one of the global education goals. The European Parliament and the Council of the European Union have approved the European Reference Framework of Key Competences for Lifelong Learning [9]. It defines entrepreneurship competence as "the capacity to act upon opportunities and ideas and to transform them into values for others. It is founded upon creativity, critical thinking, and problem solving, taking initiative and perseverance and the ability to work collaboratively in order to plan and manage projects that are of cultural, social or commercial value. Other basic international documents state that each country, taking into account its national specifics and individual situation, builds its education system in such a way as to harmonize social needs, available resources, internal and external factors of economic development".

A detailed review of studies by Borodiyenko et al. [8], Malykhina et al. [10], Bazyl et al. [3, 11] shows that the problem of youth entrepreneurship training has a historical, legal, socio-economic and political basis. Quite noteworthy are recent findings on the digitalization of youth entrepreneurship training [12–14]. These ideas have been taken into account when determining types and forms of pedagogical influence on students as future entrepreneurs. One should also pay particular attention to the research on an electronic portfolio [15–17] as a method of self-presentation of business ideas.

The research fellows of the Institute of Vocational Education and Training of the NAES of Ukraine have elaborated a pedagogical system of developing entrepreneurship competence in future specialists in vocational education institutions [18] and certain pedagogical technologies: enhancing business activity [11, 18]; developing entrepreneurship competence through project activity [19] and self-management [20]; improving financial literacy [21]. However, it is still crucial to analyze the results of the systematic implementation of the author's technologies in vocational education institutions.

The article *aims* to justify and experimentally verify the author's optimizing method of introducing pedagogical technologies to develop entrepreneurship competence in future specialists in vocational education institutions.

## 2 Theoretical background

Given the urgency of education technologization, it is essential to develop and systematically implement pedagogical technologies for developing entrepreneurship competence. The latter is seen as a system of stage-by-stage pedagogical actions (teaching, character building and personal development) aimed at rational and consistent use of forms, methods and tools of pedagogical influence to develop professionally important qualities, skills and abilities in the context of entrepreneurship. The author's pedagogical technologies for developing entrepreneurship competence [18] are expected to enhance future specialists' business activity, financial literacy, project activity and self-management. The proposed method allows one to strengthen their systematicity, controllability, reproducibility and effectiveness.

The author's technologies involve the use of similar forms and methods of work. Optimizing the introduction of pedagogical technologies, one can combine similar forms and eliminate duplication when selecting factors of pedagogical influence on changing features of a student's personality. Besides, this method also highlights students' traits common to all implemented technologies.

The technology for enhancing business activity relies on learning tasks accorded with the main entrepreneurship activities (business organization and planning; development and marketing of goods or services; uniting people who share views on the implementation of business ideas; personnel management). This technology lies in nurturing the qualities favourable for entrepreneurship by involving students in solving different situations, planning business,

creating and promoting goods, building teams and managing personnel.

The technology for developing entrepreneurship competence through project activity is aimed at the following: to incorporate project activities in professional training of future specialists; to reveal creative talents of students during independent and team work; to combine game-based forms and research work; to create conditions for a rational combination of cognitive, instructional, research, creative and other activities and economic simulations necessary for a successful business.

The technology for developing entrepreneurship competence through self-management implies a system of stage-by-stage pedagogical actions. These actions involve using forms, methods and techniques of self-management to nurture personal constructs (self-awareness, personal values, self-motivation, social knowledge about oneself, the world, the labour market and entrepreneurship, self-esteem, self-education, self-actualization and self-presentation) which one requires for a successful personal and professional career in the field of self-employment.

The technology for improving financial literacy is viewed as a set of pedagogical actions aimed at developing the following skills: keeping records of income and expenses; managing financial resources and planning future financial decisions; choosing financial instruments and creating savings to secure the future and be prepared for crises. The essence of the technology lies in improving financial literacy by using innovative teaching (e.g., case studies) and interactive methods. The content of the technology is aimed at developing and increasing levels of future specialists' financial competence based on a practice-oriented approach and social partnership, as well as the involvement of banking and financial organizations. This will enable the efficient preparation of young people for successful activities under the complex and dynamic conditions of the economy today.

A detailed analysis of the author's technologies has allowed one to identify students' common personal characteristics which should be subjected to pedagogical influence. These are axiological orientations, motivation towards success, interest in entrepreneurship; economic, legal and psychological knowledge to run a business; communication and organization skills; self-concept.

As shown by a survey of teachers participating in the all-Ukrainian experimental work (several orders of the Ministry of Education and Science of Ukraine, including No 1227 as of November 12, 2018, and No 742 as of May 28, 2019), they find it rather difficult to introduce several different technologies and methods in the activities of one educational institution simultaneously. In this regard, it was important to develop an algorithm for the simultaneous introduction of the created technologies in educational institutions (figure 1).

The above-mentioned algorithm consists of the following stages:

1) motivation and enhancement (motivating teaching staff by a common goal, that is, to generate young people's interest in entrepreneurship, prepare them for it and develop their entrepreneurship competence; proper theoretical and practical training of teachers (pedagogical readings, methodical seminars, round-table discussions, webinars, advanced training courses); introducing mechanisms of promoting innovative teaching);

2) strategy building (incorporating tasks of preparing for independent entrepreneurship into strategies on educational institutions development; documenting tactical tasks defined by these strategies, updating curricula and syllabi, concluding agreements with various groups of stakeholders);

3) organization and coordination (creating organizational-pedagogical conditions to introduce innovations; elaborating the programme for developing entrepreneurship competence; selecting actors, forms and methods of work; organizing the coordination centre to introduce innovative pedagogical technologies for developing entrepreneurship competence in educational institutions and entrusting certain authorities to these institutions);

4) procedures and reflection (implementing the programme of entrepreneurship competence development (motivating students, conducting classes and activities); assessing and correcting results (tests, surveys, portfolio analysis), reflection).

This algorithm has allowed one to create a mechanism for optimizing the use of the proposed technologies for developing entrepreneurship competence in future specialists. On the one hand, it identifies the factors of pedagogical influence (areas, types and forms of work) (figure 2) common to these technologies. On the other hand, the algorithm determines the main dependent variables (values, motives, knowledge, abilities, skills, characteristics of self-concept of student's personality), which should be subjected to pedagogical influence under certain pedagogical factors.

## 3 Results

A stage-by-stage pedagogical experiment has been conducted at Vinnytsia Centre for Vocational Education in the Processing Industry, Lviv Higher Vocational Art School, Odesa Higher Vocational School of Trade and Food Technologies, Regional Centre for Vocational Education of Garment Production and Service Industry of Kharkiv Oblast, Cherkasy Vocational Road-Transport Lyceum, Scientific-Methodical Centre for Vocational Education in Kharkiv Oblast, Melitopol Multidisciplinary Centre for Vocational Education, Khmelnytskyi Higher Vocational School No 11, Scientific-Methodical Centre for Vocational Education and Training of Engineering Educators in Khmelnytskyi Oblast. The participants are 401 vocational education students (to identify levels of entrepreneurship competence) and 42 teachers (to carry out an expert evaluation of the author's method for optimizing simultaneous introduction of pedagogical innovations).

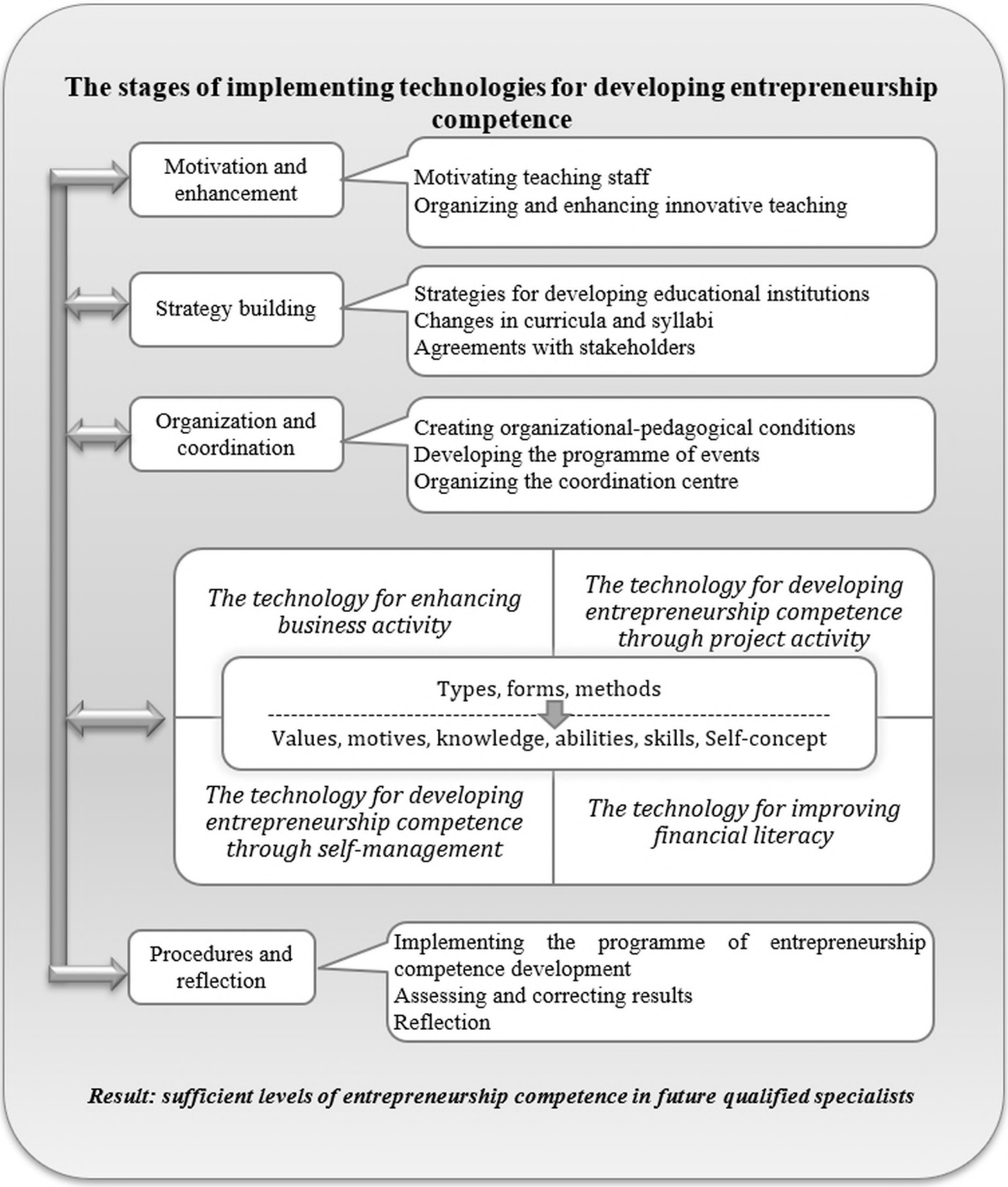


**Figure 1.** The algorithm of introducing technologies for developing entrepreneurship competence in vocational education institutions.

The levels of future specialists' entrepreneurship competence have served as the basis for verifying the effectiveness of youth entrepreneurship training under the following criteria:

- motivational – it is manifested through axiological orientations towards entrepreneurship, motives and aspirations to accomplish business goals, achieve personal and professional success;
- cognitive – it describes a system of theoretical and practical knowledge about entrepreneurship (creating start-ups, raising awareness of market mechanisms for entrepreneurship management, promoting employee relations ethics);
- activity-related – it depends on entrepreneurship skills (planning entrepreneurship, realizing business projects, making sound economic decisions, using rational meth-

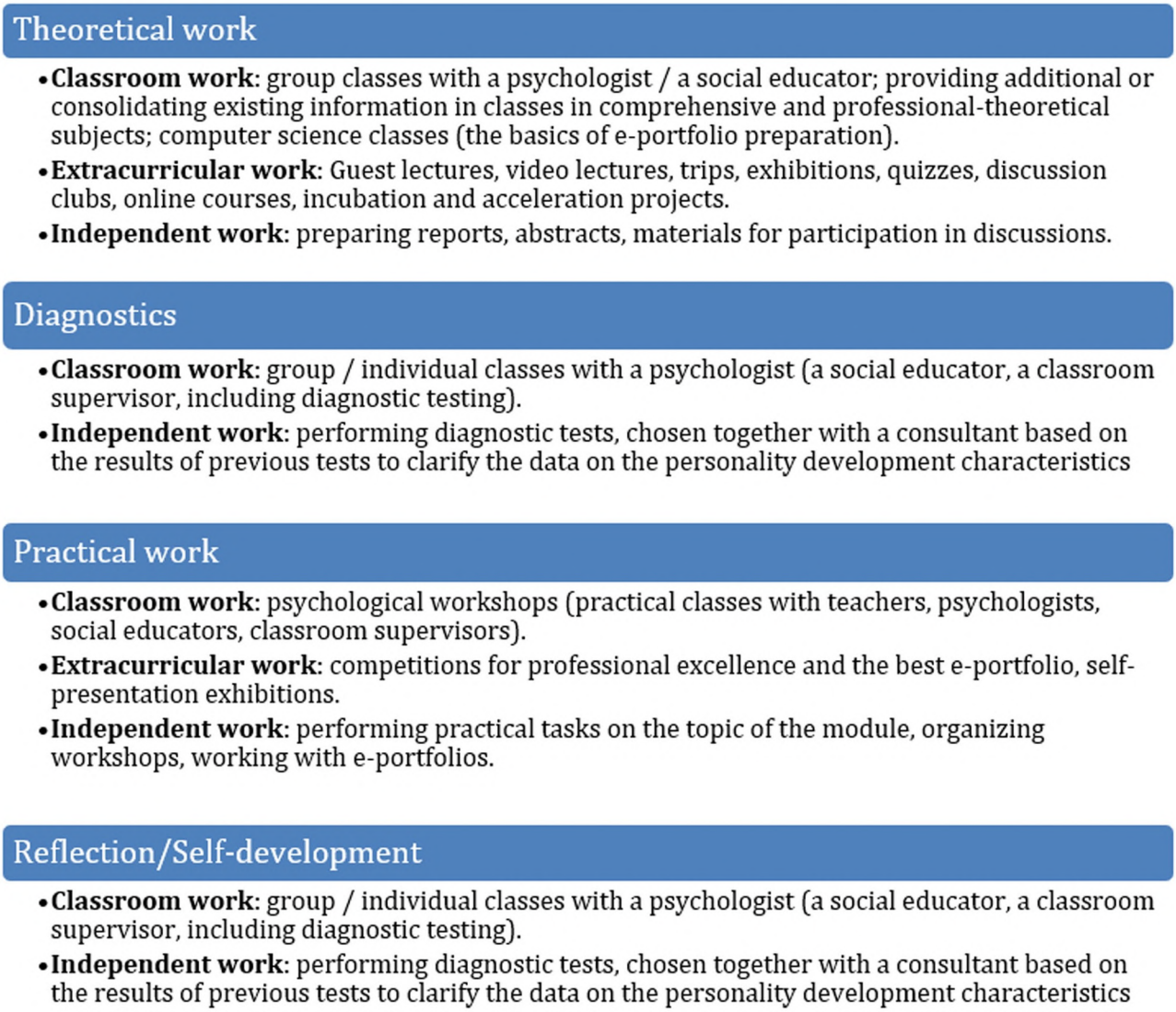


**Figure 2.** Types and forms of entrepreneurship competence development.

ods, developing effective models of action and presenting results);

- personal – the ability to generate and implement new commercial ideas, predict results, adapt to new economic opportunities, show leadership qualities, strive for self-organization and self-development.

One can evaluate the development of entrepreneurship competence by three levels (sufficient, average, initial). Methods for evaluating entrepreneurship competence can be found on the website of the professional career laboratory of the Institute of Vocational Education and Training of the NAES of Ukraine (https://ivet.edu.ua/labs/prof-career/opytuvannia-testuvannia).

Pearson chi-squared test has been used to verify the obtained results. Its indicators have proved the positive dynamics in the levels of future specialists' entrepreneurship competence by all the criteria at the ascertaining and formative stages of the experiment.

A detailed analysis of dynamics in the development of entrepreneurial competence, as the result of the systemic and controlled influence of certain experimental factors, has proved the effectiveness of pedagogical technologies for developing entrepreneurship competence in future specialists. These technologies have been systematically implemented in the educational institutions participating in the experiment.

According to the motivational criterion, the number of students with a sufficient level of entrepreneurship competence has increased by an average of 8.06%. In particular, the level of axiological orientations towards entrepreneurship has increased by 7%, the motivation towards success – by 21%, an interest in entrepreneurship – by 8.77%. Finally, the number of students with a conscious attitude towards entrepreneurship has increased by 11.17% ( figure 3).

According to the cognitive criterion, the number of students with a sufficient level of entrepreneurship competence has increased by 18.89%. In particular, the indicators of students' knowledge about entrepreneurship theory have improved by 17.94%, the entrepreneurial process – by 11.95%, the legal framework of entrepreneurship – by

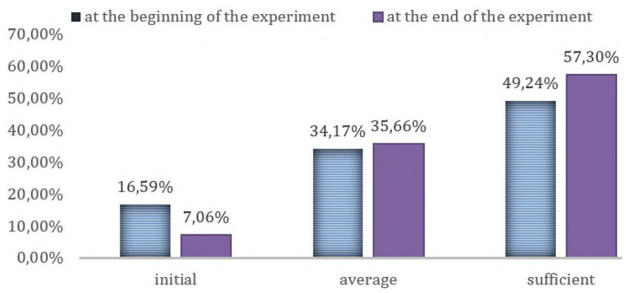


**Figure 3.** Levels of entrepreneurship competence by the motivational criterion.

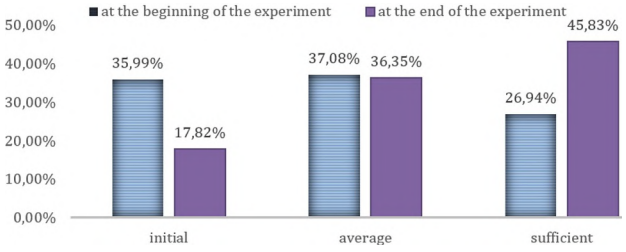


**Figure 4.** Levels of entrepreneurship competence by the cognitive criterion.

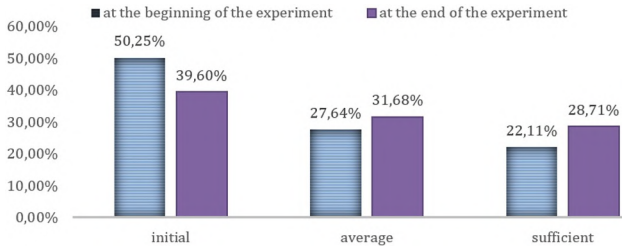


**Figure 5.** Levels of entrepreneurship competence by the activity-related criterion.

11.99%, the fundamentals of business management – by 33.25%, market mechanisms of entrepreneurship management – by 19.39% (figure 4).

According to the activity-related criterion, the number of students with a sufficient level of entrepreneurship competence has increased by 10.8%. In particular, students' entrepreneurship skills have improved by 20.07%, business project planning – by 14.99%, logical thinking – by 4.66%, self-presentation skills – by 6.6% (figure 5).

According to the personal criterion, the number of students with a sufficient level of entrepreneurship competence has increased by 23.48%. In particular, students' entrepreneurial thinking has improved by 18.53%, prognostic skills – by 28.45%, initiative, flexibility and ability to take reasonable risks – by 21.51%, organization and self-management skills – by 26.16% (figure 6).

At the same time, 42 teachers acted as experts, who, based on their experience of innovative teaching, evaluated the effectiveness of introducing pedagogical technologies before and after using the author's method. In doing so, they relied on the following criteria: ease of choosing

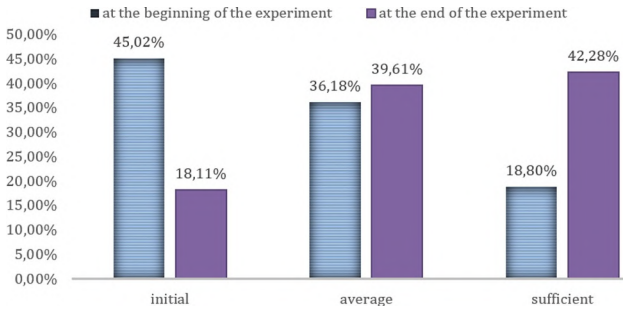


**Figure 6.** Levels of entrepreneurship competence by the personal criterion.

pedagogical influence factors; convenience in isolating dependent variables; systematicity, controllability and effectiveness of experimental factors influence; the presence of the synergistic effect. The evaluation was performed on a twelve-point scale (figure 7).

The expert evaluation shows that using the author's optimizing method in the institutions participating in the experiment has led to the following results. It has become possible to simplify choosing pedagogical influence factors by 38.62%, isolating dependent variables by 23.1%, improve systematicity (38.62%), controllability (51.61%) and effectiveness (25.39%) of pedagogical influence, identify the features of the synergetic effect from the simultaneous introduction of several pedagogical innovations.

## 4 Discussion

The authors of the article have confirmed the positive dynamics of change in all the criteria by comparing the results on entrepreneurship competence levels obtained at the ascertaining and formative stages of the experiment. In general, one can observe a significant increase in the percentage of students with a sufficient level of entrepreneurship competence. According to the motivational criterion, students' motivation towards entrepreneurship (including axiological orientations, motivation towards success, interest in entrepreneurship) has increased by an average of 8.06%. The indicators of the cognitive criterion have improved by 18.89%. These include the knowledge about entrepreneurship theory, the entrepreneurial process, the legal framework of entrepreneurship, the fundamentals of business management and, finally, market mechanisms of entrepreneurship management. The indicators of the activity-related criterion have improved by 10.8%. In particular, the respondents have demonstrated the ability to systematically study and develop qualities necessary for a successful business, create, administer and use an e-portfolio to advance a professional career; plan, present and implement business projects. The indicators of the personal criterion have improved by 23.48%. Most respondents have shown sufficient levels of the ability to generate innovative business ideas and identify possible risks, as well as prognostic, organization and self-management skills.

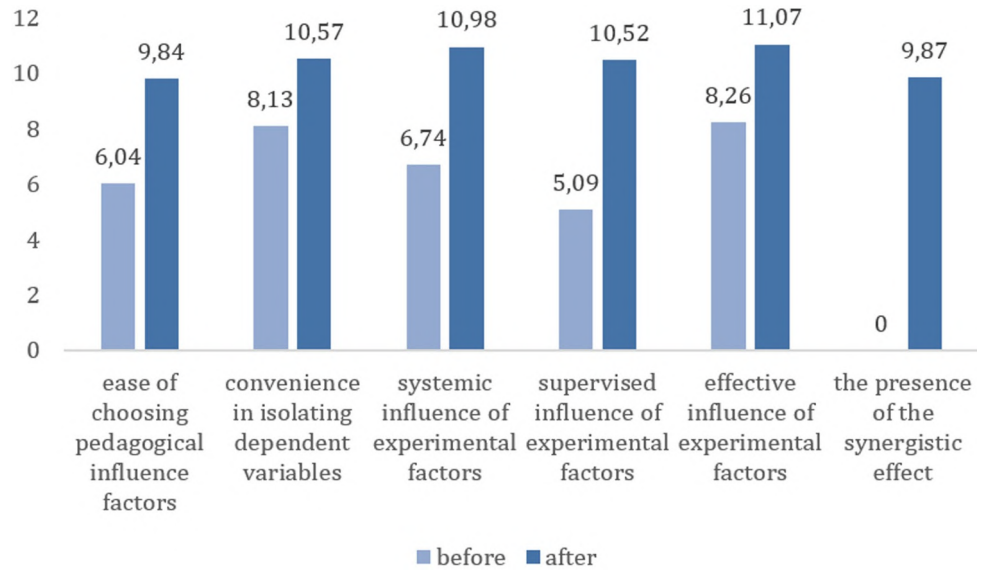


**Figure 7.** The effectiveness of introducing pedagogical technologies before and after using the author's method.

A survey of teachers participating in the experiment (eight creative groups with a total of 42 respondents) proves that systematic integration of the author's technologies for their supervised introduction in the abovementioned educational institutions has made it possible to simplify choosing pedagogical influence factors (common types, forms and methods of work), isolate dependent variables inherent in all technologies (values, motives, knowledge, skills, personal qualities), strengthen interdisciplinary links, unite the teaching staff, boost their motivation to engage in innovative teaching, optimize the time costs, increase the levels of entrepreneurship competence in future specialists.

## 5 Conclusions

It is crucial to update the national system of vocational education by taking into account basic international and Ukrainian documents, conclusions and recommendations of Ukrainian researchers and practitioners that emphasize the existence of direct links between the development of entrepreneurship competence and the country's focus on sustainable development. Besides, education technologization can help achieve sustainable development goals, since it lies in developing pedagogical innovations and implementing them in the educational process. It is possible to enhance systematicity, controllability, effectiveness and reproducibility of the author's technologies (motivating future specialists towards business activity, improving their financial literacy and capacity for project activity and effective self-management) by using the author's optimizing method of introducing pedagogical technologies. This method is a system of dependent variables, pedagogical factors, as well as the algorithm of their application designed to create the synergistic effect of systematic use of innovative forms and methods of pedagogical influence.

A comparative analysis of the obtained results on entrepreneurship competence levels and teacher survey at the ascertaining and formative stages of the experiment confirm the effectiveness of the author's method. It has allowed one to simplify choosing pedagogical influence and isolating dependent variables, optimize the time costs and motivate more students to start and run their own businesses. The proposed pedagogical innovations are expected to reduce youth unemployment, increase the percentage of the officially self-employed population, withdraw funds from the shadows and improve revenues to the state budget and, most importantly, increase the percentage of young people ready for professional careers in Ukraine.

The used method makes it possible to determine the readiness of the introduced technologies at the IRL6 level [22]. It is characterized by a team of motivated researchers, innovative pedagogical products and experimental confirmation of possible commercial prospects in the case of providing high-quality scientific-methodical support for introducing pedagogical innovations in vocational education institutions in Ukraine, especially by using the author's optimizing method.

It is possible to confirm commercial prospects of the justified technologies and the method of their introduction by a longitudinal study on professional career development of vocational education graduates who have obtained training under the author's programme for developing entrepreneurship competence.

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# New educational space in New Ukrainian School

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**Abstract.** This study reveals the basic principles of creating an effective renewed educational space in the context of education reform in Ukraine and the creation of the New Ukrainian School. Modern educational environment means multifunctional flexible spaces that promote various forms of work, motivate to learn. An important factor in the renewal of the school is the creation of a modern educational space that will motivate the child to learn something new, stimulate different activities, and evoke positive emotions. Civic competence is one of the key skills enshrined in the Education Law in Ukraine. Along with the social, they are linked to the ideas of democracy, justice, equality, human rights, prosperity and healthy lifestyles, with an awareness of equal rights and opportunities. They include cooperation with others to achieve a common goal, activity in class and school life, respect for the rights of others, the ability to resolve conflict situations. One of the tools used by teachers to develop these competencies in primary school is the creation of "Class Rules" – the first "law" in the lives of first-graders. Creating a motivational educational space contributes to the principles of reforming primary and general secondary education and global trends: personality-oriented education, child-centeredness, competence and activity approaches.

## 1 Introduction

One of the main conceptual principles of reform within the New Ukrainian School [1] is the creation of a modern educational environment that will promote creative development and students' motivation to learn. Not only curricula and teaching aids are changing, but also the organization and design of the educational space. The student place should be single and comfortable, and the educational space of schools should be divided into thematic zones, places for games and recreation.

Due to the fact that the share of project, team and group activities during classes will increase in the New Ukrainian School (NUS), the options for organizing the study space in classrooms are also diversifying. The main document that determines how to arrange the educational space in NUS are special "Guidelines for the organization of educational space of the New Ukrainian School", approved by the order of the Ministry of Education and Science dated 23.03.2018 No. 283 [2].

Tsymbalaru considers "educational space of school" as a spatial-subject component – subject means, the totality and location of which creates conditions for organizing the necessary actions. It contains educational, developmental, educational, pedagogical spaces, etc. In addition, the researcher defines the educational space of the school as a complex formation, consisting of the educational space of each student, each teacher, each parent, etc.; as events in which different activities of each participant in the educational process of mastering the school environment, necessary to meet their educational needs [3]. Educational space is built around the individual, because only it is inherent in the activities through which the learning environment is mastered.

The new educational space is not necessarily the renovation or overhaul of the entire school building. Classroom space has the greatest impact on student achievement. School design is also important, but if it is not possible to redevelop the whole school at once, updating the classroom space (and, preferably, the surrounding recreation) is a smart decision that will have a significant effect.

## 2 Educational centres in New Ukrainian School

Since the New Ukrainian School works on the basis of a personality-oriented model of education, takes into account the rights of the child, his abilities, needs and interests, the educational space must meet these criteria. In addition to the classic options for organizing the learning space in the classroom, for example, mobile workplaces are used, which are easy to transform for group work.

In addition, the organization of educational space of classrooms requires extensive use of new IT technologies, multimedia teaching aids, updating training equipment. All this will be done through the organization of 8 centres [2]:

1. The centre of educational and cognitive activities with appropriate furniture.
2. Variable thematic centres, where boards / flipcharts / stands, etc. are placed.

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3. Game centre, equipped with board games, equipment for mobile games.

4. Centre for artistic and creative activities with shelves for storing accessories and a stand for a variable exhibition of children's works.

5. Wildlife corner.

6. There is a recreation area with carpet for sitting and playing, chairs, armchairs, ottomans and cushions.

7. Children's class library

8. Teacher's office, equipped with a table, chair, computer, shelves/drawers, cabinets for storing didactic material, etc.

Given the peculiarities of the educational environment of the New Ukrainian School, the Ministry of Education and Science recommends that schools use general purpose equipment (school furniture), which is manufactured in accordance with current standards in Ukraine and meets certain requirements (table 1) [2].

Another in-depth support for changes in the organization of primary school education was the agreement between the Ministry of Education and Science and the LEGO Foundation. As you know, the company signed a memorandum with the Ministry, according to which the LEGO Foundation in 2018–2019 provided its kits for all first grades. Thus, about 17 000 schools received a set of "Six Bricks" and "LEGO Play Box" per class. LEGO is not just a toy; it is an extremely effective learning material. These kits can be used for integrated learning, reading, math, exploratory project activities, games and physical education as a tool in the work of a practical psychologist. And most importantly, these kits can be used to effectively develop children's short-term memory [2].

In Canada teachers of elementary school organize educational process in so-called "learning centres". A learning centre is a specially designated area in the classroom that enables students to practice, collaborate, communicate, create, and enhance their learning. Learning centres are supplied with books, art materials, manipulatives, and other instructional tools. Working independently or in small groups, students have an allotted amount of time to accomplish assignments and learn through various hands-on activities. After each student in the group has completed the task, groups rotate to the next centre. The essential elements of learning centres are flexibility, adaptability, and response to children's needs in a safe, comfortable, and supportive environment. Building child-cantered learning requires more than arranging materials and grouping students. It demands teacher's knowledge of children, their abilities to acquire new information, their behaviour, ways of collaboration. This teaching strategy requires exceptional organizational and time management skills. Teachers need to provide differentiated instruction to meet all learners' needs and design activities where students can work simultaneously and independently. The main advantage of learning centres is that they transform classes into engaging, active learning experiences. The activities promote hands-on learning and critical thinking. Learning centres give more opportunities for differentiation. Thus, they address the needs of struggling and advanced students as well as students with disabilities.

**Table 1.** Main standards and requirements for school equipment.

| Requirement | Description |
|---|---|
| Ergonomics | Availability in each class of sets of furniture for students (desk / table + chair) at least two growth groups (yellow, red, green markings); availability of stands for accessories on the tabletop; rounded corners of countertops, backs and seats. |
| Safety | Made of materials permitted by current sanitary legislation for use in educational institutions; the product meets sanitary and hygienic requirements; absence of sharp corners, strange smells; matte table top surface; structural stability; availability of devices to prevent damage and contamination of the floor. |
| Shape and size | A tabletop in the shape of a trapezoid, triangle or other, which will provide a quick transformation for group work; tables and desks must be single; the tabletop should have a cut-out on the closest to the student side; compliance with the size of the growth group; possibility to stack furniture compactly. |
| Strength | Warranty period of at least 24 months; vandal resistance; resistance to detergents and disinfectants approved for use. |
| Weight | Not more than 4 kg for a chair and 10 kg for a table or desk. |
| Colour | Not bright light warm shades of yellow, green, blue, pink. |
| Aesthetics | Attractive appearance; modern design; compliance with the style of the general arrangement of the classroom. |

As Fontno and Brown stated, "students become more communicative and begin to work collaboratively. As they cycle through the centres, they experience using different resources and tools and can then compare those experiences to previous ones. Students are more focused and engaged during the centres as compared to traditional lecture sessions, where there are rarely questions asked and eliciting responses becomes difficult" [4].

There are many ways to organize learning centres, and teachers can make changes to the centres throughout the year. The number of centres may depend on the curriculum goals, the activities prepared by the teacher, the num-

ber of students, and the size of the classroom. A lot of teachers use this strategy daily. Some found it helpful to have specific "learning centre" days or allow students to work in the centres after they are done with their work. Considering space, teachers should organize learning centres around the classroom's perimeter and nooks to not interfere with the classroom movement. To provide a new experience to the students, it is advisable to set up centres on the floor, rugs, and even hallways.

Teachers usually have information about students' skills and knowledge after the first month of school. This information is essential while grouping students. They can place students of the same abilities in one group. However, it is recommended to have mixed-abilities groups where more advanced students can help struggling ones. Groups of 3–5 students are the optimum size to complete their assignments and move easily through the centres.

## 3 Main principles of the modern educational space

Modern educational space is based on a combination of two principles – flexibility and stability. Flexible organization allows you to quickly change the space depending on the needs of the educational process, to implement various forms of work. Stability ensures continuity of the process, consistency of perception and activity, maintains order in space and controllability in work. Flexibility and stability are combined through appropriate zoning. In the classroom should be identified fixed stationary cells that form its basis – "frame". As a rule, this is a teacher's workplace, the main blackboard, containers for storing educational materials – both restricted and open to students. Other elements of the classroom can be mobile, provide flexibility, the ability to quickly reorganize. First of all, we are talking about student workplaces. And in a modern school it is not only standard tables and chairs; student furniture is very diverse and allows you to work with the whole class, in groups or alone, in various poses (sitting, standing, even lying down), communicate, relax [5]. Obviously, in a typical classroom, it is impossible to provide each student with a full set of furniture for all occasions, allocating separate spaces for frontal, group work, discussions, recreation and more. Flexible organization of the classroom allows you to change the location of student workplaces, quickly move from one spatial form of work to another, gives students the opportunity to transform their own workplace, use as needed furniture.

Written work should be done using standard tables and chairs; conversations and discussions are best done without tables, in a circle, sitting on chairs or on the floor (on the carpet or pillows); for individual and group tasks, workplaces can be different: grouped standard tables, and ottomans, chairs or sofas, and low tables that allow you to work sitting on the floor.

What kind of furniture to have in the classroom and how to use them – the answer to this question can best be given by teachers, based on their own experience and approaches to classroom management. The main thing is that the furniture allows for a flexible organization, leaves enough space for activity, does not clutter the room, does not limit the choice of work forms.

The most noticeable and important factor in the artistic decision of the class is colour. It creates an emotional atmosphere, models the mood, promotes learning activities or, conversely, interferes with and demotivates. The issue of colour solution should be considered holistically. Every detail of the interior has a certain colour, but only a harmonious combination of colours can create the overall atmosphere that will make the room comfortable to stay. The colour of the walls or floor, cabinet doors or table legs – all elements of the space should be selected on the basis of a single approach, not to oppose, but to complement each other. Warm colours in elementary school create a cosy atmosphere, promote communication, encourage various activities. The main colours of the room – the colours of the walls and large furniture surfaces – should be light, calm. Brighter colours are used to attract attention: for example, a wall with a blackboard can have a deeper and more intense colour [5].

The design of the classroom should be balanced, provide sufficient, but not excessive visual stimulation. But today visually overcrowded rooms are more common. Studies by Portuguese psychologists show that such interiors negatively affect students' ability to perceive and remember information. Overloading and visual clogging of the room is due to the fact that at different stages of decoration and arrangement is not taken into account how the premises will be used, what equipment, design, training materials are needed in the work [6].

The work of the teacher also has many opportunities to create a harmonious space or, conversely, to overload the classroom with many seemingly useful learning materials. Seasonal or holiday decorations should not be abused: you can decorate the classroom for the holiday, but no holiday lasts for several weeks. Permanent elements of work design (for example, "classroom corner") do not have to take up much space and constantly catch the eye of students. In addition, it is recommended to exhibit in the classroom only those teaching materials (posters, tables) that are directly related to the topic of the lesson. The expectation that students will memorize mathematical formulas or verb forms simply because this information is constantly posted on the wall is futile: learning is an active and purposeful process, involuntary contemplation does not give the desired result [6].

Teachers should encourage children to participate in the organization of the educational space of their classroom. This will help to build students' sense of responsibility. For example, children can help hang signs or make birthday calendars.

## 4 Creating class rules as one of the conditions for an effective educational process

An important condition for creating a harmonious educational environment is the creation of so-called "class

rules". The use of materials and equipment (books, desks, storage areas, specialty materials and equipment) is an important area for rules and procedures. In "A handbook for classroom management that works" by Marzano et al. they provide some important tips for the safe use of materials and equipment in the classroom. The first strategy is "establishing rules and procedures for common classroom materials and equipment" and the second one is "establishing rules and procedures for specialty materials and equipment" [7]. In primary school, it is important to teach children to use, store, maintain in good condition the books and materials they use, as well as to keep order in their workplaces and in various classroom learning centers. Marzano et al. describes main rules for primary grades:

"**Be Prepared Every Day**

- Bring a pencil or pen to class.
- Bring a spiral notebook for note taking and other work.
- Bring your textbook to class each day.
- If you forget your materials, remember the Borrowing Rules we set:
  - Try to borrow what you need from a classmate. OR . . .
  - You may borrow up to five times from the community shelf.
  - Put a checkmark next to your name each time you borrow something.
  - Don't forget to return what you have borrowed at the end of class" [7, p. 22] .

There may be materials and equipment in the classroom that require careful treatment and attention: computers, software, a printer, maps, globes, scales, and other specialty equipment. From the beginning of the school year, students must understand the essence of safe behavior in the classroom and remember that safety is paramount. In elementary school, the rule "Do not touch!" must accompany all dangerous elements of the educational space.

Nowadays, teachers are actively using the strategy of creating "class rules" or "learning promises", which aim to involve students in creating an educational environment, forming responsibility and maintaining discipline in the classroom and at school. Marzano et al. gives some examples of elementary school students "promises":

"**Our Promise to Each Other**

When we care about each other in our classroom, we share what we have, listen carefully, help each other learn, work hard, and have fun together. We understand that everyone makes mistakes, that we stand up for ourselves and others, and that when someone asks us to stop, we stop. This is who we are even when no one is watching" [7, p. 10].

"**My School Pledge**

I pledge today to do my best
In reading, math, and all of the rest.
I promise to obey the rules
In my class and in my school.
I'll respect myself and others, too.
I'll expect the best in all I do.
I am here to learn all I can,
To try my best and be all I am" [7, p. 10].

When creating rules, teachers should pay attention to some tips: there should not be many rules (from 3 to 6); they should be short (3 to 7 words); the rules must be specific and clear from the first reading; these should be statements ("Always tell the truth"); negative phrases should be avoided ("Do not disturb others in class", "Do not run through corridors") and use positive vocabulary [8].

Children do not like to do what is imposed on them by someone and even with the word "obliged". Therefore, the rules are the conscious choice of the student and his responsibility for this choice.

For example, in Canadian elementary school every year the whole parallel of classes is mixed and new classes are formed, so each new team creates its own rules for students, agrees to follow them for effective learning and safe stay in school. Understanding the importance of rules is the key to following them [9]. It takes 2–3 weeks in September, 30–40 minutes daily to study and model behaviour, set rules, establish incentives and consequences for violations. Teachers spend so much time on this topic, diligently discussing and working on everything till Grade 4–5. It is much easier and less time for secondary and high school teachers to follow the rules, because they "get" students with a good understanding of the discipline. The topic "Class rules" is not very interesting for children, so you need to be creative: draw, cut, write, put together puzzles, glue, guess, watch videos etc. First-graders usually draw pictures: 1 rule – 1 picture. They present their drawing, interpret what it means, discuss WHY IT IS IMPORTANT. 20–25 children's ideas are summarized, and the teacher writes on a large poster 5–7 basic rules of behaviour. The children agree – they draw their hand on the paper, cut it out, write their name, and stick their hands with the names around the rules [9]. Usually the rules are as follows: "I respect everyone"; "I listen carefully"; "I keep my hands and legs with me"; "I go"; "I raise my hand to say"; "I try to"; "I thank".

The following lessons in Canadian elementary school are devoted to:

- discussion "What if ..." (if a student breaks the rule, what inconveniences or troubles he creates, what danger he exposes himself and others);
- analysis of different school situations, teachers read short stories, watch comics or watch videos, discuss which rule was violated;
- when it is possible/impossible to interrupt teachers, students, work;
- what is respect;
- how to be a good listener;
- identification of incentives and consequences.

Particular attention is paid to emotions, teachers and pupils should work on it constantly, all year round. You have the right to be angry, resentful, because we are all human, but you can not spill your negative emotions on other

people, on objects around you. And at lessons the teacher and pupils discuss what uncontrollable negative emotions can lead to. Someone hit, called, broke, shouted – "what rules have been violated?"; "how do other people feel did you get a positive result?"; "how are you feeling?" etc. Teachers often use the breathing exercise to calm the student – "Blow a candle, smell a rose" [9].

If the rules of the first-graders are just 5–7, the routine is much more, naturally, time and attention they need more. What is the difference? The rule is about the upbringing and safe behaviour of the student, there are consequences for non-compliance. Routine is a daily action that has its own algorithm: to prepare for class, ask for a toilet, hand in notebooks, gather in the yard, go to the gym, etc., and there are no consequences, only reminders and repetitions. Adherence to these actions correctly and consistently is the basis of mutual success. Routines are not only discussed "why it is important", but also modelled: the teacher shows himself, the students show, the whole class does.

Teachers usually talk a lot. But when it comes to routines, or when they give students assignments, the instructions should be as clear, concise and accurate as possible: "Clean up", "Voices off", "Stuck your chairs", "Eyes forward", "Line up" etc. In Canadian schools, students have finger signals – 1 index finger up – to the toilet, 2 fingers – I want to drink (there is a sink in the classroom), hand up – to answer. So, if the student needs to go out, he quietly raises 1 finger up, the teacher nods, if allowed (1 boy and 1 girl at a time). On the marker board near the door, the student writes his name, leaves, and when he returns – erases the name. Without a word! Without distracting others! Why is it important to write a name? The teacher can immediately see who is not in the class, especially when working in groups and not sitting at desks; whether it is possible to another pupil to go out or he/she should wait. This is important for teachers when there are training fire alarms (once a month), and they need to quickly take all children out into the yard [9].

## 5 Conclusions

The new educational space is a significant component of the modern educational environment. The interior and arrangement of classrooms are formed primarily for the development of students. A well-arranged classroom space creates opportunities for various forms of educational activities, provides a favourable emotional atmosphere, motivates and sets up for productive work.

Learning centres are efficient and effective means to offer engagement, cooperation, student-cantered learning, and differentiated instruction. Whereas it is time-consuming to organize, design, and collect the materials for learning centres, the payoffs are worth the efforts. Learning centres are a teaching strategy that benefits students and teachers by maximizing instructional opportunities and providing varied activities simultaneously. In such a way, teachers provide more instructional and practice opportunities to meet diverse learners' needs and achieve more.

The creation of educational space should take place simultaneously and in connection with the renewal of the school in general, with the introduction of new pedagogical approaches, new programs and curricula, forms and methods of work.

Educational space planning is not just about developing a technical task for designers or creating tender announcements for the purchase of equipment. It is also necessary to outline the field for the activities of teachers, students, parents, find ways of systematic cooperation with science, a wide range of fellow educators, the local community and more.

The school environment nourishes the student's learning experience. Everything from the aesthetics of school design to the emotional background is designed to create the conditions in which students will grow as individuals.

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# Cultivating a child's love for parents as a spiritual practice: pedagogical aspect

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**Abstract.** Spiritual education of a child is one of the most difficult and important areas of educational research. The way of family life has always been reflected in the moral character of a person. The emotional and moral atmosphere reigning in the family, the desire to share responsibility, the level of mutual understanding and mutual respect, parental love and reciprocal feelings of a child, family traditions – all these lay the foundation for spirituality. Teachers who work with younger students often observe their interactions with their parents. Each child and each parent is individual, and relationships between them develop differently. In this article, the authors reflect on teachers' role in cultivating love, where the theoretical concept of "from child to parent" is the basis for study. The article identifies the types of a child's love for parents, reveals the markers of manifestation of a child's love for parents, which is positively associated with the cultural and social environment. In addition, the basic pedagogical characteristics for cultivating a child's love for their parents in the context of the school are proposed.

## 1 Introduction

There are a lot of questions that relate to various spiritual practices in pedagogical science. Cultivating a child's love for parents is one of these practices. Cicero was right when he said that "love for parents is the basis of all virtues". A child who is able to love its parents, which means, to support them at any moment, to find a warm, sincere word for them, to thank for what they have done for it, cannot be angry and cruel. There are many answers to the question of "How to love a child?" in pedagogy. However, these answers cannot be mechanically transferred to the question "How to love parents?" The difference is that each spiritual practice on the part of a child is unique. So, a child is an object of parental love, expresses its love without reliance on solid knowledge about the expression of care. It moves along an intuitive trajectory, based on interest, naivety, imagination, openness, a sense of pleasure.

## 2 Materials and methods

There is quite a bit of relevant research about the development of mutual attachment between children and their parents and caregivers/teachers. Researchers such as A. N. Schore [1], D. J. Siegel [2], R. Feldman [3], and C. Trevarthen [4] have done extensive research into attachment relationships between child and adult. Originality of the article is that it identifies the types of a child's love for parents, reveals the markers of manifestation of a child's love for parents, which is positively associated with the cultural and social environment. The basic pedagogical characteristics for cultivating a child's love for their parents in the con- text of school are proposed. The purpose of the study is to examine the teachers' role in cultivating love, where the theoretical concept of "from child to parent" is the basis for study. The methodological basis of the study are: system approach, activity approach (L. S. Vygotsky [5], A. N. Leontiev [6]), the principle of determinism (S. L. Rubinshtein [7]). Considering the problem of love for parents, as a theoretical basis for the study, we use the concept of personalization (A. Petrovsky [8]), theoretical principles and provisions of the theory of relations (V. N. Myasishchev [9]). Research methods: review-analytical theoretical research of pedagogical and psychological literature on the studied problem in order to clarify its development and determine further ways of research.

## 3 Results and discussion

### 3.1 Cultivating a child's love for parents: history and contemporaneity

Raising a child means laying the foundations of a spiritual character in it and bringing it to the ability to love its parents and other people [10]. Parents who accepted and creatively solved this task fulfilled their spiritual vocation, justified their mutual love, strengthened and enriched the life of people on earth. Only the spiritual flame of a healthy family hearth can give the human heart an incandescent coal of spirituality, which will both warm it and shine for it throughout its future life. So, the family has avocation to give the child the most important and essential in life – the ability to love.

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According to Tertullian, "human soul is a Christian by nature" [11]. These words are especially true when applied to family. In a marriage and in a family, a person learns to love, to suffer from love, to endure and to sacrifice, to forget about himself and to serve those who are closest and dearest to him. Therefore, the family turns out to be a natural school of love, a school of creative self-sacrifice, social feelings and an altruistic way of thinking. In a healthy family life, the soul of a person from early childhood is restrained, softened, and learns to treat its neighbours with respectful and loving attention.

A child's love for parents deserves special attention. The positive experiences of cultivating such love by teachers have been one of the largest investments in pedagogical science in the development of the spirituality of society. A child's love has been often considered in the relationship of the theoretical concept of "parent–child", which made a child more vulnerable, an object for the manifestation of love and care, but not its active subject. The positive effect of teacher's work, who cultivates a child's love, has great prospects – from improving the quality of family lives to creating new families in future. The teacher, using this approach, in addition to improving social development, softening the psychological climate in the family, led adult members of society to the development of spiritual consciousness, promoted self-actualization and self-development of the individual.

Janusz Korczak in his book "How to Love a Child" wrote that he didn't know and he couldn't know how parents, unknown to him, in conditions unknown to him, could raise a child unfamiliar to him; he emphasized that they could, but they didn't want and they hadn't [12]. Such love – "love as an opportunity" is in its essence the definition of the spiritual practice of parents. The child is the possibility of love for the parent, but the love of the parent is not always love for a child. As Rollo May testifies, culture of the relationship of a child with significant others in its environment plays an important role in the history of human culture [13]. The concept of Karen Horney reveals the belief that as a result of a violation of the relationship of parents with children, basic anxiety manifests itself, which is inextricably linked with basic hatred of parents. If a person finds himself in unfavorable conditions, where cruelty, humiliation, ridicule, neglect, blatant hypocrisy reign, as Karen Horney points out, there is a bitterness for survival. This situation in relationship is accompanied by a child's attempts to gain sympathy, affection, interest, but a child ultimately refuses the need for tenderness and gradually decides that sincere love is not only unattainable, but does not exist at all. So such child no longer desires her and is rather afraid. However, this step has dire consequences, because the need for affection, human warmth and intimacy is a powerful incentive for the development of qualities for which other people value us. The feeling that you are loved, and even more that you can be loved, is probably one of the greatest values in life [14].

Each new pedagogical system, which developed as a result of dependence on new socio-political decisions, claims that it is thanks to the introduction of this system that many issues that were previously impossible were resolved. Thus, if a child's love for parents, in particular, its cultivation by the teacher at different periods of personality growth, has many solutions in pedagogical science, then in the teacher's practice there are even more options that turned out to be suitable for real children. For example, these are studies of expressing spirituality in elementary school [15], spiritual well-being of a child [16, 17], caring relationships between a child and an adult for better development [18], attachment relationships between a child and an adult [1–4].

These decisions, presented by pedagogical science, still need to be investigated. It will probably be discovered that the issue of spiritual practice on the part of a child is forced to turn to the realities of the modern world, the socio-political and economic environment, which is dictated by both parents and teachers, their arguments for the manifestation of "love as an opportunity".

In these cases, to answer the question "how to love parents?" a child begins to feel annoyance, since the manifestation of its love is caused by the very spiritual nature of man, which is often not comparable with the existing practices of adults. That is why the pedagogical study of a child's love for parents is viewed through their daily spiritual experience. A study of this spiritual experience can explain the understanding of the issue of a child's love as a spiritual practice, as well as its incompatibility with "love as an opportunity". If the question "what is love?" is asked, then we will find a semantic solution to the question. In the case when the question "how does it manifest itself?" is asked, then usually we are talking about the sensitive, emotional sphere, as well as the sphere of actions and human activities. Of course, such a question on the part of a child more often expresses its emotional state and that is why the question of the manipulator is: "Whom do you love more – dad or mom?" is painful and, in the case of a healthy family atmosphere, will remain unanswered.

A child does not always understand why it feels love for his parents and the question of whether he loves dad and mom equally or differently relates to spiritual practices, which, on the one hand, lie on the surface, but have not yet been studied by pedagogical science fully. Thus, Esther O. Ohito, as a researcher of critical pedagogical love, points out the insufficient literature on the study of love in general. The author confirms: "the concept of love is fairly frequently (ab)used, yet under-theorized" [19].

We observe various spiritual practices, but their characterization remains an open question: "who has empirical data in this area?" The situation is completely different in pedagogical practice. For the teacher, the understanding of the question "Does a child love its parents?" is mostly associated with the meaning of educational activity in general, the manifestation of a child's confidence in its childhood environment and the manifestation of self-love or self-hatred. Of course, the question "what is the child's love for parents?" like any question relating to the spiritual sphere, can be an expression of interest in this phenomenon. So, for example, a child, observing other children who accidentally appear in his field of vision, remembers their behaviour and asks about what could serve, for example, their joy or hostility. If the answer on the

part of the parent is clear, then there is no doubt that the child asks about its manifestation of feelings, tries to find an answer about the need / uselessness of the manifestation of its love for parents. That is why such questions are important on the part of a child. Obviously, it is necessary to conduct a study of different types of love of a child for parents, their differences. Their existence can be traced in religious, philosophical, psychological literature, in art, including the folk epos. It is easy to answer the question "what is the love of a child in the understanding of world religions?", "What is the love of a child in the philosophy of childhood?", "Why do children compete for love for their parents?" Of course, these are not simple questions, but their semantic charge is fixed in various worldviews. Meanwhile, to understand the answer to the question "what is a child's love for parents?" it is necessary to distract from these worldviews and focus on specific spiritual practices that may be incompatible even within the same family, where children are brought up by their biological parents, and not by foster parents or stepmothers / stepfathers.

### 3.2 The meaning of love in a child's life: necessity need or right?

In order to appreciate the importance of a child's love for parents, a multidimensional approach to the study of this concept is needed. We present several categories.

Love is often interpreted as a feeling that is experienced and understood as attraction, affection, passion. This is a free manifestation of a human being, an existential attitude to a person, an object, knowledge, activity, nature, and fatherland. The recognition of love as a life-giving force that can spiritualize a person, help to make an unselfish act, stimulate the manifestation of creative qualities is an important fact. We understand that such a concept of love is limited and does not reveal it in whole, as one of the virtues. David W. Robinson-Morris adheres to a similar point of view: "Love is the metaphysical fiber, which binds us to one another. It may be the very force that makes the planets orbits, the sunrise in the East and set in West. Love may very well be the force that holds the stars in the firmament, the Energy of energies, a force that can neither be created nor destroyed" [20].

Teachers have actual data on the manifestations of such power on the part of children, and therefore the question "what is a child's love for parents?" does not seem difficult for them. The pedagogy of love is manifested through loving kindness, compassion, and equanimity [21]. However, this question always sounds differently for parents. They do not study philosophy and pedagogy, so it is not clear for them why their "love as an opportunity" comes into conflict with "love for parents".

Some parents who listen to teachers' advice are annoyed that their ideas about their child's love are questionable. They believe that the teacher is deceiving them, and meanwhile they do not even understand the reasons for the manifestation of such states of a child as anxiety, fear, feeling of loneliness. Few people come up with the idea that it is necessary to identify indicators of a child's love for parents. As the ideal of a child's love for parents, the following set of qualities is often presented, including: obedience, respect, patience, caring, etc. But, as pedagogical practice shows, not always an obedient child really loves its parents, as well as a child who shows patience with the vices of parents or their social disadvantage in society. Resentment, helplessness, or the accumulation of imaginary scenes of revenge may be hidden behind the external manifestations of a child's supposedly positive character traits. Of course, this does not mean that we deny the upbringing of positive qualities of a child, but we direct our attention to overcoming delusions on the part of both a child and its parents, which is necessary for personal development, the formation of new spiritual practices.

Meanwhile, teachers who are supporters of various pedagogical systems usually agree with the statement that most often a child still loves its parents, although few of them would bother to examine in detail the manifestations of such love. A child's love for parents and an adult's love for a child are fundamentally different.

### 3.3 Differences in a child's manifestations of love must be recognizable

Differences in love, which are created both by the conditions of upbringing, and by the social environment, and the cultural life of society, can be recognized and accepted for correcting pedagogical practice. Let us emphasize the difference between the types of love, which, as a rule, does not always attract attention in educational science. If a child's love was transformed into its surrogate in an adult, then what is the achievement of pedagogical science? Apparently, it is necessary to conclude that our pedagogical science does not develop love as a spiritual practice, but, on the contrary, makes a child's love for parents very abstract, throwing off the flaws of their pedagogical technologies on the "cruelty of the world around" and the pedagogical immaturity of parents under the slogan "it is their own fault that such a child was brought up". That is why a child's love for parents becomes abstract in the school environment, which unites many manifestations of types of love into a diverse system of beliefs: for one child, love for parents is a source of pleasure, it draws from there positive emotions, a desire for development, while for another it is a source of fear, which fetters its feelings, dulls the saturation of the perception of the world around it and the knowledge of itself as a person. For the third child, love for parents is a source of duty and piety, which most often becomes an external, but not an internal factor. That is why it is possible to formulate an abstract concept of a child's love for parents: love is a conviction that builds the entire system of cognition of the external and internal world of a person, which allows you to feel, comprehend, analyze, act, relying on the experience received from parents. A child's love for parents based on intra-family relationships allows exploring and building further interpersonal relationships, to learn, evaluate the behaviour of other people to whom a child is interested. In many ways, this concept is based on the understanding of child's love in those cultures in which a child itself develops. For example, Guop-

ing Zhao points to the importance of a child's love for parents in Chinese culture as a special feeling that is freed from the concepts of "duty". He emphasizes natural attachment in relationships where the maturing personality thrives: "In the private space reserved for nourishing natural human affections, the child's individuality flourished" [22]. Perhaps, some scientists will disagree with such a definition of a child's love for parents. So, Kevin James Swick believes that child's love should be manifested in its understanding, decency, peacefulness, caring for its parents, who should be manifested every day: "Democracy requires decent and caring people. The trust and love that bind people into partnerships for living in peaceful ways require us to learn, share, care, and support each other in these efforts. We must be sensitive to the dynamics of helping each other become peaceful and caring" [23]. Only in this case, according to the author, a caring relationship can be considered love. Not all scientists may also agree that child's love for parents is a cognitive system. Howard S. Schwartz believes that a child should win love "The hope is that, having learned to survive and succeed, we will be able to gain a place of love and importance, modeled on our early experience with mother, as father seems to have done", than implies the presence of basic patterns of behaviour inherited in the family and the study of worlds of love and worlds of indifference [24].

Despite these views, let us nevertheless assume that the concept of a child's love for parents is a "conviction" as a deep communication process and a fundamental concept. However, often, in everyday life, persuasion is examined through techniques that are studied in order to subordinate the thoughts, feelings, will of another person to solve their personal issues, and not of another person. The desire to influence the train of thought, to rule a child on the part of an adult is not always based on spiritual and moral values, and is often authoritarian in nature. The arguments of parents are less likely to be ethical, moral, value, and often based only on information that is beneficial for a quick solution to the situation. Parents (especially in critical situations) are increasingly using rude language of influence (anger, annoyance, disappointment, etc.), which, without relying on mental values, plunge a child's consciousness into chaos, fear, anxiety. Parents often deceive a child, hiding behind good intentions. False myths have always existed in different cultures for coercion and intimidation of a child ("don't go there, boogeyman is there", "the gray wolf will bite if you don't obey," "I'll put you in a corner, let bogeywoman take you", etc.). Such deception limits the freedom of the child's spirit, compels it to make a false decision that the will of the parents is omnipotent and only adults know how to behave.

However, we emphasize that the child's love for parents is, first of all, of a value character, based on the recognition of parents. If a child is dissuaded from its parents, sees or feels their obvious deception, the value of the parents is gradually refuted, which creates the basis for future conflicts. For example, a child asks "How are you feeling? How are you?" and parents reply: "I'm waiting for you to do something for me ..." This is a recognizable manipulation, deception on the part of parents. Such and similar phrases internally push a child to accept the feeling of guilt for the unfulfilled wish of the parent, which is destructive and devastates a child mentally. Manipulation, pressure, and even such tactics as parental refusal of love is detailed in the work of Karen D. Annear and Gregory C. R. Yates. The authors believe that excessive strictness and control of authoritarian parents can further cause irreparable damage to their child. This position does not take into account, in their opinion, the manifestation of a child's love as a need of life itself: "Psychological control methods are geared to a child's compliance with parental decisions, where a child's input is minimal and possibly irrelevant to the agenda. Psychological control implies the expectation of obedience with minimal recognition of the needs of the developing young person" [25].

There is no doubt that the ideal of such parents is gradually erased in a child's picture of the world. So, in making future decisions, a child will be guided by the advice of any person who seems close to it, understands and accepts it without manipulation, pressure and psychological control. The situation can be aggravated by the fact that the understanding of the traditional role of parents has been changed significantly in the modern economized world. And love, as a spiritual practice, begins to be oppressed, its spectrum narrows, and manifestations become rare [26]. For example, a mother who works outside the home is perceived differently by a child than the one who is constantly nearby. The child is faced with an unusual feeling for it: "why do my parents abandon me?", "What needs to be done so that the parents are always at home?" Anxiety, lack of well-being, feelings of anxiety affect the very manifestation of love, and the mental and physical pain inflicted by the parents force to divide the world into at least two worlds that are not alike: "with parents" and "without parents". At the same time, as emphasized by Debra Lindsey Prince and Esther M. Howard, love appears from the first days of life: "From the first moment of life, human beings continually seek the reassurances of belonging and love. Children who receive sensitive and reliable responses from their parents or caregivers during the early years of their life are able to develop successful, secure relationships" [27]. In this case, it is important not to miss those moments that have a positive effect on the spiritual world of a child sensitive, timid, beautiful, full of hopes for the future.

There are studies that confirm the importance of the value of the childhood world. Hiroyuki Numata analyses the types of manifestations of love in different cultures (including Japanese) and points to dichotomous relationships in European culture: "the concept of "love" presupposes that there is a person who loves and the other who is loved" [28]. At the same time, the author states the fact that modern children are protesting all over the world, which gives rise to such antisocial phenomena as crime, cruelty, violence in children's environments.

Reflecting on such phenomena, some questions arise: "How can love be cultivated in such environments? What generation should we educate and how can a real teacher influence the spiritual world of a child? And is it just the time for teachers to pay attention to the torn worlds of chil-

dren?" We take into account that there are different types of a child's love for their parents. However, the typification must also receive its own understanding. For example, it can be characterized by the degree of emotional manifestation, the presence or absence of actions, the manifestation of self-awareness, and the expression of special behaviour. Therefore the existence of different types of a child's love requires a distinction.

The first type the physical is based on the fact that a child feels pleasant feelings only when the needs of its body are satisfied. A child who is close to this type loves parents for their hugs, kisses and gentle treatment.

The second type – social based on the desire to talk and listen, to interact. It may not be important for such a child how it is dressed, how and when he ate; listening to parents, understanding them, perceiving their speech, speaking with are the most important things for such children.

The third type spiritual based on the contemplation of the spiritual nature of the parent. Such a child may not care what tone the parents talk to him, in what conditions they live. The desire to observe the manifestation of the spirit of the parents, their life story, and formation as a spiritual person are the main things. A child gets pleasure from the very thought of the parents, their manifestations of the strength of the spirit, the ability to withstand life's difficulties. The parents of such a child may be lucky, or they may be unhappy, but for this type of child's love, this does not matter. Their spiritual image is the main thing, which can be manifested in the child's consciousness through various symbols, sounds, smells, and not just as through the expression of their physicality. Note that this distinction is fundamental, although in its pure form, each of the listed types of love is rare.

Of course, the question "How can the concept of a child's love for parents be defined?" may arise. So, we understand it broadly, as the child's system of views on parents as a whole, the acceptance of the parent's ideal. Also, a child's love can be a system of views on a particular parent and his/her attitude directly to a child itself. This concept should include a child's understanding of the parent's place in its life and a value judgment about it. Thus, we see that the love of a child is made up of conscious acts that are gradually formed into beliefs. Love, therefore, is not only a feeling, as is often stated. Naturally, in various circumstances, living conditions (prosperous or dysfunctional developmental environments), these beliefs can be erroneous, imaginary, and therefore, in some cases, there may be a variety of sensual manifestations from hatred to exaltation. The manifestation of such feelings is quite wide and diverse. This is important to emphasize, since the manifestation of the beginnings of love is not only the satisfaction of basic needs at an age when a child cannot provide itself with the necessary for survival.

We associate the very love of a child with manifestations of courtesy in behaviour, with pleasure in joint communication, with benevolence, reverence, joy and mercy. Diligence is one of the markers of a child's manifestation of love for his parents. A child makes efforts to make the parent happy from his actions: it studies hard, helps about the house. It is important that these efforts are not forced. They are pleasant for a child and are done with pleasure. And even if parents for some reason do not appreciate the efforts of a child, a child is not angry or offended. It observes with respect why the parents are upset. Thus, the set of manifestations of a child's love is very wide. It is also important to distinguish manifestations contradicting love flattery covered by imaginary care, the root of which we see, first of all, in deception and in seduction. A child, not knowing how to correctly express love for its parents, tries to dissemble; its deception subsequently manifests itself in actions, which later reveals insecurity and secrecy in relation to loved ones. Emphasizing the importance of a child's manifestation of love for parents in ordinary actions and words, one cannot ignore the existing attempts to erase their meaning. Both a child's deed and an involuntary offensive word are not really thoughtless, as parents themselves might not notice. With this behaviour, parents can refer to a crisis of age, a reassessment of values; however, the dominant type of love of a child does not change, but only acquires new features. In this case, pedagogical work on the development of moral courage is indispensable. Such work consists of 11 components: education of kindness; education of virtue; education of truthfulness; education of compassion; education of responsiveness; education of moral stamina; education of moral culture; fostering empathy; the development of moral habits; education of politeness and friendliness; education of a sense of human duty. If a child's love for parents and adult family members is not directed towards doing good deeds, then it will be selfish. For example, if a child loves its mother only because she is the source of his good mood. We must cultivate in children courage, the desire to take care of others, worry about them.

## 4 Conclusions

Taking into account all the above, at least five basic pedagogical characteristics in cultivating a child's love for parents can be distinguished:

1) teachers should be aware of the main types of manifestations of child's love for parents and understand the difference between them;

2) teachers should inform children that the spiritual type of love is laid down from the first days of birth, and all subsequent types of love can be manifested depending on relationships within the family;

3) teachers need to disclose to children that they have many markers of manifestations of love that are manifested in their actions. These markers are only an external manifestation, and, as a rule, are desirable, but not absolute, since each child has its own character and environment that affects it;

4) teachers need to prove to children the importance of working to foster moral courage, and in this case, both teachers and parents themselves serve as the ideal for expressing this type of courage;

5) teachers should strive to reveal to the pupils the meaning of manifesting their love for their parents, regardless of the environment (prosperous or disadvantaged) they live in.

The expression of a child's love for parents is one of the given properties of a person. This belief can be developed. This should be of great importance for pedagogy as an applied philosophy and for everyday practice in school. Freedom of expression of the spirit, mercy on the part of the child is largely determined by the parents themselves, by their behaviour. To a large extent, the manifestation of pedagogical love is important, which finds expression in direct communication with both children and their parents. Thus, the initial question of a child's love in our time becomes a question of its future fate and an acute social problem that worries many peoples. The solution to this issue a measure of the teacher's influence on a child's self-understanding, management of its feelings, acceptance of values will help build up the spirituality of the whole society.

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# Innovations in professional activity: what students of specialty "Preschool Education" think about it

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**Abstract.** Contemporary challenges of society, its dynamic development cause changes in all spheres of life, particularly in education. To obtain a university education in the Ukrainian state, higher Education Standard in specialty 012 Preschool Education for the second (master's) level of higher education (2020) was approved, which provides for the formation of relevant competencies. The purpose of the study was to analyze the essence of innovations in the professional activities of teachers of preschool educational institutions (PEI). To find out the attitude of students to the implementation of innovations in professional activities, a thematic survey was conducted. The selection of questions and respond options is based on all competencies of the Standard and the materials of theoretical analysis. The sample of the online survey covers the students' responses from two state universities of Ukraine ($n$ = 159), who are obtaining the second (master's) level of higher education on the educational-professional program "Preschool Education". Respondents were grouped according to the mode of study. The obtained quantitative and qualitative data revealed the influence of the experience of practical experience in the PEI on the choice of the respond. This determined the necessity to teach students the educational component "Innovation activities in PEI" and the development of corresponding tasks during their teaching practicum in the system of preschool education.

## 1 Introduction

The current stage of society development is determined by high dynamism and a number of challenges that determine the processes of modernization and transformation, including in the field of education. Today, the Ukrainian state is reforming all components of education in accordance with the adopted and implemented European quality standards of education. It is primarily due to the necessity to train a new generation of professionals who are able to respond quickly and act effectively in a changing environment. A modern teacher is supposed to possess a number of developed competencies that will contribute to their competitiveness in the labor market. Among the key competencies identified in the "Recommendation on Key Competences for LifeLong Learning" one of the priorities is innovation, the formation of which is associated with the development of critical thinking and creativity of an individual [1].

In the professional development of a teacher it is important to realize the irreversibility of innovative processes designed to meet the new requirements of society for sustainable development [2]. The world community of scientists is actively studying how to reconcile higher education programs and sustainable development goals considering "education as a mechanism for social change", to provide with the formation of innovative competence in students by university education [3, 4]. The organization of the educational process in the system of higher education involves the formation of student's "innovation capacities" as a result of obtaining the appropriate level of higher education [5, 6]. In this context, considerable attention should be paid to improving the training of teachers who fulfill the social order of teaching, development and education of the growing generation by finding, producing and implementing various innovative pedagogical models and technologies in the educational process [7]. At the same time, the professionalism of the teacher is not only in awareness and implementing current tasks in education, but also in directing their efforts to continuous self-improvement, building the optimal trajectory of personal development, which determines his readiness for internal change. It is especially important in the curricula of universities to provide for such disciplines, the mastery of which would ensure the development of future specialists' innovative type of thinking in a dynamic society [8]. Only such a systemic combination as the performance of professional duties and the provision of personal growth will lead to professional self-improvement.

Thus, today the issue of actualizing the purposeful training of teachers to implementation of innovative activities in educational institutions and the development of ap-

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propriate competencies for this purpose has become pressing [7–9]. Within the framework of the outlined scientific problem, the process should be started with the first component of the education system, which in Ukraine is preschool education. Innovative activity in preschool educational institutions (hereinafter referred to as PEI) is the fundamental basis for the whole education system, which is currently rapidly developing and is the primary basis for the whole system of education ensuring its quality in accordance with the social requirements of society. In order for this process to be successful, human resources – PEI teachers must be prepared in accordance with modern requirements. In the Ukrainian state, this process is regulated by approved orders of the relevant ministry, in particular one of them – the Standard of Higher Education in specialty 012 Preschool Education for the second (master's) level of higher education, which came into force in 2020/2021 [10]. This Educational Standard provides for the conclusion of an educational and professional program (hereinafter – EPP), which is aimed at obtaining a three-component block of competencies by students, among which: integrated competencies (hereinafter – CI), general competencies (hereinafter – CG) and special or professional competencies (hereinafter – CS), defined in accordance with the specialty. With respect to the suggested above, it is appropriate to find out how higher education students determine the tasks of implementation innovations in the preschool education system and how it corresponds to the formation of their competencies outlined in the Higher Education Standard [10].

Thus, the determined topicality of the raised problem, which mainly involves strengthening the effectiveness of teachers' training in the labor market, gave grounds to outline the following purpose of the study:

a) finding out of the essence of innovations in the professional activity of preschool teachers on the basis of the analysis of the scientific and source base;

b) determination the attitude of students studying on specialty "Preschool Education" to the implementation of innovations in professional activities on the basis of the developed questionnaire;

c) generalization the results obtained and outlining the strong and weak points of this process.

The following abbreviations are used in the text:
Preschool educational institution – PEI
Educational and professional program – EPP
Integral competencies – CI
General competencies – CG
Special competencies – CS

## 2 The analysis of the recent publications on the essence of innovations in the PEI teacher's professional activity

The analysis of the source base gives grounds to claim that there are different scientific views on the essence of the concept of "innovation" and "innovation activity" in the teacher's performance of professional duties. The implementation of innovations in pedagogical activities itself is an indicator of modernity demonstrating improvement of society. It focuses education on the child's personality and improves the quality of educational services in general as well.

Innovations are considered as a new product that improves the efficiency of the educational process, as it is based on the determination of a specific system of priority indicators that correspond to the innovative development of society and reflect the individual's psychological qualities [9]. The result of the implementation of innovation as a system of professional means of personal development, which provides an innovative way of teaching, is also the formation and development of innovative active personality [5]. Researchers interpret innovation activity as a process carried out at a sufficiently high level of professionalism and manifested in the ability of a specialist to evaluate new ideas objectively, in their readiness to master and implement creatively in their practice everything new and progressive [8].

Innovation activity in the context of the professional activity of a PEI teacher involves their awareness of the meaning and current aims of educational activities at the present stage of society development; ability to define teaching tasks, with respect to social requirements; ability to outline new pedagogical guidelines in accordance with the requirements of personality-oriented education; development of skills to adjust the educational process timely in accordance with the criteria of innovation, etc. The implementation of innovations in PEI requires from the teacher mastery of technologies, forms and methods of innovative teaching of preschool children; development of the ability to analyze changes in educational activities, formation of awareness about the characteristics of children's personal qualities; development of the ability to activate personal creative potential, reflective activity, awareness of the importance and relevance of their own innovative searches and discoveries [11].

Thus, innovations are a subjective category, and their implementation should be considered in two areas: as a professional (pedagogical) activity, which includes the readiness and motivation of teachers to it on the basis of acquired knowledge, skills and innovative competence, and personal needs in the implementation of the system of own values and cultivation of relevant qualities as well. Therefore, the purpose of innovation is seen not only in the performance of professional functions by a PEI teacher, but in ensuring their personal growth and strengthening their own position as a competitive specialist in the labor market. This aspect will be considered when developing the questionnaire for the survey of students studying in specialty 012 Preschool Education, which is determined by the purpose of the study.

In clarifying the essence of innovations, it is important to state that they are not "homogeneous". Depending on the potential and degree of novelty, they are divided into:

- innovations a new product development – is a kind of invention, which lies in the development of technology, methods, techniques, etc.;
- innovations in the implementation (introduction) of new and progressive elements in the educational process;
- innovations-reproductions, presented in a form with methodical developed recommendations [12].

As innovations have different degrees of novelty, the mobilization of human resources for their implementation also differs in the nature of workload. Discovery innovations (heuristic innovations) are the most difficult, because they usually emerge as a result of a teachers' creativity, in their corporate integration with others, because the development of fundamentally new products requires the support of colleagues. Creative innovations are the ones, the implementation of which provides improvement, rationalization, modification, modernization of what an analogue or prototype has. The most common in the PEI practice are the innovations that are reproductive in nature, they have been widely tested and have a thorough methodological support [11]. In fact, the considered conditional classifications of innovations are the same in terms of explaining their content, do not contradict each other, which allows us to take this as a basis in the process of conducting the empirical investigation.

Scholars express unanimity in the viewpoint that the innovative activity of a teacher ensures their professional growth [4, 6, 8]. This is due to the desire of an individual to self-education in search of new information, which helps to broaden knowledge; to self-improvement in the development of the ability to organize the educational process, to establish cooperation with other subjects, which ensures self-realization in professional activities. This is interpreted as CS-9 of the Standard of Higher Education in the specialty 012 Preschool Education [10].

The intensification of innovation is significantly influenced by a range of factors, among which there are external and internal. External factors include: level of professional training; improving the material conditions of the educational institution, overcoming conservatism; internal factors include: motivation, creativity, corporatism [7, 13–16]. With regard to external factors, they are easier to state, identify gaps and take corresponding measures to eliminate them. In particular, the level of professional training of preschool education specialists is increased by obtaining university or postgraduate education. For this, educational and professional standards have been approved in Ukraine. The implementation of the Standard ensures the formation of the competencies for students outlined in it. According to the initiated research, these are the students of the 2nd (master's) level of higher education in the specialty 012 Preschool Education, who develop the ability to innovate (CI) during their studies; to generate new ideas (creativity) (CG-2), as well as the ability to organize the educational process in preschool educational institutions implementing modern tools, methods, techniques, technologies (CS-1) [10].

Revealing the internal factors, we focus on motivational one, which is a priority, because the motivation of an individual, determined by needs, goals, ideals, operating conditions, worldview, beliefs, is a powerful driving force that motivates teachers to innovate [13–15]. According to researchers who have studied the motives aimed at stimulating the introduction of innovations, their (motives) should be grouped as follows:

- internal motives manifested in the interest of teachers in innovation activities through the desire for self-improvement, the hope of recognition of their own professional significance;
- external motives that motivate teachers to innovation and are related to the prestige of innovation and are maintained by the image of the educational institution [14].

A striking example of the manifestation of internal motives is the motivation of PEI teacher's professional self-improvement.

The development of innovative activity is influenced by the ability of the teacher to critical thinking, solving pedagogical problems in a non-standard way, creative thinking in a constructive direction, the correct expression of evaluative judgments; improvisation, creative imagination; production of original ideas (going beyond the stereotypes of pedagogical thinking) and building a strategy for their implementation in the educational process [16]. An important place is given to such a factor as corporatism – the ability to work in a team, implementing the idea of creating a new original product, supporting the team [7]. It promotes the development of an individual in the process of innovation, the ability to manage their own development; understand and evaluate yourself, take a subjective position; realize their own problems, mistakes, complications; analyze their causes, correlate their actions with the problem situation, find effective ways to eliminate them (providing CS-9 of the Standard) [10].

It is especially important to start applying innovations in the educational process of preschool education, as the modernization of the preschool education system, its current development requires effective methodological management of the process of implementation of pedagogical innovations in practice to improve the quality of educational services [11, 17]. The educational process in PEI should be carried out according to the formula: "implementation of innovations = correspondence to the requirements of the time and social demands + vector of progress in the implementation of educational aims". To perform this, it is necessary to ensure the systematic growth of innovative skills of PEI teachers; inform them about the essence of innovation, etc. [18–22]. The readiness of the teacher for innovative activity is characterized by a range of developed professional skills, which justify the conscious implementation of personal innovations in the educational process of PEI [18–20]. The development of the teacher's skills in planning the educational process in PEI (with respect to the conceptual foundations of innovation, the goals of teaching and teaching children, the use of optimal forms, methods and techniques of professional activity, specification of goals and objectives) allows to

implement new technologies, including information and communication technologies [21, 22].

It is appropriate to give examples of the implementation of innovations in the system of preschool education in different countries. In Slovenia and Poland, training courses have been introduced in the process of university training of future PEI teachers for innovative work aimed at the development of engineering thinking [23]. This type of thinking contributes to the improvement of technological knowledge, provides a creative approach to solving problems, as well as enriches the experience of behavioral practice, which is an important component in the formation of pedagogical skills. The importance of innovations in the educational process was noted by preschool teachers-practitioners from California [24]. The application of innovations, on the one hand, means the improvement of the processes of education and upbringing children, and on the other – the motivation of teachers to perform their professional duties effectively. Regarding the difficulties that future PEI teachers in Jordan have in the process of training, they pointed out the lack of "field training" in the context of the implementation of innovative work with young-age children [25]. The necessity to improve the quality of preschool education programs and the optimal use of teamwork of preschool education professionals from different countries through cross-cultural research is emphasized. In particular, the conducted international research emphasizes the importance of professional training of PEI teachers to perform the tasks of pedagogical activity. Thus, the need to innovate in Norwegian kindergartens is seen as a "natural part of a day-to-day practice" [26]. Similar results were obtained in the process of conducting a survey among unexperienced PEI teachers of New Kindergarten Teachers' (NKTs') in Israel [27]. Regarding the obtained responses on the essence of innovation implementation, the respondents noted the professional unity in starting a new idea, high motivation and improving their own pedagogical skills.

Introduction of elements of innovative activity in PEI has a number of advantages: it provides creative climate between teachers and children, develops creative abilities at the subjects of educational process [28]; increases the level of pedagogical skills in the context of the organization of play activities as a leading type in preschool age [29]; promotes the development of the social and emotional sphere of children [30]; changes their attitude to the environment [31] etc. It is the introduction of innovations by PEI teachers that develops their sense of professional responsibility for improving the quality of the educational process [32]. For example, in Saudi Arabia, PEI teachers have called for the need to improve their own professional development in order to implement the tasks of STEAM Education with children of young age [33]. Defining such innovation as progressive, as it provides a combination of creativity and technical knowledge, educators noted the necessity to improve basic strategies and skills. Thus, we generalize that in order to make innovations effective it is necessary to provide purposeful preparation of future PEI teachers for performance of pedagogical activity and formation of the corresponding professional competences.

Thus, summarizing the analyzed materials of the scientific source base, we can conclude that the effectiveness of innovation in the professional activities of PEI teachers is provided by considering a range of conditions: the goal, the chosen type of innovation, the influence of interdependent factors. Their outlined significance is the foundation for the practical implementation of the main innovative tendencies in the modern system of Ukrainian preschool education as well.

Analyzed research, which is the theoretical basis for clarifying the essence of innovations in the professional activities of teachers, as well as competencies outlined in the current Educational Standard for students for the second (master's) level of higher education in specialty 012 Preschool Education will be the basis for the questionnaire for students.

## 3 Methodology of research of determining the attitude of "Preschool Education" (future PEI teachers) students to the implementation of innovations in professional activity

*Research tools.* The empirical basis of the study was a survey of students. They were to fill in an online questionnaire "Innovation in the professional activity of preschool teachers: what is it and what for?" (using Google Forms). The main goal was to find out the attitude of students of specialty "Preschool Education" to the application of innovations in professional activity. Information about the survey among students was offered to academic groups of followers on social networks Facebook, Viber, WhatsApp. Students of the second level of higher education – master's students studying on the educational and professional program (EPP) 012 Preschool Education, from two state institutions of higher education of Ukraine – Hryhorii Skovoroda University in Pereiaslav and Bohdan Khmelnytsky National University of Cherkasy were involved in the survey. The choice of such a research group is due to the implementation of the order of the Ministry of Education and Science of Ukraine from 29.04.2020 № 572 "On approval of the Standard of higher education in the specialty 012 Preschool Education for the second (master's) level of higher education" [10].

The questionnaire included 8 questions: of which 7 questions include selective options (for three (only the 6th question has four) response options for respondents), from which they had to choose only one. One question (the last, eighth) – a kind of "passport", the respond to which determined the respondent's correspondence to the group according to their sample. The content of the questions was based on the educational standard, according to which the formation of 3 types of students' competencies (integrated, general and special (professional)) are determined. In particular, the implementation of innovations (integral), CG-2 (general), CS-1, CS-9 (special) [10].

According to EPP 012 Preschool Education for the second (master's) level of higher education includes one of the educational components "Innovative activity in

preschool educational institutions", which is provided by the curriculum for 2021/2022 academic year. The study of it provides for the formation of competencies noted in the standard of education by students. Respondents were asked to respond the questions of the questionnaire without prior explanation and notification of the purpose of the study, which eliminated the possibility of external influence on them.

*Data collection procedures and methods of analysis.* Empirical data from the study were collected in the first decade of September 2021 by students filling out an online questionnaire. This preceded the study of the discipline (educational component of the EPP) "Innovation in preschool education", which allowed to clarify the students' views on the implementation of innovation in professional activity before the lecture and provided the study of the real state of research. Processing of the obtained questionnaire materials, namely how many of them were filled in (quantitative analysis) and the content of the responds provided (qualitative analysis) took place in October-November 2021, generalization and analysis – during December 2021.

*Study sample are described.* 2nd year students who obtain a master's degree in EPP 012 Preschool Education of various modes of study were involved in conducting an empirical study – thematic survey. This, in fact, determined their division into groups: 1st group – full-time students (38 respondents), 2nd group – dual-form students (27 respondents), 3rd group – part-time students who do not work on the specialty (51 respondents), the 4th group – part-time students working on the specialty (43 respondents). The total number of respondents who took part in filling out the questionnaires was 159 students. Such conditional division of students into research groups is due to the fact that the experience of practical activity largely determines the individual's views on the performance of professional functions [8, 11–13]. If the students of the 1st and 3rd groups (full-time and part-time, who do not work in the specialty) had the experience gained only during the various types of teaching practicum at higher educational institutions, then the students of the 2nd and 4th groups – had the experience of pedagogical activity (these are the ones of dual and part-time mode of study, working in the specialty).

## 4 Results of research of determination the attitude of "Preschool Education" students to the implementation of innovations in professional activity

Based on the collected data of the questionnaire "Innovations in the professional activity of a preschool teacher: what is it and what for?", which was offered to students obtaining education at the second (masters) level ($n$ = 159) it was stated that all forms were filled in. There was no spoiled questionnaire, so all the responds were taken to carry out quantitative and qualitative analysis. In addition, this attitude of students proved their responsibility in fulfilling the task. Quantitative results of determining the attitude of students of specialty "Preschool Education" to the implementation of innovations in professional activity (which were noted in questions 1–7) are presented in the diagrams (see figures 1–7).

Symbols which are characteristic for all figures presented in the text: Full-time mode of study (group 1); Dual mode of study (group 2); Part-time mode of study (do not work on the specialty) (group 3); Part-time mode of study (work on specialty) (group 4).

After the presented visual images, a qualitative analysis of the actual content of the responds to all questions of the questionnaires was performed. We continue with the presentation of the results of the survey among students.

Giving response to the first question of the questionnaire: "In your opinion, what is the essence of the innovative activities of preschool teachers?" respondents chose one of the response options, which characterized the type of innovation:

- developing a new product;
- introduction of innovation to the educational process;
- reproduction of widespread innovations.

Quantitative results of the obtained responses are given in figure 1.

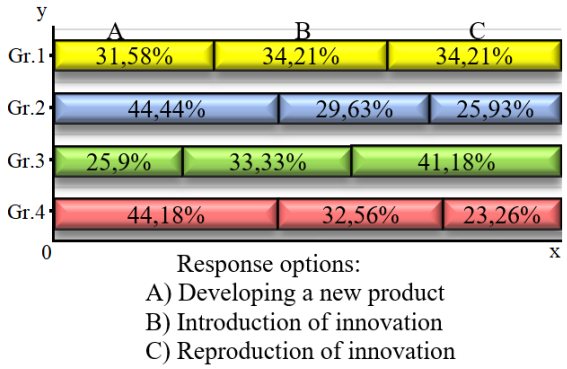


**Figure 1.** Quantitative analysis of the responds to the question: "In your opinion, what is the essence of the innovative activities of preschool teachers?".

As figure 1 displays, the responses of all groups of students denoted almost identical results with insignificant differences. In fact, they chose a proportionally equal distribution between all three response options, namely the three types of innovation. The difference is found in the greater advantage of the first option of the response – "developing a new product" in groups of dual and part-time students working in the specialty. It was 44.44% ($n$ = 11) in the 2nd provisional group and 44.18% ($n$ = 11) in the 4th one. On the other hand, the responds of the 3rd provisional group (part-time students who do not work in the specialty) for the choice of familiar and developed innovation with a number of methodological recommendations was predominant – 41.18% ($n$ = 11). It is explained by the fact that the reproductive type of innovation has developed methodological support for its implementation and students who were in the PEI only during teaching

practicum, considered it the most widely used. This respond was the least chosen among students who obtained education on the basis of dual education – 25.93% ($n$ = 7) and part-time students working in the specialty – 23.26% ($n$ = 10).

The obtained data give grounds to generalize that the choice of the respond option is significantly influenced by the gained experience of pedagogical activity and direct (practical) awareness of the specificity of performing professional functions of a preschool teacher. Those respondents who work at PEI (2nd and 4th groups) in greater number chose the option A) – it is the creation of a new innovation, as it allows you to develop your own creative ideas and implement them. The total calculation ($n$ = 159) of the responds to the 1st question of the questionnaire has the following results: A) developing of a new product – 35.22% ($n$ = 56); B) introduction of innovation – 32.70% ($n$ = 52); C) reproduction of innovation – 32.08% ($n$ = 51) (summary analysis of the obtained data is presented visually in figure 8).

Obtained data to the second question of the questionnaire involved finding out from the students what, in their opinion, is the driving force in determining the purpose of innovation in the PEI. Respondents were asked to choose one of the options, namely: A) improvement the quality of preschool education; B) implementation of program tasks of education, training and development of preschool children; C) personal growth of a PEI teacher. Quantitative analysis of the results is presented in figure 2.

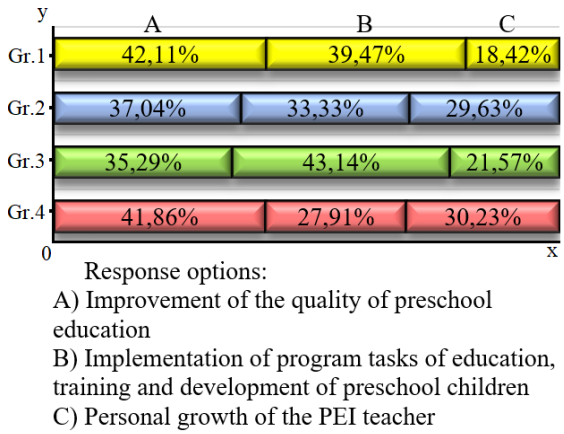


**Figure 2.** Quantitative analysis of the responds to the question: "What is the purpose of innovation in PEI?".

Providing a qualitative analysis, first of all, it should be emphasized that options A) and B) included the context of obtaining high professional achievements. As for the option C), it includes the content that implemented the formation of CS-9 according to the Educational Standard of training masters in specialty 012 Preschool Education [10]. The largest number of choice among the respondents of all four groups obtained option A). Thus, it was preferred by the students of full-time education (1st group) – 42.11% ($n$ = 16); part-time students working in the specialty (4th group) – 41.86% ($n$ = 18). With a slight decrease in accordance with these groups, the indexes of this option were recorded for respondents of the 2nd group – students of dual mode of study – 37.04% ($n$ = 10) and respondents of the 3rd group – part-time students who do not work in the specialty – 35.29% ($n$ = 18). On the other hand, the representatives of this group (3rd group – part-time students who do not work in the specialty) demonstrated the highest index of option B) – 43.14% ($n$ = 22), which indicates that they have theoretical knowledge about the necessity of performing the tasks of current educational programs of PEI. Respondents of the 1st group (full-time students) presented almost similar opinions on this issue – 39.47% ($n$ = 15). In contrast to the indexes on the choice of option B) in the 3rd and 1st groups, the 2nd and 4th groups demonstrated a significant decline. In particular, only 33.33% ($n$ = 9) among students of dual mode of education tend to think that the purpose of innovative activities is the implementation of program tasks of education, training and development of preschool children; and among part-time students the index is 27.91% ($n$ = 12). In contrast to the data obtained on the choice of option C), where the largest number of it is made by the 4th and 2nd groups, including part-time students working in the specialty – 30.23% ($n$ = 13), and students of dual mode of study – 29.63% ($n$ = 8). Respectively, in the 3rd and 1st groups the indexes of the response that the goal of innovative activity is the personal growth of a teacher are recorded by 21.57% ($n$ = 11) of part-time students who do not work in the specialty, and 18.42% ($n$ = 7) by respondents of full-time mode of study. This can be explained by the fact that students who are practitioners of PEI are aware of the necessity to be successful and competitive in the labor market, and therefore consider the implementation of innovative activities as a factor of self-realization.

Summing up the responses to the second question of the questionnaire, we state that the first two options were in more priority among student choices: A) improvement of the quality of preschool education – 38.99% ($n$ = 62); B) implementation of program tasks of education, training and development of preschool children – 36.48% ($n$ = 58); C) personal growth of the PEI teacher – 24.53% ($n$ = 39) (summary analysis of the obtained data is presented visually in figure 8). These results convincingly demonstrate that respondents have chosen professional growth and, in particular, completion the regulatory framework governing preschool education as the main goal of innovation.

It was important for understanding the research problem to obtain data if respondents had an opportunity to implement innovations in their professional activities or during teaching practicum (this concerned to the students of full-time and part-time mode of study who do not work in the specialty). Such was the 3rd question in the questionnaire, which contained three possible options: A) Yes; B) Partially; C) No. Figurative indexes of the obtained results are presented in figure 3.

As it can be seen from the figurative indexes presented in figure 3, unfortunately, the majority of respondents chose the option that they did not implement innovations either in their professional activities or during teaching practicum. Most of them are part-time students who

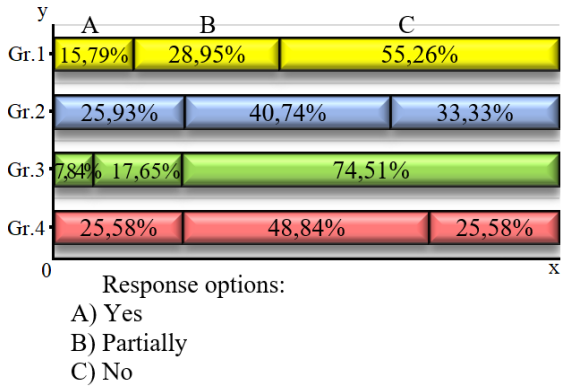


**Figure 3.** Quantitative analysis of the responds to the question: "Do you implement innovations in your professional activity (during teaching practicum)?".

do not work in their specialty – 74.51% ($n$ = 38) and full-time students – 55.26% ($n$ = 21). It demonstrates that they are unable to implement at least some of the elements of innovation during their short practicum. A significant percentage of such respondents are also students of dual and part-time mode of study who work in their specialty (almost a third part in each). In particular, in the 2nd group – students of dual mode of study – 33.33% ($n$ = 9) and in the 4th – part-time students working in the specialty – it's 25.58% ($n$ = 11). However, it was comforting that the respondents of these groups still partially implement innovations in their own professional activities (option B). It is correspondingly most recorded in the 4th group (part-time students working in the specialty), which is almost half of the number of these respondents – 48.84% ($n$ = 21), as well as in the 2nd group (dual mode of study) – 40.74% ($n$ = 11). That is, in direct practical activity, they, as subjects of the educational process at the PEI, from time to time try to implement innovations in their practical work. The indexes which demonstrate partial application of innovational activity turned out to be lower in those groups of respondents who had an opportunity to do it during their teaching practicum (in accordance with the curriculum). In particular, in the group of respondents who study full-time (1st group), such were 28.95% ($n$ = 11) and in the group of part-time students who do not work in the specialty there were only 17.65% ($n$ = 9). Indexes of the previous option are similar to option A) as well. Those who are practical teachers (dual mode of study and part-time students working in the specialty) implement innovations in their professional activities, although the quantitative results were not high enough. Thus, in the 2nd group (dual mode of study) there was 25.93% of such respondents ($n$ = 7), and in the 4th group (part-time students working in the specialty) – 25.58% ($n$ = 11). These indexes were much lower in the groups of respondents both full-time (15.79% ($n$ = 6) and part-time, for students who do not work in the specialty (7.84% ($n$ = 4)), which convincingly indicates the lack of appropriate conditions and opportunities to implement innovations during teaching practicum. It outlines the scientific problem of reconsidering teaching practicum programs, strengthening them with the task of introducing innovations to the educational process of PEI, conducting credit classes for students with elements of innovation, and so on.

The generalization of the obtained data on the 3rd question of the questionnaire gave grounds to determine that the responses were distributed as follows: option A) Yes – was recorded by 17.61% ($n$ = 28), option B) Partially – 32.7% ($n$ = 52); Option C) No – 49.69% ($n$ = 79) of the total number of respondents ($n$ = 159) (summary analysis of the obtained data is presented visually in figure 8). Such results lead to increased attention to the organization of practical activities of students as future PEI teachers, as well as motivation to introduce elements of innovation in the educational process during the teaching of the discipline "Innovation in PEI".

The 4th question of the questionnaire "Do you know preschool teachers among your colleagues (or practicum supervisor as a preschool teacher) who implement innovative activities, while performing their professional functions?" had another correlation. The students' responses ("almost") were distributed proportionally: A) Yes; B) I am not sure that their activity is innovative; C) No. We present a quantitative analysis of the obtained data in figure 4.

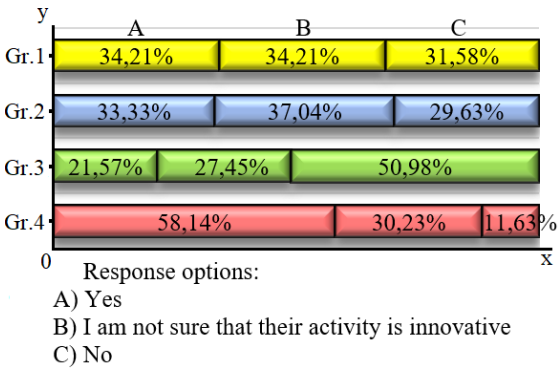


**Figure 4.** Quantitative analysis of the responds to the question: "Do you know preschool teachers among your colleagues (or practicum supervisor as a preschool teacher) who implement innovative activities, while performing their professional functions?".

In particular, the numerical value shown in figure 4 clearly demonstrate that the responses of students of the 1st research group (full-time) and the 2nd research group (dual mode of study) do not differ much, who actually have chosen each of the options equally. However, in the 2nd group there is a slightly higher number of those who preferred option B). If in the 1st group such index was 34.21% ($n$ = 13), then in the 2nd one their index was 37.04% ($n$ = 10). On the other hand, in the 2nd group the number of respondents who have chosen the option C) decreased (29.63% ($n$ = 8)), while in the 1st group it turned out to be 31.58% ($n$ = 12). This proves that students of the dual mode of study still have more opportunities to study problems in the organization of the educational process in the PEI and to contact with specialists in preschool education.

As for the responses of part-time students who were in the 3rd group (those who do not work in the specialty) and in the 4th group (those who work in the specialty), they were radically different. In particular, the majority of respondents of the 3rd research group noted that they didn't not know their supervisors while having teaching practicum in PEI and, performing their professional functions, applied innovations. Their index equals 50.98% ($n$ = 26). At the same time, their choice of response options A) and B) was almost the same: yes – 21.57% ($n$ = 11); C) I am not sure if their activity is innovative – 27.45% ($n$ = 14). The response options among the respondents of the 4th research group was completely different. Thus, part-time students working in the specialty, mostly have chosen option A, noting that they know colleagues among preschool teachers who apply innovative activities, performing their professional functions. Their index was 58.14% ($n$ = 25). Accordingly, response option B) was chosen by 30.23% ($n$ = 13) of respondents and option C) – by 11.63% ($n$ = 5), which is the lowest among all others. It can be explained by the fact that part-time students who work in the specialty, obtain a master's degree, having some experience in teaching, and therefore are more oriented in implementing innovations in PEI.

In general, the conducted quantitative analysis of the responses to the 4th question of the questionnaire gave grounds to note that the distribution of responses by all of the respondents was as follows: option A) Yes – 36.48% ($n$ = 58); option B) I am not sure if their activity is innovative – 31.44% ($n$ = 50); option C) No – 32.08% ($n$ = 51) (summary analysis of the obtained data is presented visually in figure 8). It demonstrates that students of specialty 012 Preschool Education during teaching practicum and their professional activities as PEI teachers had examples of implementation of innovative activities in the educational process.

More optimistic results were recorded when considering the responses to the 5th question of the questionnaire: "Do you believe that innovation is a necessary component of a preschool teacher's professional growth?" Students had to choose one of the suggested options: A) Yes; B) Partially; C) No. The obtained quantitative data are presented in figure 5.

The results presented in figure 5 show that the prevailing response in all four research groups is A). Even before studying the discipline "Innovative activity in PEI", students indicated such activity to be necessary for the teachers' professional growth. Their responses were distributed as follows: the most preferred by those who know the peculiarities of the organization of the educational process in PEI were respondents of the 2nd group (students of dual mode of study) – 62.96% ($n$ = 17) and respondents of the 4th group (part-time students working in the specialty) – 60.47% ($n$ = 26). With slightly lower indexes, this response was recorded by the respondents of the 1st group (full-time study) – 47.37% ($n$ = 18). The lowest number of choice option A) to this question was found in the responds of the 3rd group (part-time students who do not work in the specialty) – only 37.26% ($n$ = 19), which indicates that they are still insufficient, in comparison with respondents from other groups, who familiar with the specifics of the educational process in the system of preschool education. Almost the same indexes were recorded for the choice of option B) in all the research groups. This was approximately one third of the number of respondents. In particular, we present in decreasing order: in the 1st group (full-time study) there were 36.84% ($n$ = 14) of respondents; in the 4th group (part-time students working in the specialty) – 30.23% ($n$ = 13); in the 3rd group (part-time students who do not work in the specialty) – 27.45% ($n$ = 14); in the 2nd group (dual mode of study) – 25.93% ($n$ = 7). These results prove that students are still concerned about making a successful future professional career. As for the choice of option C) to the question of recognizing innovation as the mandatory component of professional growth of a PEI teacher, it was chosen by a small number of respondents. Nevertheless, unfortunately, we state that one third of the respondents of the 3rd research group (part-time students who do not work in their specialty) have chosen such option – 35.29% ($n$ = 18). Twice less than in the 3rd group, option C) was chosen by the 1st group (full-time students) – 15.79% ($n$ = 6). And a very small number of them all was in the 2nd (dual mode of study) – 11.11% ($n$ = 3) and 4th groups (part-time students working in the specialty) – 9.3% ($n$ = 4).

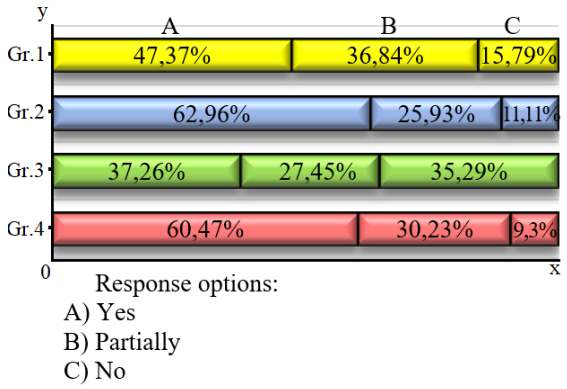


**Figure 5.** Quantitative analysis of the responds to the question: "Do you believe that innovation is a necessary component of the preschool teacher's professional growth?".

Based on the generalization of the obtained data, we state that, in general, among all the respondents of the survey the responses were distributed as follows: option A) Yes – 50.31% ($n$ = 80); option B) Partially – 30.19% ($n$ = 48); option C) No – 19.5% ($n$ = 31) (summary analysis of the obtained data is presented visually in figure 8). These data convincingly prove the necessity to increase the motivation of students to carry out innovative activity as compulsory component of the PEI teachers' professional development. This will be implemented in the process of teaching the discipline "Innovative activity in PEI", which will develop students' competencies outlined in educational standards.

Giving the response to the question: "What factors, in your opinion, hinder the implementation of innovative

activities in PEI?" (6th in the questionnaire), the respondents were to choose one of the following four options: A) teachers' low level of motivation to such activities; B) lack of proper material resources in the PEI; C) insufficient training; D) conservatism. The collected quantitative data are presented in figure 6.

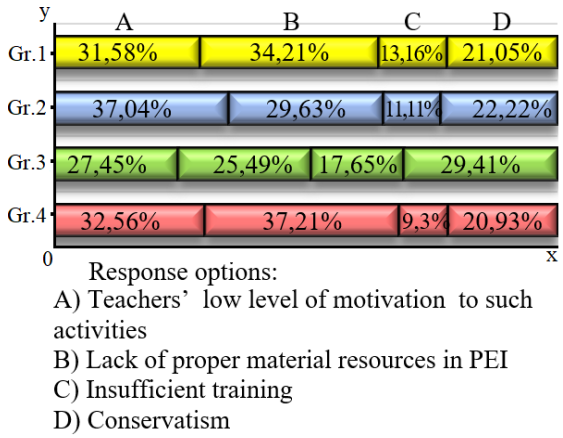


**Figure 6.** Quantitative analysis of the responds to the question: "What factors, in your opinion, hinder the implementation of innovative activities in PEI?".

According to the quantitative data demonstrated in figure 6, the choice of almost a third of respondents in all groups of option A) is directly related to the analysis of the results obtained on the previous 5th question. The largest number of students who chose this option was in the 2nd research group (dual study) – 37.04% ($n$ = 10); then, with a slight difference, students of the 4th group (part-time students working in the specialty) – 32.56% ($n$ = 14) and students of the 1st group (full-time students) – 31.58% ($n$ = 12). The choice of the influence of motivation on the innovative activity of a PEI teacher was slightly lower in comparison with the responds of the respondents of the 3rd group (part-time students who do not work in their specialty) and their index was 27.45% ($n$ = 14). Identical indexes were recorded for the choice of option B) and it was also preferred by one third of the students from the total number of respondents. Although the order (from higher to lower) has changed. Thus, the largest number of respondents who chose this option are part-time students working in the specialty – 37.21% ($n$ = 16), followed by full-time students but with a slight decrease – 34.21% ($n$ = 13) and students of dual study – 29.63% ($n$ = 8), who are aware of weak points in the material resources of modern PEI, so to say "from the inside", because they are the subjects of the educational process. Regarding the respondents of the 1st group, who chose this answer, we believe that they gave such response relying on their observations during their teaching practicum. As for the respondents of the 3rd group (part-time students who do not work in the specialty), their choice of this option, which was 25.49% ($n$ = 13) was also due to the impressions got during teaching practicum. According to the number of choices option D) conservatism is in the third place. It was preferred by 29.41% ($n$ = 15) of respondents from the 3rd group (part-time students who do not work in the specialty); 22.22% ($n$ = 6) of respondents of the 2nd group (students of dual mode of study); 20.93% ($n$ = 9) of the respondents of the 4th group (part-time students working in the specialty) and 20.05% ($n$ = 8) of students of the 1st research group. We believe that this choice can be explained by the fact that innovation is a change, and not all teachers with whom respondents contacted were intended to step out of "comfort zone" of the usual stereotypical process of their own professional activities. It is encouraging that the least number of respondents chose the option C) – insufficient training, believing that modern higher educational institutions provide full training for future professionals in preschool education. The responds were distributed as follows: this was typical for 17.65% ($n$ = 9) of part-time students who do not work in the specialty (3rd group); for students of dual mode of study (2nd group) – 11.11% ($n$ = 3); for full-time students (1st group) – 13.16% ($n$ = 5); and for part-time students working in the specialty (4th group) – 9.3% ($n$ = 4).

The analysis gives grounds for making the following summaries: in general, respondents ($n$ = 159) identified the following correlation between the factors that inhibit the implementation of innovative activities in the PEI: option A) teachers' low level of motivation to such activities – 31.44% ($n$ = 50); option B) lack of proper material resources in PEI – 31.44% ($n$ = 50); option C) insufficient training – 13.21% ($n$ = 21); option D) conservatism – 23.91% ($n$ = 38) (summary analysis of the obtained data is presented visually in figure 8). This encourages the specification of the following priority actions:

- strengthening of such a factor as motivation, which will encourage PEI teachers to develop, implement and apply innovations in the educational process;
- improvement of material resources in PEI, which will allow teachers to work fruitfully on the implementation of innovative activities in PEI;
- in order to overcome conservatism as one of the factors that hinder the implementation of innovative activities in the PEI, it is necessary to use motivation and encouragement for teachers;
- to conduct quality training of a modern competent specialist in the field of preschool education.

Giving response to the 7th question of the questionnaire: "What, in your opinion, the personal traits of a preschool teacher that are decisive in the implementation of innovative activities in PEI?", students were asked to choose one of the following three options: A) creativity; B) corporatism; C) ambition. The responds got from the students were analyzed and visualized in figure 7.

The indexes shown in figure 7 convincingly demonstrate that in total almost half of all the respondents preferred option A) creativity. In particular, the largest number of such respondents was found in the 4th and 2nd groups: among part-time students working in the specialty, it was – 60.47% ($n$ = 26) and, accordingly, among students of dual study – 55.56% ($n$ = 15). Lower rates of preference for this option were recorded in the 3rd and 1st

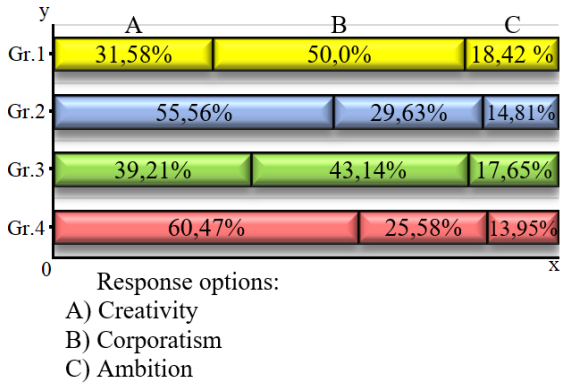


**Figure 7.** Quantitative analysis of the responds to the question: "What, in your opinion, are the personal traits of a preschool teacher that are decisive in the implementation of innovative activities in PEI?".

research groups. Thus, part-time respondents who do not work in their specialty chose "creativity" in the amount of 39.21% ($n$ = 20) and in the group of full-time students this index was 31.58% ($n$ = 12). Creativity as the ability of an individual to make non-standard decisions, generate and implement new ideas is defined as one of the priority qualities by many researchers [13–15]. The next option – C) corporatism – the ability to work in a team is no less important in the process of development, implementation and use of innovations in PEI. It was chosen by: full-time students (1st group) – 50.0% ($n$ = 19); part-time students who do not work in the specialty (3rd group) – 43.14% ($n$ = 22); students of dual study (2nd group) in the number of 29.63% ($n$ = 8); and among part-time students working in the specialty (4th group) – 25.58% ($n$ = 11), which is also the right choice. At the same time, we note that the respondents of the 2nd and 4th groups actually gave twice as much advantage to creativity (option A). No less interesting was the result of students' choice of option C) – ambition, because this personality trait in a correct dosage stimulates to move towards the goal, although on the verge of overestimating their own importance. This respond was typical for 18.42% ($n$ = 7) of full-time respondents (1st group); for 17.65% ($n$ = 9) part-time students who do not work in the specialty (3rd group); for 14.81% ($n$ = 4) of students of dual study (2nd group) and for 13.95% ($n$ = 6) of part-time students working in the specialty (4th group).

The general distribution of responds ($n$ = 159) to the question: "What, in your opinion, are the personal traits of a preschool teacher that are decisive in the implementation of innovative activities in PEI?" has the following picture: option A) 45.91% chose creativity ($n$ = 73); option B) corporatism – 37.74% ($n$ = 60); option C) ambition – 16.35% ($n$ = 26) (summary analysis of the obtained data is presented visually in figure 8). Such results are a proof of the students' conscious approach to the problem of innovation in the PEI teacher's professional activity. The obtained results are demonstrated in the integrated presentation in figure 8.

The results of determination the attitude of students of specialty "Preschool Education" to the implementation of innovations in professional activities present only a limited sample of students from two universities in Ukraine, and these data cannot be summarized. However, as it is presented in figure 8, the survey demonstrates some tendency regarding the essential importance of innovation and the implementation of innovative activities in the structure of specialty 012 Preschool Education. Respondents' interpretation of the essence of innovative activity (1) depends on their awareness of the specifics of the pedagogical functions of the PEI teacher; determining the purpose of innovation (2) was seen in the implementation of the tasks of modernization of preschool education at the present stage; personal experience in the process of innovative activities implementation (3) is clearly fixed by the mode of study of students of speciality "Preschool Education" (see the description of the presentation of four research groups); the latter is directly dependent on the production of the best patterns – the experience of innovations implementation by PEI teachers (4); the need to innovate as a mandatory component of professional growth (5) should be provided with appropriate practical training of students; the factors that hinder the implementation of innovation activities are identified (6), which gave grounds to outline the priority lines of professional training of future PEI teachers; it is established how students of speciality "Preschool Education" characterize the image of a modern PEI teacher, capable of implementing innovations (7). We state that the respondents of all research groups have chosen different options. However, the responds of the respondents, who were in the 2nd (dual mode of study) and 4th (part-time students working in the specialty) groups, were especially different. Representatives of these two research groups consciously perceive the necessity to apply innovative activities, understand its basic principles, which will directly influence both professional and personal growth. The explanation for this is that the students of these groups are the subjects of the educational process in the PEI themselves, performing professional duties have deep theoretical knowledge and skills in relation to its organization and solving complex problems. The latter is defined as the development of the competence of a teacher in implementing innovative activities, which is determined by the Educational Standard of Ukraine for students of the second (master's) level of higher education on the specialty 012 Preschool Education [10].

## 5 Conclusion

Taking account the global trends to meet the needs of sustainable development, the question of finding optimal ways to modernize the education sphere is increasingly being raised in modern society. This is due to the necessity to form a new generation of professionals able to compete in the labor market. This directly concerns to the training of PEI teachers, which takes place in the process of implementing the Standard of Higher Education for the second (master's) level of higher education in specialty 012 Preschool Education, in particular the development of

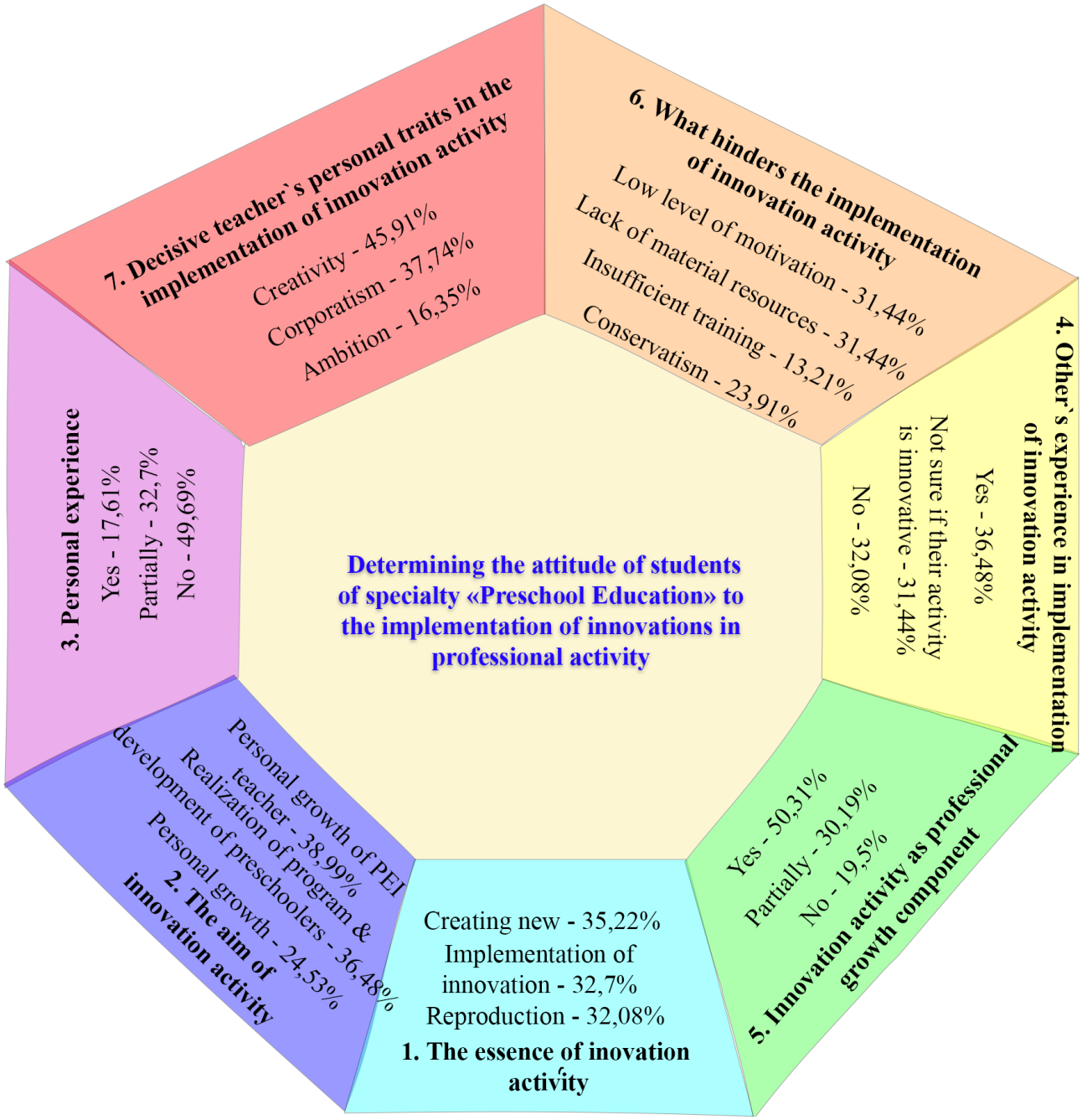


**Figure 8.** Summarizing the data obtained from the survey "Innovation in professional activity of PEI teacher what is it and what for?".

competencies for innovation. This was the relevance of the study, which accumulated a *three-component goal*:

a) on the basis of the source base handling the essence of innovations in professional activity of PEI teachers is defined. Different viewpoints of scientists on the explication of the concepts of "innovation" and "innovation activity" are identified [5, 8, 9, 11]. It is specified that innovative activity produces increase of professional level of the teacher and their personal growth. Varieties of innovations that can be used in the organization of the PEI educational process are revealed [11, 12]. The range of relevant internal and external factors that contribute to the formation in students (of the specialty 012 Preschool Education), competencies in accordance with the Standard of Higher Education (CI, CG-2, CS-1, CS-9) is outlined [7, 10, 13–16]. Based on the analysis of the latest publications, the essential content of innovations in the educational process of PEI was characterized [28–33], as well as the specifics of the training of students for their implementation (on the example of different countries) [23–27];

b) to determine the attitude of students studying on specialty "Preschool Education" to the implementation of innovations in professional activities there was developed a questionnaire "Innovations in the professional activities of preschool education teachers: what is it

and what for?" considering the content of all the competencies mentioned above and the results of the theoretical review of the literature. The survey was conducted online, it was conducted by students of the second (master's) level of higher education, studying in the educational-professional program (EPP) 012 Preschool Education from two state universities of Ukraine (159 students in number). Grouping into research groups took place on the basis of the application of the criterion of the mode of study: full-time mode of study (1st group) – 38 respondents, dual mode of study (2nd group) – 27 respondents; part-time mode of study – students who do not work in the specialty (3rd group) – 51 respondents, part-time mode of study – students who work in the specialty (4th group) – 43 respondents;

c) as a result of generalization of the obtained data the attitude of students of the specialty "Preschool education" to implementation of innovations in professional activity is defined. The analysis demonstrated that the respondents' responds to the questionnaire and their choice was mainly different from the existing experience of pedagogical activities in the system of preschool education, namely, depended on the mode of education. Students who made up the 2nd and 4th research groups (practicing educators) have personal experience of implementing innovations, which mobilizes their internal resources (personal aspect) and leads to improving the quality of preschool education (professional aspect). As for the students of the 1st and 3rd research groups, they still lacked awareness of the essence of innovation, the necessity for pedagogical innovation, understanding of the social significance of modernization of education. We anticipate that the study of the educational component "Innovation activity in PEI", defined by the EPP, will help to increase the effectiveness of future specialists' training.

In general, a study to determine the attitude of students of two Ukrainian universities studying on specialty 012 Preschool Education to the implementation of innovations in professional activities showed positive results, which is an important indicator for their future career and personal growth. However, we currently consider the following issues to be debatable:

- providing organizational and methodological base for the implementation of innovation activities in the process of teachers' training;
- choice of diagnostic tools to determine the levels of innovative activity of the PEI teacher.

Prospects for further research will include adjustments to the first (bachelor's) level of higher education in relation to the formation in accordance with the requirements of the Standard of Competences and the development of appropriate tasks for their "practice" during students' (of specialty "Preschool Education") teaching practicum in PEI. The aim will be to implement the best examples of world preschool education for the professional training of future PEI teachers in the context of the introduction of innovations in the teaching process.

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# Preventive pedagogical work on negative manifestations of preschool children's behaviour

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**Abstract.** The role of preventive education in averting negative behaviours in preschoolers has been considered in the article. It has been justified that preventive work with the children prone to negative behaviours will enhance harmonious development of preschoolers' personalities, provided that effective forms, methods and techniques have been implemented into preventive education of children with negative behaviours during interpersonal communication (preschool teachers – child – family). It has been proved that the realization of the proposed model of interpersonal communication within preventive work with children prone to negative behaviours in preschools provides positive results, indicating the importance of cooperation among all subjects of the education process in these institutions. The need for primary or early preventive work highlights the significance of primary preventive education, since only early socio-pedagogical prevention of children's negative behaviours is an effective means of coping with destructive phenomena in the children's environment. The main factors for children's negative behaviours and the most essential indications of the need to implement senior preschoolers' preventive education have been identified. Methodical guidelines on effective preventive education of senior preschoolers prone to negative behaviours have been outlined. The forms, methods and techniques of preventive work that promote constructive behaviours in children have been implemented and verified; the level indicators of development of a sustainable and responsible attitude towards negative behaviours in preschoolers during interpersonal communication have been determined.

## 1 Introduction

The choice of the research topic is based on a range of sociopolitical, educational and pedagogical factors that influence the development of socio-cultural, moral spheres of human life and activities and cause some negative phenomena in Ukrainian society. Although Ukraine is guided by the current model of social and economic development of the European Union, the high poverty rate, the dissemination of asocial behaviours of children and youth predetermine the younger generation dehumanization, replacement of humane values with illusory ones, aggression, immoral behaviours, neglect of their health, the decreasing role of the parental institution. In the context of these problems, one can observe some trends in the dissemination of negative behaviours, even in children. Therefore, the problem of preventive pedagogical work to prevent preschool children's negative behaviours is becoming relevant.

## 2 Theoretical analysis of the problem

An obligatory stage of the research process was to define the concepts of "prevention" and "preventive education" based on the views of Ukrainian and foreign scholars. In our opinion, UNESCO's definition of prevention found in the "Preventive education series 1" is the most relevant one: Definitions of "prevent" – to anticipate something undesirable to stop it or to ward it off; to satisfy in advance; to warn in a threatening way, and "prevention" – a preconceived opinion about individuals or things with unfavourable connotations of uncertainty; or a state of mind which is predisposed to one thing or another [1].

Smancer and Rangelova defines prevention as a "general preclusion, avoidance, obviation of negative actions and behaviours in children, as well as assistance and support in difficult situations" [2]. Consequently, prevention is mainly general preclusion that must protect the child from participation in questionable and disgraceful activities, immoral behaviours, the negative impact of the living environment, etc. Preventive education implies scientifically justified and timely measures taken to prevent asocial behaviours in children and to preserve their health. It is an objective social reaction to the social need for survival and preservation of the gene pool in Ukraine [3] and other undeveloped countries in the world.

Preventive education in the researches by Belicheva [4], Botvin [10], Gottfredson et al. [11], Ischenko and Melnykova [8], Kochubei and Savrii [7], Kondrashova [5], Melnykova [9], Orzhekhovskaia [6], Pisani et al. [12], Zeleeva and Shubnikova [13] implies scientifically justified and timely measures taken to prevent children's social behaviours and to preserve their health.

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Orzhekhovskaia suggests three types of preventive measures, which constitute the system of work in educational institutions: primary or early social prevention (social, psychological and pedagogical prevention); secondary prevention (diagnostics, preventive care and correction); tertiary or target prevention (adaptation, rehabilitation and re-socialization) [6].

In this regard, it is expedient to consider the definitions of "behaviour" and "deviations in behaviour". Orban-Lembryk understands under the concept of "behaviour" the system of interrelated actions and the individual acts necessary to implement certain functions and require communication between the individual and society [14]. "Deviations in the children behaviours" are the actions that do not conform to the norms adopted in a society they belong to [6]. We completely agree with opinions of Fedorchenko and Potapova that the most essential social needs of children, in particular, the need for communication, approval, respect, emotional contact (with peers, family) are not fulfilled. Blocking can become a source of profound experiences that will contribute to the emergence of negative behaviours [15]. The classifications of children negative behaviours proposed by researchers are divided into four groups due to the following main factors: lack of attention from others, mainly socially significant individuals (parents, preschool teachers, authoritative adults, peers); crises of psychological development (three-year-old and seven-year-old behaviour crises); irregular types of family upbringing; the children unfavourable adaptation to preschools, etc. [15]. Therefore, preschoolers negative behaviours may include hysterics, aggressiveness, shyness, closeness, dishonesty, fears, hyperactivity, weak motivation.

Thus, Battistich [16], Conrad [17], Izzo et al. [19], McCrae [21], Qi et al. [18], Webster-Stratton et al. [22], Zadeh et al. [20] indicate the conditions that cause negative behaviours and emphasize the introduction of diagnostic techniques to determine such behaviours and technologies to overcome them.

Pryor [23] explains behavioural training methods that can provide positive reinforcement for undesirable behaviour and be of assistance to both teachers and parents. In the book, the author considers eight methods, among which distinguishes four "negative reinforces" and four "positive reinforcers". Within the scope of this research, we would like to consider "positive reinforcers" in more detail, namely, "Train an incompatible behaviour"; "Stimuli as reinforcers: behaviour chains"; "Untraining: using reinforcement to get rid of behaviour you don't want"; "Change the motivation" [23]. We used these reinforcement methods in experimental work to develop a sustainable and responsible attitude in preschoolers.

Inappropriate behaviours in children and their improper understanding and interpretation of morals and ethics indicate the need for new approaches to overcoming these negative phenomena. Therefore, psychological and pedagogical prevention of negative behaviours in children considered to be a set of measures aimed at neutralizing the influence of negative factors of social environment on child's personality to avert deviations in their behaviour should occur at preschool age. It can only be achieved through joint efforts of families, preschools and children themselves.

"The Draft Concept of Preventive Education of Children and Youth in the Education System in Ukraine" emphasizes that "within children's environment there is a neglect of legal, moral, social norms, a decline in interest in learning and socially useful work. Modern children's personality is distinguished by increased anxiety, cruelty, aggression, lack of respect for adults, a low level of emotional attachment to family members, as well as institutionalization of deviant behaviour" [6].

Therefore, the need for preventive pedagogical work complicated at each subsequent age period of child development will sustain preventive actions in the previous period. The most favourable period for preventive pedagogical education is considered senior preschool age. It can be attributed to the essential characteristics of this age, namely, direct involvement into the education process of the preschool that ensures a systematic preventive pedagogical work with each child; fundamentals of moral values and emotions, behaviour patterns and modes of activity; susceptibility to adult behavioural influences, especially imitation of adults, peers, books characters, movie characters, comics characters, cartoon characters, video games characters, anime characters etc.; creation of a socially favourable environment in both preschool and family; joint efforts of teachers and parents to overcome five-year-old and six-year-old psychological crises, which provoke negative behaviours (moodiness, grimacing, mannerisms, stubbornness, negativism, etc.).

Thus, senior preschool age may be characterized by both positive and negative potential for personality development, which affects social communication between children and adults. Simultaneously, families and preschools leading social institutes that develop children are frequently unable to optimally implement their functions and their sustainable and responsible attitude towards negative effects of the micro- and macro- environment. It can be evidenced by McWayne et al. [24], Owens and Ring [25]).

The analysis of scientific sources, normative and methodological documentation of preschools has shown that there is no targeted and systematic preventive work aimed at averting negative behaviours in preschoolers in these institutions. Preschool teachers implement traditional forms and methods of work at the ascertaining stage of negative behaviours, which complicates the education process in preschools and does not allow achieving positive dynamics in preventing negative behaviours in preschoolers. One of the ways to solve the problem of negative behaviours in preschoolers in Ukraine is to apply preventive forms, methods and techniques to interpersonal communication: preschool teachers – child – family.

## 3 Research methods

*The purpose of the study* is to theoretically substantiate and experimentally test the effectiveness of the implementation in practice of the PEI of Ukraine preventive means, forms

and methods in preventing negative behaviours in senior preschoolers during interpersonal communication.

*The main objectives of the research* are:

- implement effective measures that promote constructive behaviour in children in interpersonal interaction;
- provide advisory support to teachers and parents on preventive education of older preschoolers.

To meet the outlined objectives, a set of *research methods* has been used:

- *theoretical methods* – analysis of pedagogical, psychological and professional literary sources on the problem raised; analysis of legal documents and methodical guidelines of preschools;
- *empirical methods* – interviewing parents, questioning preschool teachers, observing communication between parents and children, analysis of children's projecting drawings; preparatory, main and final stages of the experiment;
- *statistical methods* – processing the experiment results.

The *methodological basis* of the study was activity, personality-oriented, competence approaches:

- The basic idea of the *activity approach* in education is connected with activity as a means of formation and development of the child's subjectivity. The focus is on the joint activities of children and adults in the implementation of the goals and objectives.
- A *person-centred approach* allows you to focus on each person's development and ensures the prevention of children's antisocial behaviour.
- The *competence approach* involves the separation of the child from the adult, his ability to act not only on the instructions and prescriptions of authoritative people but also on their motives, based on personal experience, meeting their individual and social needs;

## 4 Results and discussion

The experiment has been conducted at preschool No 12 "Zolota Rybka" (nursery, kindergarten, Uman, Cherkasy region), preschool No 25 "Yahidka" (nursery, kindergarten, Uman, Cherkasy region), school, kindergarten "Strumochok" (Kyiv), preschool No 368 (Kyiv).

The hypothesis consisted of the fact that preventive work with children prone to negative behaviours will enhance the harmonious development of preschooler personalities. It provided effective forms, methods and techniques that have been implemented into preventive pedagogical education of children prone to negative behaviours during interpersonal communication (preschool teachers – child – family).

While applying theoretical and empirical research, we designed a model of interpersonal communication that will contribute to developing a sustainable and responsible attitude towards negative behaviours in preschoolers and a clear and effective system of measures to prevent negative behaviours in preschoolers.

The experiment covered the period during the three stages of experimental work during 2020–2021, namely: analytical-modelling, experimental and generalizing. It involved preschoolers (120 persons), parents (120 persons) and preschool teachers (42 preschool teachers).

At the analytical-modelling stage of the experiment preschool teachers filled in some questionnaires. It was necessary to study the peculiarities of negative behaviours in senior preschoolers and the content of preventive work with them. They were suggested to indicate the children's names, their gender and, in fact, negative behaviours.

The preschool teachers stated that negative behaviours in senior preschoolers were caused by pedagogical neglect, weakened health, innate qualities, which negatively affect their progress in class, problems in establishing positive interpersonal relationships with peers and adults. In addition, they believe that hyperactivity as a natural human characteristic prevents the child from perceiving any information under certain conditions, can lead to their poor progress, unpopularity among peers, and as a result, the desire to self-assert themselves using inadequate methods within their group or outside the preschool. Hyperactivity and misconduct are also ways to attract the attention of their teacher or peers.

The analysis of the survey among preschool teachers revealed trends in negative behaviours of older preschoolers, changing based on gender. Types of negative manifestations in the behavior of older preschoolers are observed in both boys and girls, in particular: excessive slowness, inhibition (boys – 3.8 %, girls – 1.2 %); increased distraction, inattention (boys – 4.3 %, girls – 1.4 %); restlessness and indiscipline (boys – 4.1 %, girls – 0.7 %), decreased interest in classes, lack of curiosity (boys – 1.2 %, girls – 1.2 %) timidity, anxiety, restlessness (boys – 1.7 %, girls – 1.4 %).

At the same time, we can trace another trend – a decrease in the manifestation of a certain quality of behaviour in boys and an increase in girls, which is manifested in such signs as isolation, excessive shyness (girls – 1.0 %, boys – 0.5 %); self-doubt (girls – 1.9 %, boys – 1.5 %); rapid fatigue, morbidity (girls – 2.2 %, boys – 0.7 %), which requires consideration of gender characteristics in preventive pedagogical work with preschool children.

There was an increase in conflict, bullying, stubbornness in boys (boys – 3.8 %, girls – 0.7 %) due to their desire for active, dynamic knowledge of the world and lack of skills to establish favourable interpersonal relationships. It should be noted that the indicator of uneven success in classes for boys (boys – 1.2 %, girls – 0.5 %) has increased significantly, which indicates the instability of cognitive interests, lack of skills of systematic, independent work.

Indicators of abusiveness and tearfulness are equally observed in boys (1.7 %) and girls (1.7 %). This is due to the fact that older preschoolers express their emotions outside, which are manifested in unstable experiences, lack of skills of emotional and volitional self-regulation. The survey shows that the highest rate of negative behaviours, according to preschool teachers, is expressed in excessive

activity, mobility, incontinence, especially in boys (boys – 4.8 %, girls – 2.1 %).

To identify parents' attitudes towards preventing negative behaviours in children, parents filled in a questionnaire, which consisted of five questions:

1. What behaviours do you consider deviant?
2. Which of them do you consider the most common among your children's peers?
3. How much time does your child spend without adult care?
4. What does your child do in their spare time?
5. What are the main causes of deviant behaviours in children?

The results of parents' observations of preschoolers' behaviours have allowed revealing forms of negative behaviours in children and the causes leading to them.

Thus, the interviewed parents singled out among the forms of the negative behaviour of preschool children: rudeness, profanity, which accounts for 47 % of parents' answers, negative attitude to learning and play activities – 39.9 %, violation of rules of conduct in preschool and at home – 39.2 %, the humiliation of others – 28.2 %, disobedience and criticism of adults – 27.4 %, hooliganism – 16.2 %, fights – 14.1 %, theft – 4.8 % of responses.

These data show that the dominant forms of negative behaviour are rudeness, slander, negative attitude to learning and play activities, violation of rules of conduct, the humiliation of others, disobedience (average is 36.4 %), fights, theft is less common the average figure is 11.3 %).

According to the results of interviews with parents, the reasons that lead to the negative behaviour of preschool children have been identified. Thus, the most common reasons that lead to negative behaviours in children are the unfavourable situation in the family (51.0 %); increased excitability of children (41.3 %); stressful family situations (41.3 %); examples of violence, cruelty, impunity received through the media (39.2 %); a tense financial situation in the family, excessive employment of parents (34.3 %); contemptuous attitude from peers (30.1 %); adults' misunderstanding of children's difficulties (30.1 %). The average is 38.1 %.

Negative behaviour of children is less affected by such reasons as lack of self-confidence of the child (27.3 %); insufficient pedagogical knowledge of parents (22.4 %); morbidity of the child (18.9 %); biased assessment by adults of children's abilities (18.2 %); lag in leading activities (16.7 %). The average is 20.7 %.

To analyze parent-child relationships, both parents and preschoolers were observed (while bringing and taking children to / from a preschool). The observation results have shown that parents did not pay enough attention to their children, hardly talked with them, did not ask any questions (even "What happened in the kindergarten today?"). They were not interested in their progress in class and relationships with peers. Some ignored the children's questions addressed to them. Consequently, the children most often used such phrases as "I want" and "I need" (63 % of children), etc. It indicates some parents fulfil specific requests and demands of their children when others ignore them without using the words "please", "thank you", etc. (37 % of children). Instead of talking with their children, some parents prefer "more serious" phone conversations with other adults or work on a computer, etc. [26].

So, the results from the analytical and modelling stage have proved that children negative behaviours are today's reality both in Ukraine and other countries all over the world. Therefore, it is imperative to specify why such behaviours occur in a particular situation. Knowing the mechanism of emerging violation, one can plan relevant preventive pedagogical work in the context of interpersonal communication based on the principles of humanism, child-centred approach, conformity with nature, optimistic approach, and beliefs in their potentially positive capabilities.

During the experimental stage, the following forms of work with preschool teachers have used: lectures (preschool teachers were introduced to models and styles of communication, leadership, psychological influences on child's personality); workshops (they aim to improve the relationship between teachers and children through such techniques as "Identify your leadership style", "Model of teacher's communicative activity"), psychological training ("Act and its causes", "Mastering effective communication techniques"), positional games ("Teacher being a child", "Teacher and parents"), individual consultations (they aim to stabilize teachers' internal state, solve their problems, etc.). In particular, relaxation techniques appeared to be effective enough to relieve stress and regulate their mental activities ("Relaxing facial muscles", "Air balloon", "Pit of emotions", "Float in the ocean").

To deepen parents' knowledge of psychology and pedagogy and establish effective interaction between teaching staff, we have held individual consultations and training ("How to help a child to improve their behaviour", "We seek to understand"), a discussion circle ("The role of the family in a modern child's education"), a parent forum ("Problems in modern children's education"). To ensure educational cooperation between preschools and families, generalize and apply positive achievements in education, "Vseobuch" (pedagogical training for parents) has been implemented into the education process of preschools.

Realizing the influence of parent-child relationships on negative behaviours in children and further development of children personalities, we started an educational event "Loving Parents – Happy Children". It is aimed at ensuring positive changes in parent-child relationships, establishing healthy family relationships, creating a positive psychological climate in the family and promoting comfortable communication between family members, which stipulate developing preschoolers' constructive behaviours.

The research objectives have been realized through training sessions with parents ("Education through kindness"), joint educational activities, family holidays, pedagogical consultations ("Negative and positive affirmations:

if you have said that, take it all back", "Crib sheet for adults or rules for effective communication with "problem child", "Parents and children: meet halfway"), etc.

It is important to activate positive emotions in preschoolers prone to negative behaviours while working with them. Based on the research findings, it has been proved that taking into account individual characteristics of each child and using individual and differentiated approaches. One can quickly achieve positive results through introducing forms of joint activities with parents (development of creative projects, parents' participation in the institution's activities, etc.), involving preschoolers into various activities (psychological theatre, psychological sketches, games, exercises, etc.), which have contributed to positive changes in behaviours and character of "problem" children.

One of the effective ways to meet the objectives of preventive pedagogical work with children prone to negative behaviours is to create a positive emotional climate between peers. Therefore, we involved preschoolers in circle time activities, ("Step to Success", "We are equal", "Rights through children's eyes") and organized corrective and developmental activities: a fairy tale and game "What a wonderful world", interactive lessons "Let's overcome aggression together", "I am kind", role-playing games that allowed modelling unusual situations and events for children that eventually fostered their understanding, empathy, etc. In our opinion, the following information and communication technologies also contribute to positive results of preventive pedagogical work with preschoolers: watching cartoons "Tsarevna Lyagushka" (The Frog Princess), "Moydodyr" (Wash 'til Holes), "Dvoie spravedlyvykh kurchat" (Two Fair Chickens), "Nekmitlyvyi horobets" (Dummy Sparrow), etc., reading tales "Kolosok" (Spikelet), "Kotyk i pivnyk" (Kitten and Cockerel) and stories by Sukhomlynskyi "Pyhata litera" (Haughty Letter), "Lehenda pro zolote zerniatko istyny" (The Legend of the Golden Grain of Truth), "Obrazlyve slovo" (A Mean Word)), by Vasylchuk "Podruzhylysia" (Best Buddies), watching short videos, demonstration and modelling of game situations with further discussion.

One of the objectives was to develop a sustainable and responsible attitude towards negative behaviours in preschoolers during interpersonal communication. Therefore, a senior preschooler's ability to develop this quality has been evaluated with the help of the following indicators: moral and legal knowledge of good and evil, children's rights and responsibilities, justice, honesty, self-esteem, etc.; a sustainable and positive attitude towards the rules of conduct; the ability to establish positive interpersonal relationships during communication. Each of these indicators has been evaluated based on the 10-point system: high level of the quality's development is equal to 8–10 points, average level – 5–7 points, low – 3–4 points.

The reliability of experimental data was checked based on (motivational, cognitive-intellectual, practical-activity criteria), levels and indicators. Student's criteria (t-test) was used to determine the difference between the mean levels of each of the indicators in the experimental group and control group. Pearson's criterion ($\chi^2$ criterion) was used to check the statistical significance of changes in the levels in experimental group and control group.

Preschoolers' knowledge was evaluated with different tasks (e.g., produce examples of people's actions, which prove they are kind, responsible, honest, fair or confident; such techniques as "Colour code relationship" and projective drawings).

Based on the data obtained, the following levels of development of a sustainable and responsible attitude towards negative behaviours in preschoolers during interpersonal communication have been determined high, average and low.

*High level*: the child understands moral concepts, performs their duties (of son, daughter, grandson, granddaughter, brother, sister, etc.) and adheres to the rules of conduct. They have developed the skills and abilities required to establish and maintain friendly relationships with peers during joint activities of different types.

*Average level*: the child has ethical views, is able to analyze moral situations and find the right solution to them, understands their duties (of son, daughter, grandson, granddaughter, brother, sister, etc.), seeks to adhere to the rules of conduct within both preschool and family, is friendly, supports parents and friends.

*Low level*: the child has superficial ethical views, adheres to moral norms and rules if controlled by adults or violates them, is aware of their duties, but does not always fulfil them, often reveals negative emotions towards peers, sometimes adults, is often rude, negative and unrestrained. The overall results are presented in table 1.

**Table 1.** Indicators of the preschoolers' sustainable, responsible behaviour development to the negative manifestations at the experimental stage.

| Groups of children | Total number | Levels | | |
|---|---|---|---|---|
| | | High | Average | Low |
| Experimental group | 62 | 17.5 | 48.2 | 34.3 |
| Control group | 58 | 22.4 | 49.3 | 28.3 |

The experiment results presented in table 1 indicate significant positive changes in developing a sustainable and responsible attitude towards preschoolers negative behaviours during interpersonal communication in the preschools. The obtained data allow stating positive results of the proposed preventive measures.

Therefore, attention has been paid to the organization of educational and preventive measures to develop a sustainable and responsible attitude towards negative behaviours in preschoolers during interpersonal communication. In particular, preschoolers participated in psychological interventions, which included sketches, exercises, games aimed at developing and correcting various aspects of the child's psyche, both cognitive and emotional sphere. In addition, conducted activities proved to be effective by the fact that the classes were based on problem situations in children life (humiliation from peers, fighting, profanity, misconduct, etc.). Such work stimulated the child's interest in their inner world. In addition, they learned to

analyze their actions to identify positive and negative character traits.

We applied preventive pedagogical technologies due to which the preschoolers learned to influence their own life, acquired the ability to establish constructive relationships with others and improved themselves while researching. Therefore, those gaming technologies that develop the ability to solve creative assignments based on choosing alternative options prevailed.

The experiment results have been characterized based on the objective evaluation of the qualities under study and the changes in the development of a sustainable and responsible attitude towards preschoolers negative behaviours during interpersonal communication, as well as application of levels of its development in senior preschoolers according to the outlined criteria and their indicators at each stage of the experiment.

The analysis of the obtained data suggests that the experiment has positively influenced the development of the quality under study (table 2).

**Table 2.** Indicators of the preschoolers' sustainable, responsible behaviour development to the negative manifestations at the generalised stage.

| Groups of children | Total number | Levels | | |
|---|---|---|---|---|
| | | High | Average | Low |
| Experimental group | 62 | 53.4 | 31.2 | 15.4 |
| Control group | 58 | 27.4 | 44.5 | 28.1 |

It must be noted that in the control group, where a preschoolers' sustainable and responsible attitude towards negative behaviours during interpersonal communication was not purposefully developed, one can observe positive changes in negative behaviours. However, the level of development of the quality understudy in the control group is significantly lower (27.4) than in the experimental group (53.4), where experimental work was purposeful and systematical, necessary conditions were created to develop a preschoolers' sustainable and responsible attitude towards negative behaviours during interpersonal communication.

Therefore, the data in table 3 show the dynamics of changes in the studied quality in preschool children experimental group at the experimental and generalizing stages of the study.

**Table 3.** Dynamics of changes of experimental and generalizing stages of research of experimental group (in %).

| Levels | Experimental stage | Generalizing stage |
|---|---|---|
| High | 17.5 | 53.4 |
| Average | 48.2 | 31.2 |
| Low | 34.3 | 15.4 |

The data in table 3 show that the number of older preschoolers with a high level of studied quality development has almost tripled (35.9); the number of children with a low level of this quality development decreased by 18.9. It indicates that the content of the experimental work corresponds to the goal and objectives and their effectiveness. The results of the generalized stage of the experiment showed that the number of older preschoolers with a high level of formation of the studied quality increased significantly (17.5 of experimental group children – at the experimental stage and 53.4 at the generalized stage),and significantly reduced the number of children with low levels of education.This quality (34.3 of children experimental group at the beginning of the experiment and 15.4 – at the end of the experiment). These data indicate the positive dynamics of the studied quality development, which proves the effectiveness of the research work.

## 5 Conclusions

In the research the peculiarities of negative manifestations in the older pre-schoolers' behaviour have been analysed which allowed determination the content of preventive pedagogical work to form responsible behaviour to negative manifestations in preschool children in intersubjective interaction with selected forms, methods and means of preventive pedagogical work; support for teachers and parents on pre-schoolers' preventive education.

The results of the study show to prevent older preschoolers' negative behaviour it is necessary to take effective measures to promote children constructive behaviour in interpersonal interaction; to adhere to the continuity and consistency in the conduct of diagnostic and prognostic, preventive, educational work in preschool and primary schools; to provide advisory support to teachers and parents on preventive education of older preschoolers at the level of cooperation; to introduce training of all subjects of preventive pedagogical activity for qualified implementation of preventive and corrective work.

The study demonstrates the feasibility of preventive pedagogical work to prevent children negative behaviours. It is a necessary area of psychological and pedagogical work with children, which has its specifics, characterized by content, tasks, as well as prerequisites for parental education and vocational training.

Prospects for further research are the study of the partnership between the preschool institution and the family in organizing preventive pedagogical work with preschoolers.

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# Formation of the reading comprehension skill in primary school students by visualization

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**Abstract.** This article describe the problem of shaping scrupulous reading comprehension in primary school students through visualisation tools and identifies its key factors. The scientific psychological and pedagogical and methodological literature, the current legal framework of primary education in Ukraine, educational experience of the research problems of foreign and domestic teachers, the results of the PISA research were analyzed. Foreign theories of interpretation of the term "reading comprehension" are reviewed and our own understanding of the essence of the concept is suggested on their basis. Presents its own classification of modern visualisation tools. It describes the author's organizational and methodological model of shaping reading comprehension by visualization means, as well as the work done by the author on shaping of scrupulous reading comprehension by visualization means among primary school students. The research involved a set of theoretical (analysis of scientific literature, legal framework, synthesis, generalisation, systematization) and empirical methods (expert assessment, modelling; questionnaires, interviews, monitoring of the educational process, method of mathematical statistics).

## 1 Introduction

New trends in education are moving more towards a learner-centred approach. Due to the expansion of the information space, children today are experiencing the phenomenon of "clip thinking" [1]. This poses the problem of developing the ability to read with understanding. Simultaneously, the information context is currently changing the way information is perceived, leading to the introduction of digital devices and new technologies into the educational environment, characterised primarily by visualisation. Mosina [2] considers the most important principle of communication and presentation of information in today's information environment. Therefore, in our opinion, it is advisable to form young schoolchildren's reading comprehension skill with the help of various visualization tools.

This need is due, in our opinion, a number of factors: the technologicalization of education; insufficient level of reading competence of schoolchildren, peculiarities of the educational environment in the conditions of quarantine restrictions, low level of reading interest and motivation to read; the requirements of the Concept of the New Ukrainian School, the State Standard of Primary Education and the Standard Educational Programs for the literacy of students as the ability to understand complex texts from any field of life, to be competitive; PISA monitoring studies in 2018 on reader literacy. The latter showed that Ukrainian students have low scores among OECD countries, including an average reading score of 466.74% of students achieved only the second level of reading, which means that about 26% of students do not even have a basic level of conscious and literate reading. Approximately 3% of students achieved levels V-VI (highest). At these levels, students have developed the ability to understand in detail an unfamiliar text [3].

The problem of educational results in the formation of primary school students' reading skills is mentioned in the State National Program "Education" ("Ukraine of the XXI Century") [4] and the "Concept of General Secondary Education (12-year school)" [5], which became the foundation for the modernization and reform of all existing educational documents. The Law of Ukraine "On Education" defines eleven cross-cutting skills that are common to all key competencies, the first of which is "reading comprehension" [6]. The Concept of the New Ukrainian School in the "outline" of student development" also primarily defines the "ability to read" [7].

The basic normative document, which indicates the importance of developing this skill, is the State Standard of Primary Education [8], but the interpretation of the concept of "reading comprehension" is presented in the State Standard of Basic Secondary Education as "ability to emotional, intellectual, aesthetic perception and comprehension, understanding of information recorded (transmitted) in various ways or reproduced by technical devices, including, in particular, the ability to reveal hidden and obvious information, make assumptions, prove the reliability of arguments, supporting their own conclusions with facts

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and quotations from the text, express ideas related with understanding of the text after its analysis and selection of counter-arguments" [9].

Data from the current socio-cultural project "All Ukraine Reads to Children", initiated by the ABCXXI Foundation – "All Poland Reads to Children" in the programme "All Europe Reads to Children" (2013 – present) [10] and research by Kachak [11], showed that the formation of the reading comprehension skill is better to start at an early school age. According to Villaume and Brabham [12], younger students must visualize what they are reading. So they will ask more questions, draw conclusions and predictions about the text read. However, the analysis of modern scientific and methodological literature shows that there are no special studies in Ukraine on the use of visualization in lessons of language and literature education to teach primary school students to read with understanding, which determines the relevance and significance of our study.

The *goal of our research work* is to explain and present the author's theoretical model and methodology for the implementation of visualization tools in the educational process for the formation of reading comprehension skill in young schoolchildren.

## 2 Results and discussion

In connection with the novelty of the term "reading comprehension" for Ukrainian linguodidactics, we have considered in detail the theories of foreign researchers on the outlined problem. Thus, the NARAP (National Accessible Reading Assessment Projects) on assessing the level of accessible reading [13], PIRLS (Progress in International Reading Literacy Study) in the context of the International Study of Reading Literacy and Reading Achievements 2016 [14, pp. 11–29] draw attention to target and cognitive components of working with text.

Analyzing the reading components identified by the US National Reading Panel [15], we can conclude that the most important is motivational (the process of encouraging young students in general to read); free reading (reading without pressure or constraint, reading texts that are enjoyable); comprehension is the most important component for determining the level of concentration, comprehension and the ability to interpret what is being read.

Exploring theories on the essence of the concept of "reading comprehension" (Veeravagu et al. [16], Hudson [17], Khoiriyah [18], Hulme and Snowling [19], De Beni and Palladino [20], Channa et al. [21], Oakhill et al. [22], we can conclude that reading comprehension depends on the relationship of cognitive and speech processes. This skill requires the use of processes that are considered basic, such as decoding, word recognition, and extracting the meaning of printed words. In addition to basic skills, the reader must use high-level cognitive processes, such as memory, mental ability to draw conclusions about information that is not clearly defined in the text, and so on.

Cunha and Capellini [23] emphasize that in order to understand what is read, it is important that students make connections between the content of literal information in the text and the acquired knowledge of the reader. To achieve this integration, interference activities are required that require the reader to reflect and integrate between information that is explicitly expressed in the text (obvious information) and implicit information (prior knowledge), which will draw the necessary conclusions for a deep understanding of the text. That is, to understand the text read, the reader must formulate two types of conclusions (inferences): a literal conclusion concerning the author's ideas within a work, and a non-obvious conclusion that connects the ideas with complete information based on prior knowledge and experience.

To our mind, reading comprehension requires students to master various forms of understanding according to the genre and type of text. For example, a newspaper article has specific structural components, features, and a number of grammatical features that are very different from a scholarly article, work of art, or comic book. Khoiriyah [18] found that comics as one of the means of visualization make it easier for students to understand the plot line of the read text. Visualized reading skills are necessary for fast and effective comprehension. In connection with the above, we believe that reading comprehension is a complex activity that requires activating critical thinking to assimilate and understand the author's message, as well as producing personal inferences and ideas about what is read, using a variety of visualization tools.

The components of the reading comprehension skill of visualisation tool can be considered as follows:

I. *Personality-motivating* – is to establish a stable motivation, awakening the interest of each student in the effective process of reading.

II. *Thought-cognitive* – a component that focuses on the knowledge, skills and abilities of younger students to analyze the information obtained from the text and work with visualization tools, life experience that will help in deep understanding and comprehension of what is read.

III. *Productive-generalizing* – involves the ability to independently choose the means of visualization and interpret information using these tools to better understand what is read, draw conclusions and discuss the results.

A special role in the formation of younger students' reading comprehension skill by means of visualization is played by the teacher. It is important for a modern teacher to master the means of visualization on their own and be competent in them. Currently, on the online platforms "Na urok" [24], "Vseosvita"[25] Ukrainian educators present their own pedagogical experience: "Visualization in the educational process: scribing, sketching, smart cards and other tools" (T. Bondar), "Dudling as an effective means of developing students' creativity" (G. Sokur), "lapbook in the work of educators and primary school teachers" (I. Kotlyar), "New approaches to learning: sketching and comics for primary school students" (M. Shinkevych), "Features of the use of flash cards in the study of Ukrainian

language and literature" (T. Buturlym), "Online tools for visualization of material. Creating a timeline" (V. Kosyk), etc.

Hrechko [26], Sadkina [27], Kovalenko et al. [28] describes some visualization tools and features of their application in the educational offline and online environment in literature lessons (eidos-synopsis, scribing, etc.).

Teachers-practitioners (Rycroft [29], O'Connor [30], Jones [31], Halliday [32], Bell [33]) in blogs highlight the experience of using visualization tools under time to develop the reading comprehension skill, in particular the card "My mental image".

To investigate the state of awareness of modern Ukrainian primary school teachers with the outlined problem and visualization tools to teach reading comprehension, we conducted a survey among educators working in primary school in Kryvyi Rih, Pyatykhatky, Mykolayiv using a google form containing a number questions:

1. How do you understand the concept of "reading comprehension"? Do you think it is necessary to form it in modern schoolchildren? Justify the answer.
2. Do you shape this cross-cutting skill with your students? Which educational fields do you base on?
3. What difficulties do you have in developing the end-to-end ability to "read comprehension" in primary school students?
4. How exactly do you express the level of awareness and understanding of the text read by students? What technologies, methods, techniques or tools do you use for this?
5. What do you know about visualization tools, their varieties?
6. Do you think it is advisable to use them when developing the end-to-end ability to "read comprehension"? Name the visualization tools you use.

We interviewed 20 teachers. After studying the answers, we obtained the following results: 67% of teachers understand the essence of the concept of "reading comprehension" and are aware of the need to form it in younger students in lessons of language and literature education, familiar with some visualization tools. Only 33% of teachers answered that they are working on developing a thorough ability to read with comprehension, using visualization tools in their work. These are mainly various diagrams, charts and infographics (figure 1).

Thus, in the practice of modern Ukrainian schools, visualization tools are not used systematically, although teachers are aware of their potential for teaching reading comprehension on the basis of various educational fields. Teachers state that most students are not aware of the material read due to inattention, limited vocabulary, low motivation to read. To increase the level of awareness of what is read, teachers use additional questions after reading, conduct testing, use didactic games, stagings, graphic organizers of critical thinking (Euler's Circles, Fishbone), translation, drawing based on what is read, infographics. Educators include all the visual aids used in lessons: cards, drawings, puzzles, videos, presentations, photos, diagrams, intelligence cards, handouts, portraits, cards with key words, diagrams to the text and more.

Foreign teachers mostly use visualisation tools such as diagrams, tables and drawings to develop children's reading comprehension. Moreover, modern visualisation tools, especially digital ones, are still being neglected by national and international primary school teachers.

Analyzing various Internet sources, scientific works, developments of modern researchers, we have identified a large number of interesting visualization tools that can be used in various subjects from primary to senior education, and divided them into the following groups: graphic, digital, graphic-digital, hand-made (figure 2).

To the group of graphic means of visualization we included fishbone, denotation graph, eidos abstract, calligraphy, cluster, scribing, doodling, sketchouting, diary of impressions. We have combined such visualization tools into one group on the principle of working with different types of diagrams, charts, graphics.

The group of digital visualization tools, which includes book trailer, word cloud, emoji language, social networks, literary memes, interactive posters, playcast, crosssense, infographics, was singled out by us in connection with the active introduction of distance learning in Ukraine and in countries abroad, the widespread use of Internet platforms and Internet sites.

The following visualization tools belong to the graphic-digital group: flash cards, mindmapping, timeline, comics, storyboard, scribing. We gave this group this name because children can use the tools graphically (draw) in notebooks, on separate sheets of paper, and using a variety of digital resources.

The last one we consider is the hand-made group, which includes the following visualization tools: lapbook, coloring bookmarks, moodboard, leporello. This group is characterized by a direct manifestation of artistic creativity, children's imagination and the involvement of handicrafts.

Thus, all our groups of visualization tools are aimed at the formation of reading comprehension, the development of critical, creative and creative thinking, as well as focused on key competencies such as innovation and information and communication competence. Classified visualized reading aids help students obtain new information in a more accessible format, analyze it, and draw their own conclusions. In addition, they motivate students to the process of reading in general and active participation in the educational process.

We have analysed scientific psychological and pedagogical and methodological literature, and studied the essence of the key concepts of "reading with comprehension" and "visualised reading", The classification of modern visualization tools gives us grounds for developing the author's organizational and methodological model (figure 3) [34]. This model will help teachers develop the

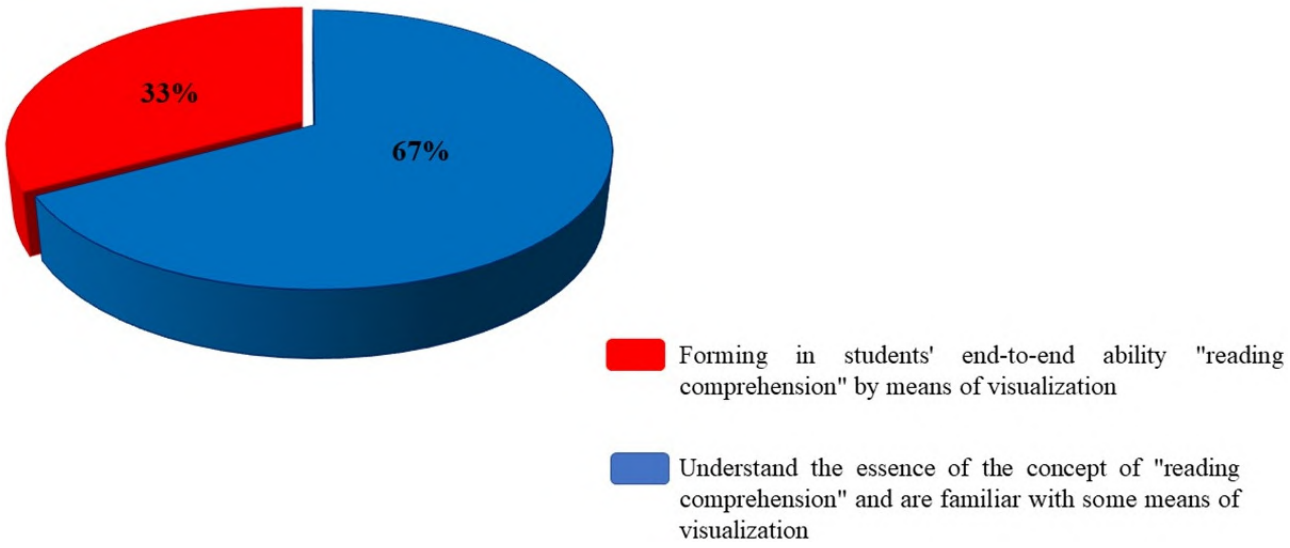


**Figure 1.** The results of a survey of teachers on the research topic.

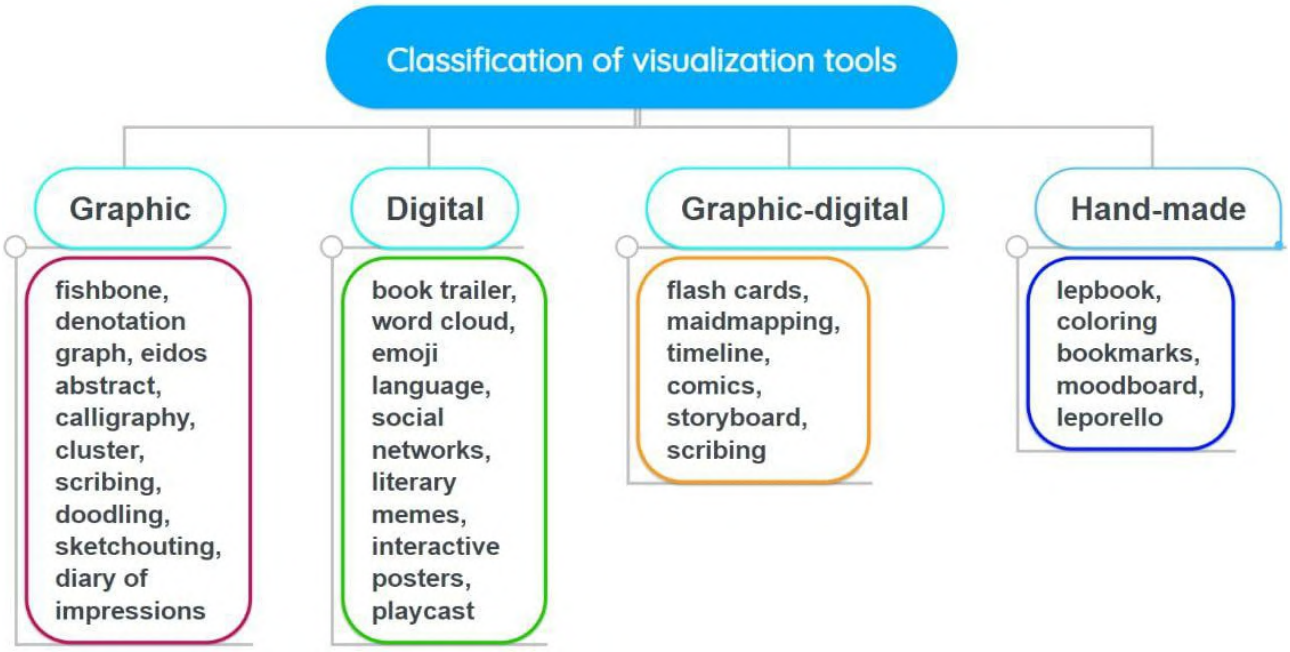


**Figure 2.** Classification of visualization tools.

reading comprehension skill in elementary school students using visualization tools.

In order for primary school teachers to begin to implement visualisation tools in the educational process and form reading comprehension, the stages of the work must be followed. Therefore, the developed model is based on the following work stages:

1. *Preparatory stimulating and motivational*: the creation of a reading comprehension environment that prepares and motivates learners to engage in active learning and cognitive activities, and builds positive motivation and interest in working with visualisation tools.
2. *Cognitive*: coverage of knowledge, skills, abilities and abilities that should be acquired by the student in the process of working with visualization tools (acquaintance with various tools, features of its use) while reading.
3. *Practical and creative*: reflective of methods of using visualization tools in the educational process, practical application of tools by students while reading and performing tasks to establish students' understanding of what is read, creating and presenting visualization products by children.
4. *Reflexive and effective*: self-assessment by primary school students of their own work on understanding

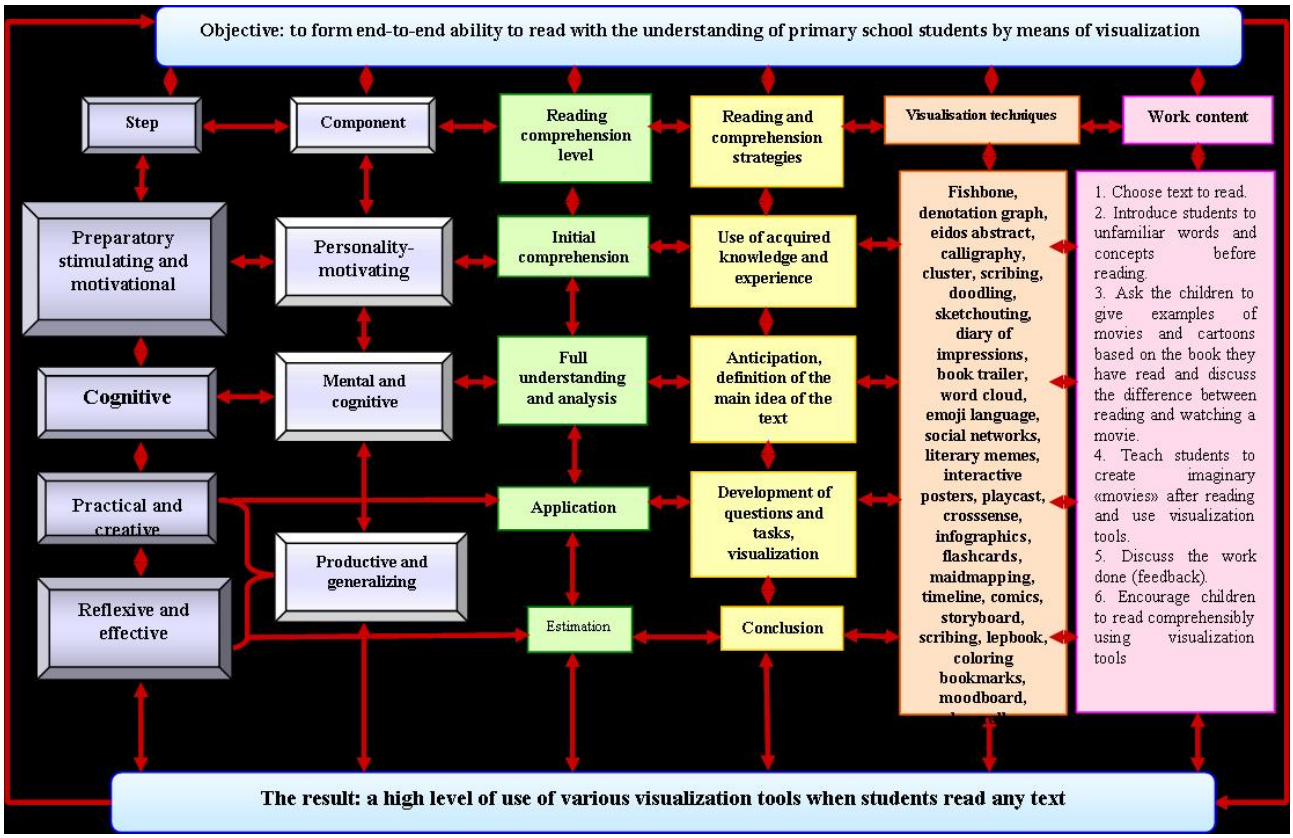


**Figure 3.** Organizational pedagogical and methodological model of formation of end-to-end reading comprehension skill by means of visualization.

the read and correct use of visualization tools, discussing it in class (feedback), identifying the causes of failure and their correction.

Since motivation is the main factor of activity, the first stage is the formation of motives and interest in the work of students with various visualization tools. The work focuses on the personal and communicative component of reading, which corresponds to the level of reading comprehension – initial comprehension and the first strategy of reading comprehension – use of acquired knowledge and experience. The implementation of this stage ensures the success of further work on the formation of reading comprehension.

In order to motivate and encourage self-study and cognitive activities of pupils and work with visualization tools, a problematic task can be proposed at the beginning, The task or situation, using a "cluster" to divide the young students into groups and give them the opportunity to turn the task and the visualisation tool, suggest a teaching game (according to the topic of the lesson) using "flashcards", which can even be suggested at the beginning of the lesson to refresh pupils' knowledge in pairs or groups, make a "leporello" to guess the text or the topic of the previous lesson and ask them to present their work, etc.

The next stage is the cognitive stage, which means familiarization with the basic visualization tool and peculiarities of its use after the text has been interpreted for reading. Thus, at the cognitive stage the formation of the thinking and cognitive component, complete understanding and analysis of what has been read, use of anticipation and identification of the main idea of the text takes place.

At this stage, students can be introduced to such visualization tools as: fish bone, timeline, storyboard, scribing, etc. That is, students will first get acquainted with the main direction of our study – reading comprehension, learn to accurately analyze the text read, determine the idea of the text, identify the problem and draw conclusions, which is the basis for further work with visualization.

On the basis of the knowledge gained on the use of visualisation tools and working together with the teacher on a certain visualisation tool, achieved in the previous stage, we suggest starting work on the practical and creative stage, namely the students' self-directed work with visualisation tools. This stage is based on a productive and generalization component, direct and practical use of the information from the text in the form of developed questions and tasks for the text and work with a certain visualization tool: eidos-outline, doodling, info-graphics, sketch noting, word cloud, lapbook, mood board, etc. The children are encouraged to present the visualisation product to the class after it has been created.

The final reflexive and effective stage is also based on the productive and summarising component, but it is focused on summarising and evaluating one's own work.

Therefore, the implementation of each stage of the developed model is subject to the relevant components of the

reading process. The teacher can supplement or change the approximate content of the work, as most visualization tools are universal. Therefore, the teacher can independently, depending on the topic of the lesson, the text to read at each stage, choose the tool that will be most appropriate. The levels and strategies we have proposed, in our opinion, should significantly increase the degree of formation of younger students' reading comprehension skill using visualization tools. The developed model will allow to practically implement the system of work on the topic of our research.

In our view, the choice of visualization tools offered in the model depends on the purpose and objectives of the lesson set by the teacher, but it is important not to forget about the age of students, as well as personality-oriented model of education. The teacher can independently, depending on the topic of the lesson, the type and genre of text to be read, apply the visualisation tool that is most appropriate at each stage, or allow the teachers to do it on their own. All tasks, exercises, didactic games developed by the teacher with the use of visualization tools should be practically oriented, related to the personal experience of students.

## 3 Conclusions

In summary, we would like to make a few arguments for the usefulness of visualised reading for teachers in their practice:

- to provide learning motivation and cognitive activity for students;
- formation and development of visual perception, critical and creative thinking;
- presentation of works of any genre in images that help you better understand and make notes of what you have read;
- checking the level of perception and comprehension of the read work;
- development of self-determination, search activity and creativity;
- teaching to compare different points of view and to express one's own opinion;
- improvement of visual literacy and visual culture.

In our opinion, the effectiveness of the formation of end-to-end reading skills with understanding means of visualization in students depends primarily on the implementation of psychological and pedagogical conditions, based on personal and motivational training of primary school teachers to use visualization tools in their own teaching activities; methodical acquaintance of teachers with the requirements and rules for the use of each visualisation tool; teachers should be trained to select visualisation tools appropriate to the age and interest of the students; the systematic use of this equipment for the formation of skills by following the stages we have defined: preparatory stimulation-motivational, cognitive, practical-creative and reflective-results.

We consider it promising to further research the theoretical and methodological aspects of the problem of developing profound reading skills by means of visualization in accordance with the principle of progression.

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# Development of ecological consciousness of future primary school teachers in the process of professional training

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**Abstract.** The article emphasizes that among the current and promising problems of modern pedagogical science of particular importance is the need to develop ecological consciousness of future primary school teachers in the process of their training. Focusing on modern theories of primary education, philosophy of education, the authors substantiate the acute general need for fundamental changes in the ecological consciousness of future primary school teachers in postclassical education. This is due to the influence of the latest models, tools and services in the context of primary education reform. The essence and the basic contradictions proving necessity of development of ecological consciousness of the future teachers of elementary school in educational process of higher school are considered. The analysis of the concept of "ecological consciousness" is carried out, the structure of ecological consciousness of the future primary school teacher is defined. The presented results of research and experimental work with the involvement of first-third year students of the first (bachelor's) level of higher education in specialty 013 "Primary Education" present factual data for the diagnosis of levels of development of environmental knowledge and environmental awareness. The pedagogical conditions that will promote more effective development of ecological consciousness of future primary school teachers in the process of professional training in accordance with globalization changes in the ecological sphere, integration of domestic higher education in the European educational space, social transformations on the way to scientific and technological progress are identified.

## 1 Introduction

The requirements of today require the improvement of professional training of future primary school teachers, due to the need to educate the younger generation of the country, able to care for the natural environment, to use its resources wisely. It is no coincidence that among the current and promising problems of modern pedagogical science of particular importance is the need to develop ecological consciousness of future primary school teachers in the process of their training. Modern scientific theories, methodology of pedagogy, philosophy of national education create the basis for fundamental changes in the ecological consciousness of future primary school teachers in postclassical education. This is also due to the influence of new models, tools and services in the context of primary education reform. The essence of the main contradictions that accompany the development of ecological consciousness of future primary school teachers in the process of professional training is dictated by globalization changes in the environmental sphere, integration of domestic higher education in the European educational space, social transformations on the way to scientific and technological progress.

These aspects are emphasized in state documents on education: "National Doctrine of Education Development" [1], "Concepts of Ecological Education in Ukraine" [2]. The mechanism of realization of the new educational paradigm in primary education is the reform "New Ukrainian School", which identifies ten key competencies. One of these competencies is defined as "the ability to use natural resources wisely and rationally, awareness of the role of the ecological for human life and health, the ability and desire to follow a healthy lifestyle" [3, p. 14]. It can be formed in primary school students only if a high level of ecological consciousness and culture of the teacher. Therefore, the development of ecological consciousness of future primary school teachers in the training process is an important issue in improving the educational process in higher education.

## 2 Literature review

A significant amount of research is devoted to this issue. Among Ukrainian scientists, the influence of knowledge about nature on the formation of moral qualities of the individual and its attitude to the environment is noted by V. I. Vernadsky [4], K. D. Ushinsky [5], V. A. Sukhomlinsky [6] and others. The works of M. I. Bauer [7], H. O. Biliavskyi [8], N. V. Levchuk [9], A. N. Nekos [10] are devoted to the importance of ecological knowledge in the process of formation of ecological culture of personality. Issues of ecological training of students of higher education institutions, formation of ecological cul-

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ture in them are the subject of study of M. D.'Andrea [11], C. L. Krause [12], V. R. Kuchma [13], V. S. Mastryukov [14] B. M. W. Mender [15], D. Tonoli [16], P. Vacher [17]. Peculiarities of formation of ecological culture of the specialist are investigated in the works of S. D. Deriabo [18], S. Futornyi [19], L. Gang [20], L. He [21], H. Mei [22], S. Sovhira [23]. H. O. Biliavskyi [8], E. V. Girusov [24], M. T. Mengak [25], T. S. Ninova [26] study the purpose, tasks and principles of ecological education.

The analysis of literature allows to outline the contradictions that prove the need to improve the process of development of environmental awareness of future primary school teachers, in particular, such: between modern requirements for the level of ecological and professional training of future specialists and the real state of their training in higher education; between the need for thorough greening of the content of the educational process and the need for modern curricula for vocational training of students, which will contribute to the qualitative growth of ecological consciousness of the future specialist; between the expediency of the development of future specialists in ecological knowledge and skills to preserve and improve the ecological and the lack of scientifically sound modern pedagogical theories and technologies, the implementation of which ensures the effectiveness of this process.

There is currently no single interpretation of the concept of "ecological consciousness", but the most common are the following definitions: scientific and practical reflection of the relationship of man and society with the present and future environment, the need to harmonize relations between them; ordinary, everyday human consciousness, meaningfully directed by ecological meanings; a set of ecological ideas, attitudes to nature, strategies and technologies of interaction with it.

In the psychological and pedagogical literature, several approaches to defining the meaning of the concept of "ecological consciousness" are substantiated. E. V. Girusov considers ecological consciousness as a component of ecological culture, as a set of views, theories, emotions that reflect the problems of the relationship between society and the natural environment in terms of "ensuring progress in unity with the natural environment" [24, p. 82].

V. O. Skrebets believes that this is "the level of mental reproduction of the natural and artificial environment, their inner world, self-reflection of the place and role of man in the biological, physical, chemical world, as well as self-regulation and filling this reproduction with ecological content" [27, p. 48]. Ecological consciousness, according to the scientist, is characterized by all the signs of conscious human activity with the feature that it is initiated by ecological meaning. S. D. Deriabo and V. A. Iasvin understand ecological consciousness as "a set of ecological ideas, the existing attitude to nature, as well as relevant strategies and technologies of interaction with it" [18, p. 11]. V. I. Panov considers ecological consciousness as an attribute, ie a property of man as a component of relations in the system of relations "man – nature". He sees the structure of ecological consciousness in the set of human ideas about the relationships in this system, personal attitudes and technologies of human-nature interaction, vital ecologically oriented human values [28, p. 91].

V. I. Medvedev and A. A. Aldasheva [29, p. 162], developing the above approach, identify the following characteristics of ecological consciousness: the degree of reflection in the ecological consciousness of social values and institutions; expression in the ecological consciousness of prognostic elements in the situation of choosing the criteria for solving a specific ecological problem, that is focus on the "present for the sake of the future"; features of orientation of ecological consciousness on collective, society; opportunity to counteract ecological troubles, to take part in overcoming the consequences of anthropogenic ecological catastrophes.

As we can see, revealing the structure of ecological consciousness, scientists identify the following main components that reflect its social essence and regulatory functions:

- conscious assimilation by man of the norms of scientifically determined, ecologically appropriate, rational use of nature and development on this basis of a system of ecological beliefs, knowledge, skills that would provide optimal, in relation to nature, his practical activities;
- mastering the norms of using the means of organizing human economic activity in the context of responsible attitude to the problems of ecology and nature conservation, legal culture and knowledge of environmental legislation, ecological situation created at the place of residence: region, state, global scale;
- understanding oneself as a part of nature, which is for man a source of health, humanism, patriotic feelings, moral, aesthetic and other qualities;
- awareness that nature is a social value.

Selected characteristics reveal the meaning of the concept of "ecological consciousness", which is an internal determinant of human attitudes to nature. According to F. A. Gismatov, the formation of ecological consciousness takes place in two ways: "spontaneously, on the basis of daily practical activities, and consciously, on the basis of a purposeful process of education and training in every field of human activity" [30, p. 71]. According to A. N. Vargo, the formation of ecological consciousness occurs in stages in accordance with the development of society "... for industrial society is characterized by interested and disturbing types of ecological consciousness, for ecologically problematic society – adaptive and unifying types of ecological consciousness; ecological society is characterized by an ecophilic type of ecological consciousness" [31, p. 16].

The formation of ecologically conscious personality, as noted by S. D. Deriabo and V. A. Iasvin, is a general principle of environmental education, concretized at three levels: 1) the formation of adequate ecological ideas about the system "man – nature", which contributes to the understanding of their unity; 2) developing an attitude to the ecologic that determines the nature of areas of interaction with it, its motives, stimulates behavior and action in terms of ecological feasibility; 3) improvement of abilities and

skills of use of ecologically expedient technologies of interaction with nature [18, pp. 22–24].

Since the main guideline in solving these problems of ecological education is the organization of such activities of the individual, which reflects the development of technologies of human interaction with nature, so the development of ecological consciousness is through a combination of different organizational forms of learning. A lot of scholars emphasize this aspect in their research [32–42].

An important factor in the development of ecological consciousness is ecological knowledge, which is of particular importance for students of higher pedagogical institutions of education as future nature users or educators. Mastering any profession should be based on the priority role of ecological knowledge and relevant skills, which will predict the consequences of their professional activities. In addition, it promotes the inclusion of students themselves in creative cognitive activities.

Noting the need for relevant knowledge and beliefs for intelligent communication between society and nature, researchers believe that the greening of the material and spiritual life of society is a condition for overcoming the ecological crisis, and ensuring harmony in relations between society and nature is possible only due to changes in the worldview of man himself. This approach requires the study of the dynamics of the development of ecological consciousness of future professionals in the training of future primary school teachers.

## 3 Methods

The purpose of the article is to present the results of research and experimental work on the diagnosis of the dynamics of the development of ecological consciousness of future primary school teachers in the process of training. To do this, it is first necessary to specify the essence of the key concept of "ecological consciousness of future primary school teachers", determine its structure. Levels of development of ecological consciousness of future primary school teachers in the process of professional training need to be diagnosed.

The development of ecological consciousness of future primary school teachers is carried out throughout the educational process. The ecological component is contained in the disciplines of the cycle of general and professional training, so there should be a change in the levels of ecological attitude to the environment, understanding of ecological problems of students of different class. To establish the level of ecological awareness, ecological knowledge of students on issues of interaction in the system "nature – man", to determine their awareness of the need for ecological education for society, conducted a survey [35] first to third year students of the first (bachelor's) level education specialty 013 "Primary Education" of Bohdan Khmelnitsky National University at Cherkasy [43].

Here are the results of a survey on selected questions of the questionnaires, which most clearly reveal the results on the level of development of ecological consciousness of students of different classes. In the figures 1–5 show (in percents) students' answers to the questionnaire: group 1 – first class (course, year) students, group 2 – second class (course, year) students, group 3 – third class (course, year) students.

The answers to students' questions about the causes of the global ecological crisis are distributed according to the results we summarized in figure 1.

First year students attribute the first global ecological crisis to the development of computerization (40.9 % respondents), which is a misjudgment. In fact, the impact of the development of agriculture and livestock, and later industry cause changes in the microclimate, soil conditions, fauna and flora. Only 22.72 % of first year students gave the correct answer; among second and third-class students gave the correct answer, respectively 53.4 % and 54.17 % respondents. The obtained empirical results confirm that the ecological education of first year students is currently quite conceptually weak, too declarative and fragmentary, which does not meet modern requirements.

The distribution of students' answers to questions about the causes of today's global ecological problems is presented in the figure 2.

Answering this question, 37.93 % of respondents in the first year of study and almost a quarter of second and third year students believe that the causes of global ecological problems are accidents at nuclear power plants. This result could be a consequence of the information received about the Chernobyl accident. 17.24 % respondents believe that scientific and technological progress and low level of ecological education caused the ecological crisis. It should be noted that third year students understand the role of ecological education in preserving the environment. This means that the concept of the conquest of nature, its transformation at the will of man, the technocratic style of thinking for the prosperity of mankind is detrimental to nature. Therefore, in third year, respondents are aware of the need for a responsible attitude to nature, the belief in the need for ecological knowledge.

Students' answers to the question of relevance for each of them ecological knowledge to preserve the environment is presented in the figure 3.

As you can see, 83-87 % of respondents give a positive answer and assume that ecological knowledge is related to the modern existence of each person, his/her activities. 12.5–16.0 % of respondents give a negative result on the question. Since ecological knowledge is the basis for the formation of ecological awareness, the level of ecological awareness can be considered low. After all, students have insufficient ecological knowledge and beliefs, in the surrounding natural world is not included in the value orientations of these students.

Respondents' answers to the question about the importance of ecological knowledge for modern man is presented in the figure 4.

Based on the analysis of the answers to this question, it can be concluded that only 22.22 % of third year students emphasize the need for ecological knowledge for the professional activities of future teachers. This means that ecological knowledge as a result of learning has not become a belief, which actualizes the improvement of ecological education and upbringing of students in the learning pro-

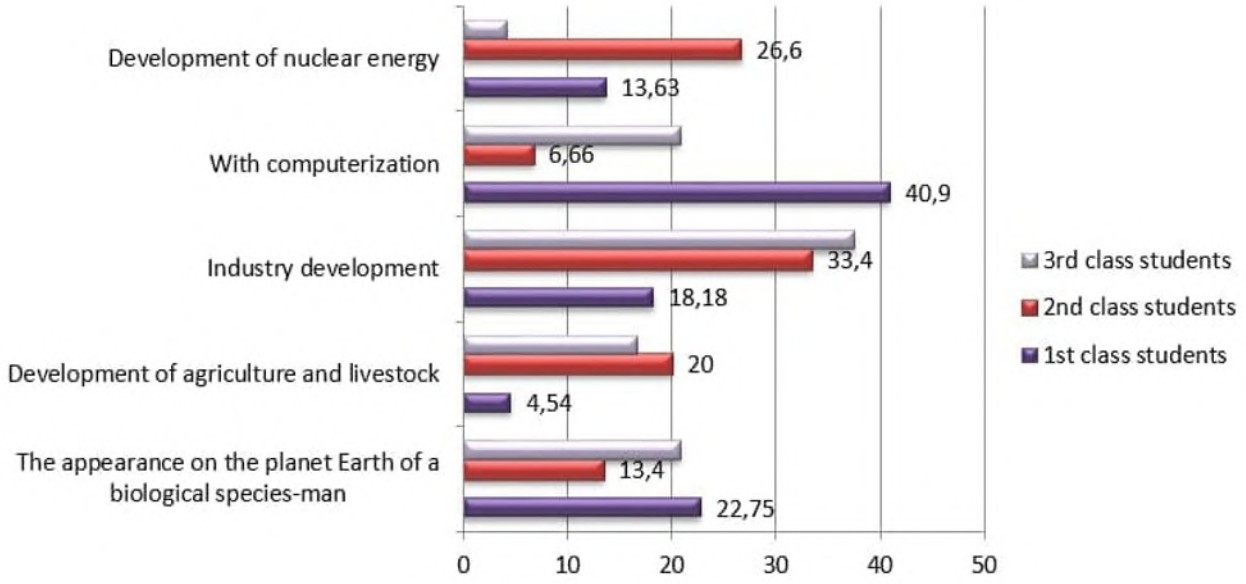


**Figure 1.** Students' understanding of the causes of the global environmental crisis.

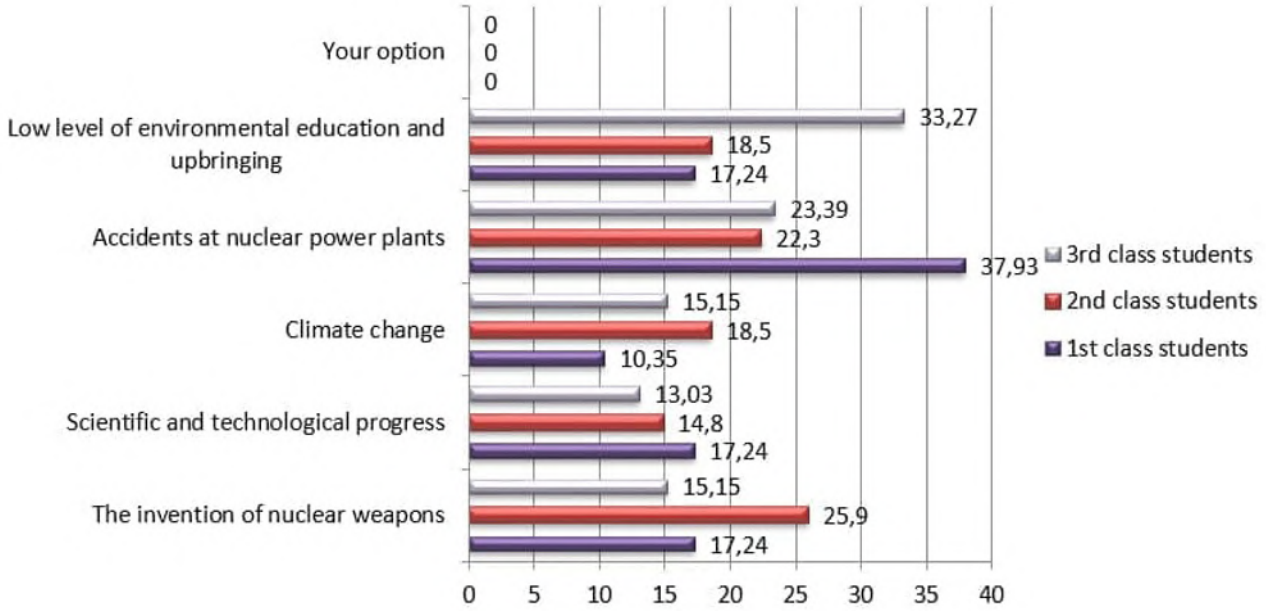


**Figure 2.** Distribution of students' answers to questions about the causes of today's global ecological problems.

cess. At the same time, 38 % of third year students have a desire for independence in judgments about the ecological situation, which is the basis of their willingness to apply knowledge in professional activities. In turn, 40 % of first year students and 37.5 % of second year students consider ecological issues only for general development. This confirms the lack of orientation in the ecological sphere.

In our opinion, the question of ways to optimize the interaction in the human-nature system is important, the answers to which presented in the figure 5.

More than 30 % of respondents from each group prefer greening of industry, while increasing the role of ecological education and upbringing – only 18–25 %. The obtained data confirm insufficient understanding of the need to restructure the system of values of modern man and build a new strategy for the development of Ukraine. These and many other issues are addressed by raising the ecological awareness of the population, and especially – future teachers. It is no coincidence that 20–37 % of respondents say that more people need to be involved in solving ecological issues, but again not realizing that they first need to be provided with an appropriate level of ecological education.

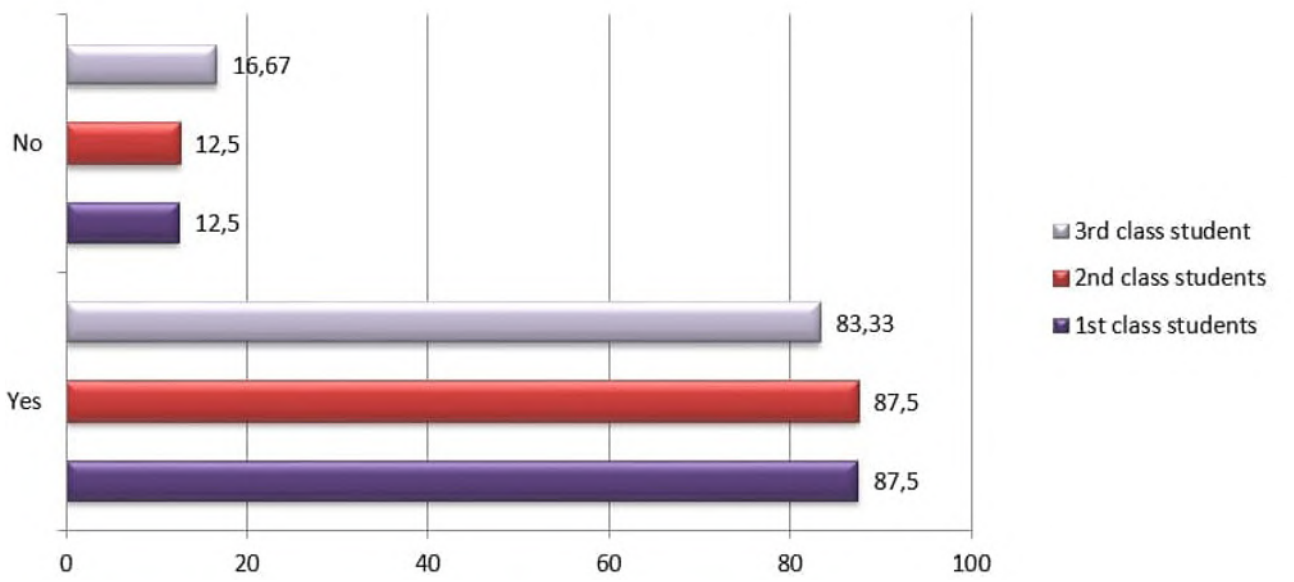


**Figure 3.** Students' answers to the question of relevance for each of them ecological knowledge to preserve the environment.

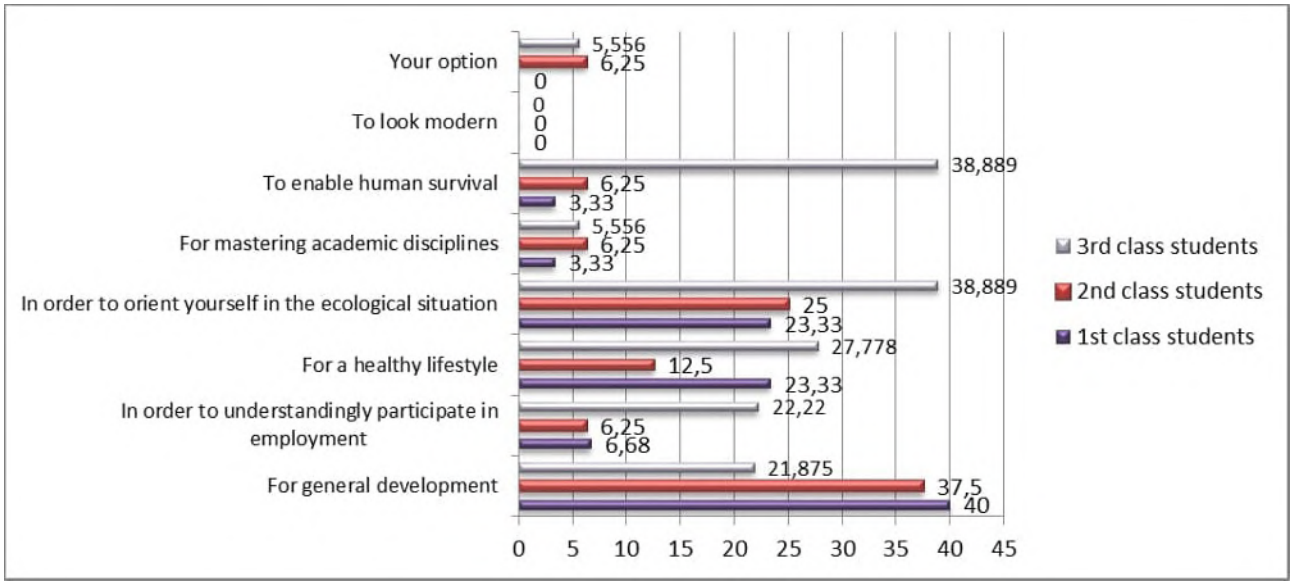


**Figure 4.** Students' answers to the question about the importance of ecological knowledge for modern man.

## 4 Results

According to the questionnaire, the awareness of future primary school teachers on ecological issues is fragmentary, undifferentiated. They are better oriented in global ecological issues than in the problems of their locality, region. Some students consider themselves not involved in solving ecological problems. The reason for this attitude is the lack of attention to the development of ecological awareness in the process of training, namely: the ecological component is not included in most training programs; the introduction of the course "Fundamentals of Ecology" is not mandatory for students of most specialties; the study of the subjects of the cycle of professional training is not sufficiently connected with the ecological problems of modern times at the regional and global levels, their causes; insufficient attention to ecological material during practical and laboratory classes in both natural sciences and humanities.

Humanistic ecological tasks are insufficiently used in the process of professional training of future primary school teachers. No attention is paid to the role of everyone in ecological protection; no skills are developed to study the ecological problems of their area and real environmental activities for ecological protection.

According to the results of the study, the necessary pedagogical conditions for the development of future primary school teachers of ecological awareness identified the following:

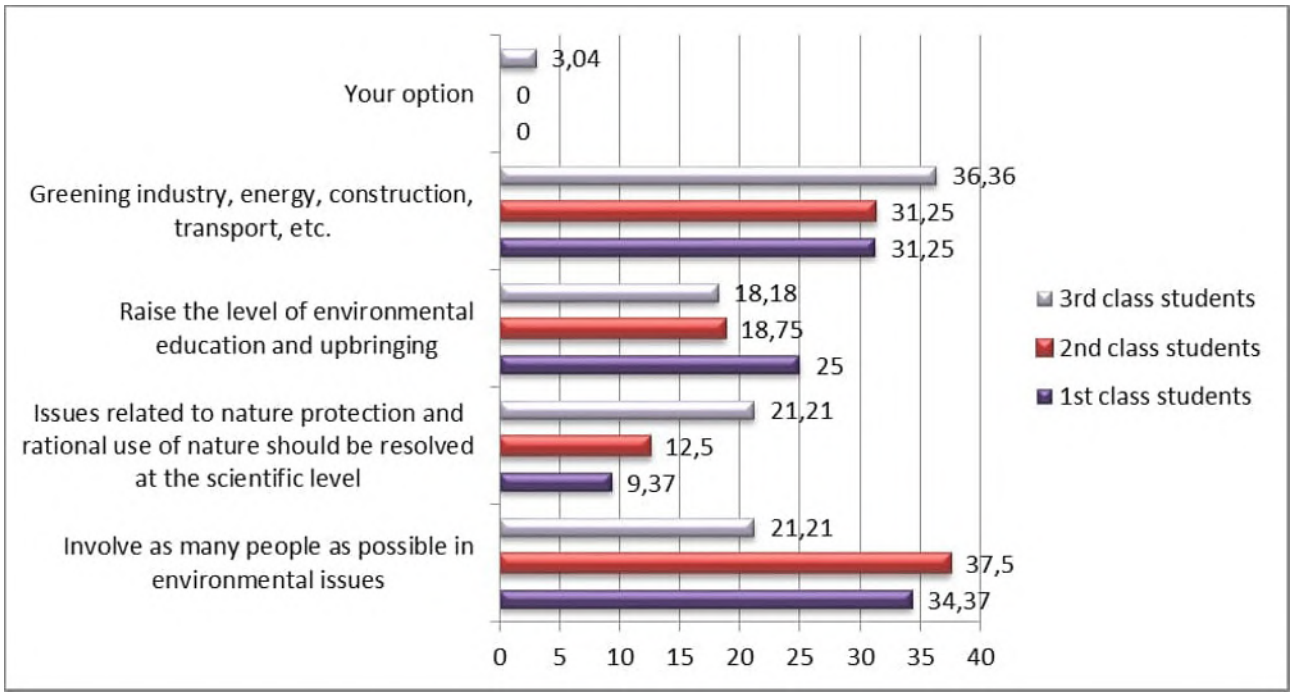


**Figure 5.** Answers to question about ways to optimize the interaction in the system "man – nature".

- systematic introduction of ecological material to all training courses for future primary school teachers;
- formation of professional skills and abilities to cover and explain ecological tasks of different levels;
- development of a system of values regarding nature and personal responsibility for the state of the ecological;
- activity approach to the process of development of ecological consciousness of future primary school teachers.

In our opinion, in order to develop the ecological awareness of future primary school teachers, it is necessary to constantly maintain the connection between the ecological, humanitarian and natural sciences components of higher education.

One of the important tasks of higher pedagogical education should be the formation of future primary school teachers of ecological consciousness of the ecocentric type. After all, consciousness determines human behavior, its activities, ecological culture, which, in turn, will lead to the proper level of development of our country. Ecological consciousness forms an active civic position of the future specialist, because the future primary school teacher cannot be indifferent to the ecological (both natural and social) in which he/she exists.

Education should not stop at the stage of simple awareness (learning), but go to the complex and problematic processes of education, purposeful formation of personality. Therefore, it is very important in the pedagogical activities of higher education teachers is the use of such forms and methods of work that would allow, despite the imperfection of educational programs, as much as possible to ensure the formation of students' ecological awareness. At present, the values of life, the search for ways and means of human survival in the face of progressive deterioration of ecological and social situation come to the fore. "The ecological aspect of the scientific worldview can be nurtured if knowledge of nature and human interaction with the ecological are transformed into personal beliefs, and beliefs are transformed into action" [24, p. 90].

As a result of ecological education and upbringing of future primary school teachers, reliable, theoretically confirmed knowledge of nature and thinking is formed. This is gradually gaining argumentative expression in the knowledge system, which makes it possible to regard ecological knowledge as a means of implementing ecological activities in the professional sphere, is the basis for ensuring the rights of future generations to decent living conditions.

## 5 Conclusion

The tasks of ecological education and upbringing of future primary school teachers go beyond the study of only theoretical issues. It is important that ecological knowledge is transformed into relevant beliefs. This process also includes the education of moral attitude to nature, including the formation of ecological knowledge, the development of ecological thinking, the ultimate goal of which is to ensure morally perfect and environmentally sound behavior of future primary school teachers, which is one of the conditions of society's transition to sustainable development.

It should be noted that in the process of society's attitude to nature between society and nature there are changes in public consciousness, which reflect the current ecological situation. Ecological consciousness of student youth is realized in relation to the natural ecology, determines the appropriate behavior and activities. In addition, the unity of ecological consciousness and ecological

activity is the basis of ecological culture of the individual. Therefore, the development of ecological awareness of future primary school teachers is one of the priorities of modern education. At the same time, developing ecological awareness, we develop students' ecological competence, which we define as the ability to solve ecological problems in professional activities, personal attitude to the ecology and willingness to be responsible for the consequences of their activities in this ecological.

Further research in this area is related to determining the components of ecological awareness of future primary school teachers, which will require adjusting the syllabi of educational components of bachelor's programs in primary education. Methods and ways to improve the ecological awareness of future primary school teachers also need to be improved.

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# Remote study for the humanities and social sciences: digitization and coaching

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**Abstract.** The article analyzes research on remote study in the areas of the humanities and social sciences, which strongly links to formation of key competences by means of digital technologies and coaching. The results of the survey are analysed and presented according to the feedback of students on the emotional and value attitude to remote study associated with the humanities and social sciences, which specify both the advantages and disadvantages of this form in education. The article suggests considering a number of initiatives for remote study in the mentioned connection and strongly encourages their implementation in higher education. The experience of structural distribution of remote study is described, in which the research findings reveal that digital technologies and communication with and between students and teachers in a coaching format enable classes to achieve a significant increase in the social and entrepreneurship competences. It is also proposed to look at feasibility and prospect development of a remote study strategy at Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine, in particular. The development plan includes three-factor support for active learning: assessment support, emotional support and information support. The recommendations accompany the development introduction of such digital and coaching competences for students.

## 1 Introduction

The globalization of society is changing the way we communicate and see the future. A high school graduate, who is no longer satisfied with traditional teaching methods, faces changes fearlessly and accepts challenges of today in order to master the tools of high-speed communication and be able to work under stress, well coping with tough competition in the job market. With an extensive growth of educational services these days, such high school graduate does not only stop studying continuously, but also positively perceives the existing boom of self-education and self-development.

The new paradigm of education in the global world provides everyone with access to education and continuous development of competences that meet the requirements of a globalized society [1]. This paper highlights the competences that can be formed during the study of the humanities and social sciences at university and which will lead to improvement of the young people's well-being, on the one hand, and result in their ability to become highly competitive in the labor market, on the other. These competences should also promote the social integration and cohesion of the Ukrainians through their active involvement in public activities.

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The research makes use of such terms as remote study, online learning, distance learning, and distance education. It is followed that online learning and distance learning share some similarities – both require use of online learning tools. However, these two terms may not be confused. The three factors are important to differentiate them. They are location, interaction, and intention. With online learning (1), the instructor may invite students to join the same classroom for digital assignments and assessments; with distance learning (2), students do not work online together in class, on the contrary, distance learning happens when students study whereas the instructor assigns jobs / exercises / assignments and checks them in, digitally. Interaction is also important. In (1), the communication happens in-person in class with one another. In (2), the study is usually carried out individually and independently. As intention is concerned, online learning adopts just another teaching technique of in-person communication (i.e., digital) as compared to distance learning, which is a variety in teaching styles; it is rather a technique used for teaching or instructing students individually, no participation of the group. For the purpose of the paper, online learning and distance learning combine to represent the idea of remote study. Finally, remote study and distance education here are used interchangeably. The difference is that distance education is a broader term than remote study. Further, remote study may be characterized by the same content styles as online classes, but other in-

structional methods could apply, "While most courses will follow a unique structure that fits best with the curriculum and professor's teaching style, remote learning may be delivered synchronously or asynchronously" [2]. To this part, a blended model of learning can be discussed. In a synchronous course delivery the instructor and students engage during a specified time-frame through a virtual meeting, e.g. Zoom, Webex, Google Meet, etc. for a discussion forum or conference call. In asynchronous course delivery, students may view and work with any content any time, not real time.

According to Chaika, it is notable to follow that leadership coaching technology can be of high value in education in general and in remote study of the humanities and social sciences, in particular [3]. The focus of coaching in education strongly links to distance learning and distance education as is individually designed to meet the needs and motivation of the student. The online learning as part of the curriculum may sometimes discourage students for its imperative form on the time management and group discussions, and meetings. However, it can develop strong leadership skills and grow desire for self-realization, self-management, self-study, etc.

At present, remote study, including distance learning, is popular and in demand in all areas of knowledge acquisition. The use of digital technologies in the field of higher education in the context of quarantine restrictions is the most relevant and necessary. Therefore, today on equal terms with full- and part-time education, the higher school uses an innovative organization of the educational process – distance learning [4–6]. Distance and online learning have both advantages and disadvantages in teaching. In our opinion, distance and online learning of the humanities and social sciences feature certain shortcomings, which will be further discussed. The solution requires constant development of digital competences, because the use of digital technologies will provide an opportunity to present the material not only verbally, but also visually, for instance, by playing videos, demonstrating graphics, schemes, formulas, tables etc. Besides, it requires proper communication. Coaching conversation and ability to build and keep a constructive dialogue become a necessity for a portfolio of the student's soft skills today.

It is obvious that the teacher in the system of distance education becomes the carrier of new roles and responsibilities. Such teacher masters cloud-oriented approaches to the open information educational space [7]; uses flexible, personalized, and open organizational systems, which altogether becomes possible with the use of cloud and mobile services [8]; uses e-learning course management systems for successful organization of distance learning [9, 10], etc.

Thus, the paper gears to consider certain coaching specific initiatives based on key competences defined by students for remote study, focusing on distance learning (individually organized by the student and self-pacing) as opposed to online learning (organized and scheduled by the instructor), relating to the humanities and social sciences, and anticipates the positive results upon their implementation in higher education via coaching format of communication.

## 2 Literature review

Research associated with the introduction of innovative technologies in education has been under the academic eye for many years. Similarly, innovative technologies in the educational process for competences development in a globalized society are immensely appealing to a great number of domestic and foreign scholars. The scientists consider a wide range of problematic issues in the field of innovative educational technologies [1]. For instance, of great significance are such questions as:

- actualized use of social and scientific issues in modern education [1, 11, 12];
- identifying factors that hinder the introduction of innovations in education [4, 9];
- the development of a strategy for blended learning and active learning [7–9];
- new elements, analytical methods and evaluation tools, as well as types of educational innovations, that measure the competitiveness of universities [13];
- the role of major public online educational platforms in the modernization of education [1];
- cloud technologies in the educational process [7, 14], etc.

Among the researchers it is worth while mentioning Maslova et al. [15], who research challenges, which the society is facing today in regards to formation of the changeable personal identity in the postmodern conditions; Kvitka et al., who contribute greatly to the development of online education inside and outside Ukraine [1]; whereas Vakaliuk et al. [7] address the issues relating to the formation of key competences including digital, in particular. Meanwhile, the modern European educational space prefers to focus on the leading means of information technology and the competences declared at the World Economic Forum [16], which currently remain silent in the works of both Ukrainian and foreign scientists. It may be reasonable to state why it is so, inasmuch such questions require deeper and sufficient coverage, and justification.

Therefore, the work **aims** at (i) the remote study as a modern dominant in the educational process, and (ii) substantiation of digital technologies for the humanities and social sciences via coaching in education.

## 3 Methods

To carry out the research, the following methods were used:

1) *analysis* – to review the source base of the study and analyse the survey results;
2) *comparison* – to identify key competences of the students, choice of digital technologies to support remote study;

3) *classification and systematization of theoretical data* – to identify key competences;

4) *observation*;

5) *methods of mathematical statistics and pedagogical diagnostics* – to organize, process and present the survey results obtained;

6) *generalization* – to determine methodical bases of use in regards to digital technologies in the course of remote studying for the humanities and social sciences, etc.

It is critical to note that the survey results presented in the paper are the data processed from the third round of surveys conducted at Kryvyi Rih State Pedagogical University (Kryvyi Rih, Ukraine) and the National University of Life and Environmental Sciences of Ukraine (Kyiv, Ukraine).

Round 1 of the surveys under study concerned the impact of COVID-19 on educational process in university and aimed to identify advantages and disadvantages of online learning as part of remote study, as explained by students, and their recommendations for "a possible solution to combat the hurdles" [13]. The case study lasted four months, from 1 September 2020 until the end of the semester.

Round 2 of the surveys was conducted in 2021 at four universities in Ukraine, the two of which are mentioned above. The specifics of the study was with the qualitative method in pursuit of the data collection associated with the ethnographic focus in the research approach. The goals were to identify and determine the preferences of university administration either to manage or lead people (faculty and students) "in communicating change and work / cultural tolerance in higher education in Ukraine", with special emphasis on education in the times of pandemic and remote study [3].

Round 3 of the survey was conclusive in the chain of data collection, processing and analysis, after implementation of coaching technologies in the educational processes at the specified universities. The findings described in this paper discuss remote study for the humanities and social sciences, feedback of students on remote study, advantages and disadvantages of remote study, their expectations and needs for the future competitiveness in the job markets domestically and globally, expressly relate to the faculty and students' achievements after the experiments.

Limited by the scope of the current paper, it is intended to mention and discuss only one program from the 7 others, which makes part of the curriculum for the Ukrainian language and literature teachers trained at philology faculties at the universities. The choice of this specific program strongly connects to another innovation in higher education – coaching technologies, which adoption in the educational process makes inseparable part of efficient teacher / instructor and student communication, especially in remote study for the humanities and social sciences.

## 4 Results and discussion

### 4.1 New trends and strategies in the modern educational process

It is no surprise that modern research on the formation of professional competences is associated with globalization questions. Many authors dedicate their works to the problematic issues of a globalizing world or a globalized society. For example, Praskievicz defines globalization as "the acceleration caused by economic growth that has led not only to global environmental change, but also to the technological and scientific advances needed to study it" [11].

Further, Maslova et al. emphasize the importance of studying the socio-economic factors that affect the picture of changeable identity of a person in the globalizing world. These arguments sound as though they were a warning against shaping and putting on a mask of identity dehumanization in the postmodern world [15]. At the same time, the authors do not research the role of the humanities and social sciences for the formation of a youthful changeable personality in the mentioned postmodern conditions. Moreover, it is not proposed nor suggested what be done in the current conditions and give response to health (physical, psychological, and emotional), educational and other risks in higher education.

The research questions stretch far beyond the Ukrainian territory. Thus, Durante examines visual media technologies and their capacity to mobilize protest movements around the world. The researcher highlights the strengths and weaknesses of the visual approach to building global common sense in people's daily lives [12]. However, Durante does not specify such visualization methods of the educational process.

Furthermore, while being acquainted with the latest scientific findings in the local and global academic fields, it is observed how globalization affects the change of socio-economic relations around the world, education, and the formation of new technologies. A certain category of researchers offers their experience in overcoming the challenges of today.

To be more precise, Gómez Zermeño and Alemán de la Garza describes the accumulated experience in conducting an open laboratory of social innovation at the university as a tool that facilitates solving the complexity of social problems through the principles of openness, experimentation, inclusion, diversity, participation and cooperation [17]. This is of high significance in another innovative technology – coaching [3]. The work of Gómez Zermeño and Alemán de la Garza reveals the experience of involving active and socially aware citizens in the processes of experimentation, exchange and creativity in order to influence their social reality through collective projects for a more sustainable future. It reflects the fundamental basics in bringing change, welcoming innovations, and raising awareness of all participants in the group- and team coaching, strategic and leadership coaching, etc. [3]. It is also emphasized that "the involvement of social innovations leads to the creation of links between society, academia, the formation of collective knowledge" [17].

The mentioned studies hypothesize that it is possible to reproduce a model of a living laboratory in other contexts and to contribute to the goals of sustainable development of society. However, the issues connected with the role and impact on the social reality of youth that do the humanities and social sciences as educational disciplines remain veiled.

It is important to note that Alcaraz-Dominguez and Barajas have actualized the use of social sciences in modern education. Such training will result in new areas of research, which establish links between the practical application of socio-scientific issues in various subjects, cultural contexts and educational systems [18]. However, the researchers do not dwell on any specific examples. The proposed study attempts to establish new connections and endeavors to demonstrate specific examples of how understanding social science issues helps students in the process of remote study for the humanities and social sciences.

In addition, Yordanova and Stoimenova provide a list of the main types as to educational innovations that measure the competitiveness of universities, as well as critically analyze the rankings of higher education around the world. It is believed here that the results can be useful for the implementation of theoretical and applied models to measure the competitiveness ratios of higher education institutions [19].

It is stated, thus, that remote study, including distance learning, involves a high-tech approach to the process of knowledge transfer and provides an opportunity to create a system of mass lifelong learning, general exchange of information. Distance learning expands and complements the capabilities of the classical learning system, especially the online learning, altogether covered in remote study for the humanities and social sciences under this research.

After studying the level of digital competence demonstrated by the teachers in the Spanish city of Melilla, García-Vandewalle García et al. [20], point to the gaps in the digital competence of both the groups, students and teachers, especially in terms of security. Next, they provide their recommendations as to overcoming the difficulties to bridge these gaps. Similarly, the students in Round 1 of the surveys pointed to the disadvantages in remote study, which concerned low level of digital competence by the teaching and instructing staff, naming, in particular, age groups of faculty [13].

García-Vandewalle García et al. emphasize that the collective search for information in databases, i.e. the ability to cooperate, also influences the increase in the level of digital competence of students [20]. Yet, there is no holistic approach in [20] to the study of factors, which affect the level of digital competence of students.

Moreno-Guerrero et al. referring to the personal data of Spanish teachers, state the lack of competencies in various areas of digital competence, which affects the application level of online technologies in teaching. The researchers stress out that the frequency of the use depends not only on the level of digital competence, but also on the ability to solve problems comprehensively and in general, the level of communication skills and cooperation [21].

Besides, Kvitka et al. [1] cover the activities associated with the main public online educational platforms in Ukraine, their role in the modernization of education. The researchers observe the interdependence between the specifics inherent in different stages of progress with distance education. The authors analyze the problematic issues in the field of innovative educational technologies such as socialization of students, difficulties in controlling / monitoring their knowledge and skills, metacognitive monitoring of their learning, etc. [1].

For instance, Vakaliuk et al. substantiate the necessity of design and introduction of the distance course on cloud technologies in the educational process at the times of quarantine [7]. However, the paper proposes a generalized approach, without taking into account the peculiarities of standalone disciplines. The and Usagawa [22] considers the selection of services for the creation of mathematical tests, without summarizing the results obtained in other disciplines. Haugland et al. explore collaborative learning in small groups in an online course in philosophy of science, ethics, and research methods [23].

With a deeper focus, Falfushynska et al. [4], Segbenya et al. [5], Tokarieva et al. [6] analyze the current state and problems of distance education in Ukraine. The left out part relates to considering the methodological aspects for the use of digital technologies for remote study in certain areas, including the humanities and social subjects.

Digital technologies have updated the strategies of active learning as a system of methods and techniques aimed at independent acquisition of knowledge, skills and abilities in the process of active cognition and practical activities. A number of explorations are devoted to this innovative system. Thus, Hernandez et al. study the types and scope of social support for active student learning provided by local authorities, thereby strengthening the effectiveness of local communities. The researchers also study the factors that motivate students to become deeply involved in active learning. The authors developed and implemented a three-factor support tool: 1) evaluation support: via supportive feedback; 2) emotional support; 3) information support: via communication of norms and values related to active learning [24].

Nguyen et al. developed strategies for instructors that can apply during active learning in order to neutralize the affective behavioral response of students to active learning. They identified the strategies, which promote the introduction of active learning: 1) strategy of explanation: the reasons for the use of active learning are explained; 2) assistance strategy: work with students; 3) planning strategy: work outside the classroom to improve active learning. These are also strategies to support teachers [25].

The analysis of the recent studies enables to conclude that scientists around the world are developing new trends in the modern educational space, creating new strategies for active learning, in particular. This paper summarizes the authors' experience in the formation of both key and professional competences in the course of remote study for the humanities and social sciences.

### 4.2 Digital remote study for the humanities and social sciences

To organize remote study in the area of the humanities and social sciences, it is necessary to use a set of digital technologies: search tools with which students can quickly look up data for statistics, categories, indicators, events, electronic reference libraries, electronic textbooks, electronic libraries of periodicals and others. Next, it is necessary to properly communicate with students and see to their motivation and encouragement in remote study. This is especially relevant when distance learning occurs, as teachers and instructors may hardly see the psychological and emotional change in the educational process when students work out of class. At the same time, it is challenging for teachers and instructors to keep all students engaged in online learning unless they are self-motivated and self-disciplining [13].

#### *4.2.1 Theoretical overview*

Today, cloud storages, including Google Drive, allow teachers / instructors to upload and store a large amount of teaching information, namely scripts of lectures, assignments and materials for practical classes and/or seminars, laboratory work, instructions and guidelines for implementation, additional materials for independent work. At the same time, students may also upload and store completed tasks in a relevant cloud storage, reporting to teachers / instructors only by reference; create and edit text documents, tables, presentations, drawings, survey forms; work with documents in real-time, tracking changes.

In order to support educational processes at Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine, the learning management system of Moodle (LMS Moodle) is used [26]. The system provides an opportunity to organize a full-fledged educational process, including teaching aids, a system of control and evaluation of student learning activities, etc.

During the distance learning of the humanities and social sciences, one of the main forms of knowledge control is testing. LMS Moodle has powerful tools for test designs, conduct of training and control testing. Different types of questions in tests are supported (multiple choice, correspondence, yes / no questions, completion, short answers, essays, etc.). In addition, LMS Moodle provides the user with many features that make it easier to process test results [27].

The most common services for video conferencing – synchronous classes in the course of remote study, are Google Meet and Zoom. The findings of the study relate to the Google Meet service, which was chosen due to the following advantages (free of charge accounts): the ability to connect up to 150 users; lesson duration allows for up to 60 minutes; Google Calendar binding.

An example of effective use of Google Meet is the organization of scientific round tables, conferences, thematic seminars. Particularly, the Faculty of the Ukrainian Philology (to train teachers in the Ukrainian language and literature) holds an annual Shevchenko seminar, which, due to quarantine restrictions, had to move to an online format. Students prepare a presentation on the works of Taras Shevchenko, clearly cite poetry from the "Kobzar" (a collection of poetic works), comment on textual options, discuss important issues on the Shevchenko literary, drama and philosophy studies. Teachers join the discussion to demonstrate new books and introduce students and colleagues, and peers to the new content of Shevchenko studies discourse. Shevchenko studies seminar promotes the formation of professional competences such as language, social and civic competences, leadership, etc. The Faculty of Foreign Languages and Translation at the National University of Life and Environmental Services adopts similar procedures in relation to foreign language acquisition and instruction.

Consequently, Ostapenko defines social competence as a multifaceted integrated characteristic of personality, which includes cognitive-value, communicative, motivational components that enable individuals to interact with society, participate in socially significant projects, and perform various social roles [28].

Bakum et al. consider that "the value-based component (intercultural competence) reflects the maturity of educational and cognitive, professional and social motives; the awareness of importance of intercultural interaction during personal and professional development; understanding of cultures equality through contrast and analysis" [29]. Chaika et al. discuss the multifaceted aspects of value-motivational (axiological) competence in connection to poly- and multicultural education of the modern student, who wishes to be a competitive professional in the job market [30].

Therefore, the use of digital technologies to organize collaboration to some extent compensates against the emotional and value relationship with students, lost in the course of remote study. Additionally, appropriately adopted coaching way of communication with students in class and outside class helps teachers and instructors grow their professionalism in communication and teaching, reveal leadership skills and become authority to students, who seek such personal and professional models for themselves [3, 13].

#### *4.2.2 Practical overview: emotional and value-oriented attitude*

In order to clarify the advantages and disadvantages of remote study in the emotional and value planes, a survey of 100 students from the faculties of natural sciences and philology at Kryvyi Rih State Pedagogical University and faculty of the foreign philology and translation at the National University of Life and Environmental Sciences of Ukraine was conducted.

At this stage of the experiment, Round 3, the results of the survey showed that the vast majority of students are positive about remote study as opposed to the data collected and analysed in 2020. Only 12 people (12%) assessed it negatively and stated that they did not adapt to remote study.

It should be noted that with the students' comments on *"little time to transfer to remote study"*, they meant distance learning challenges rather than online learning. Following the already received survey data in [13], *"The top advice was about self-education and self-development in the digital era. That was the decision heated by the pandemic and pushing fast forward, especially those, who meant themselves to be among leaders, and wished to stay ahead of the curve"* [13].

The other 18 people (18%) admit both pros and cons of remote study, online learning and distance learning.

The analysis of students' answers in Round 3 after implementation of the coaching technology into the educational process provided an opportunity to distinguish the following advantages of remote study – online and distance learning:

- Time optimization, e.g. no standard "time-eaters" (*"No need in spending time to travel to classes at university"*; especially it was important to non-local students who mentioned *"they gained much in time"*; *"more time to spend on reading belle lettre and academic works in journals"*; *"Excessive communication does not distract during classes"*);
- No need for mechanical note taking / writing up of theoretical information, only theses and diagrams (*"You can always read the full text from the cloud storage"*);
- Wide involvement of electronic resources with source databases, which provides an opportunity to absorb a large amount of information;
- Diversification of remote sessions with multimedia resources;
- Availability of all educational and methodical materials in the cloud storage;
- Creation of psychological comfort room in distance classes *("Not everyone is able to express themselves freely in face-to-face practical classes in front of the audience, and in the distance mode of student and teacher interaction it is much easier to do so"*);
- Increased confidence, reduced stress, creating a comfortable personal educational environment including organized nutrition;
- Combination of study and work;
- Mobility (*"You can learn from anywhere"*);
- Convenience (*"I do not feel lonely and insufficiently involved in students' life. I have improved mutual understanding with teachers"*);
- Optimization of reporting on different types of work (*"We are more likely to answer and score points for oral presentations, independent work, tests, essays, preparation of scientific theses"*);
- Involvement of digital technologies in the process of preparation for classes and especially during classes promotes opportunities for professional development with the development of digital competence.

A small percentage of students (12%) commented they did not see the benefits of remote study, online and distance learning, and the main disadvantages were:

- Inconsistency of technical support;
- Low quality of Internet connection;
- Lack of direct (*"live"*) contact with teachers and fellows;
- Difficulties in final reporting; congestion / lack of uniformity of courses in LMS Moodle;
- Negative impact of gadgets on health (in particular, visual impairment);
- Psychological discomfort (*"There is no full feeling that you are a student, the curiosity of student years; very little movement"*);
- Monotony (*"After a month it starts to get boring, but I see that most like it, so I'm looking for pros"*);
- A sense of "conservation" in the online world.

As demonstrated in figures 1, 2 (Round 1 of the surveys) and detailed in the students' answers from Round 3 of the experiment, many comments remain unchanged.

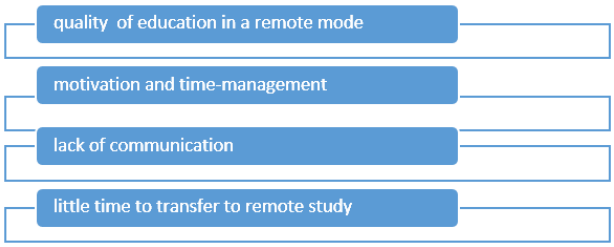


**Figure 1.** Disadvantages of remote study for the humanities and social sciences [13].

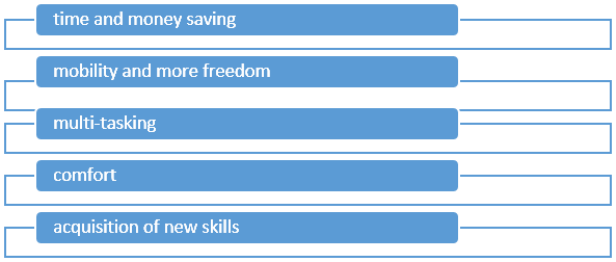


**Figure 2.** Advantages of remote study for the humanities and social sciences [13].

The analysis of the obtained results testifies to the need of creating a holistic system of support (emotional and informational) for remote study in the areas of the humanities and social sciences, both online and distance learning. Presumably, in quarantine conditions, the most acceptable is a blended form of educational formats, for example, at least a month of full-time study at the beginning of the semester in order to increase the level of adaptation of students to remote study, according to the messages by the

recipients of both the universities – Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine.

### 4.3 Model solution with the use of digital technologies

Following the feedback from the students at Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine on remote study – online and distant learning, it is collected and analysed that in most cases dissatisfaction relates to the emotional (irrational) part to the discussed and the conscious (rational) understanding of low competence for entrepreneurship.

Even with 12% of negative comments, it is seen reasonable to consider some approaches and ways of what can be done to improve the situation. It is believed that for inclusivity and leadership [3], all voices have to be heard, all opinions collected and relevant conclusions drawn.

Experts of the World Economic Forum, which took place on October 21, 2020, predict that by 2025, employers will equally divide work between people and automated systems. Therefore, the list of competences in 2025 includes skills that are directly related to digital technologies – the use of technology, monitoring and control, as well as technology creation and programming. The list also includes new interaction skills – leadership and social influence [16].

Achieving the goals connected with sustainable development of society will contribute to the establishment of ties between all members of society, in scientific circles, the formation of collective knowledge base [30]. The present study suggests adopting a model of interdisciplinary links that provide a combination of literary, linguistic, and socioeconomic competences for future professionals in the areas of the humanities and social sciences.

As a student of a pedagogical institution of higher education is focused on pedagogical practice, it is crucial to consider many factors at the same time. To this part, it may be appropriate to turn to the competences defined by the Program of Ukrainian Literature for Secondary Schools for 2017 ("the Program"), which is stipulatory and insight-triggering part of the curricula for future teachers of the Ukrainian language and literature at school. Then, in order to move ahead of the curve, it may be valuable to combine them with the competences identified at the World Economic Forum as relevant worldwide by 2025, with the socioeconomic competence as desirable to be developed by students and claiming themselves incompetent in this part.

The Program emphasizes that the purpose of literary education is "the means of the subject to help the student in their self-knowledge, life self-determination, self-realization, formation of subject (literary) and key competencies, ability to read and personally self-develop" [31], which clearly coincides with the students' comments and recommendations on improvement in Rounds 1, 2 and 3 of the surveys. It is important that the authors see the possibility of forming subject competence only in the context of providing key competences, general learning skills that help the student to act, and the knowledge necessary for these skills.

Having identified the points of intersection of competences, it is proposed to group them into the following blocks:

1. *Linguistic competence*, which includes the ability to speak the national (state) language and foreign languages.
2. *Thinking (reasoning) competence*, which represents analytical and critical thinking and analysis, innovation as the ability to generate ideas aimed at implementing the achievements of scientific and technological progress.
3. *Natural competences* as such relate to environmental literacy, well-being and healthy lifestyles.
4. *Digital competence*: the information and digital competence declared in 2017 is close to what is expected in the future until 2025, i.e. the use of technology, monitoring, control and resilience, the ability to resist stress, flexibility.
5. *Learning competence* as the ability to learn throughout life, proactive learning and training;
6. *Entrepreneurship competence*.
7. *Social competence*.
8. *Creativity and originality*, which begin with the sphere of culture (culture awareness) and extend to all other spheres of public life, including that in the form of initiativeness.

The table 1 and table 2 demonstrate the formation of entrepreneurship and social competences, stated by the students as the most necessary for the contemporary days, however, lagging behind, with using digital technologies. Table 1 shows the projected skills which result in the groups of competences, integrating those proposed in 2017 (first column) and expected to be relevant until 2025 (second column).

Lyashenko defines entrepreneurship competence as "readiness to create one's own business, the ability to bring their scientific achievements to commercialization and implementation in a particular sector of the economy, the presence of certain leadership qualities, the ability to find organizational and managerial solutions and be responsible for them" [32]. At the same time, European Commission defines and interprets entrepreneurship competence as the ability of an individual to implement ideas in the sphere of economic life, as an integrated quality based on creativity, artisticism, innovation, risk-taking, and the ability to plan and organize business [33].

Importantly, as the European Commission stresses out that: *"Entrepreneurship competence has become a priority in policy agendas of modern economies and societies with the belief that this is a vital competence within the labour market and for people in their daily lives, even for*

**Table 1.** Components of entrepreneurship competence: years 2017 / 2025.

| 2017 | 2025 |
|---|---|
| ***Sense of initiative and entrepreneurship***<br>*Abilities / skills:*<br>• develop and implement simple business plans;<br>• present and reasonably defend own business ideas;<br>• analyze the life situation from a certain position;<br>• understand the role of communication skills for a successful professional career. | ***Comprehensive problem solving***<br>*Abilities / skills:*<br>• search, accumulate the necessary quality information;<br>• search for ways to solve problems;<br>• assess the positive and negative consequences of decisions taken / to be taken.<br>***Argumentation, ability to solve problems / form ideas***<br>The ability to substantiate a certain position in order to convince of its truth, expediency |

**Table 2.** Components of social competence: years 2017 / 2025.

| 2017 | 2025 |
|---|---|
| ***Social and civic competence***<br>*Abilities / skills:*<br>• determine the content and possibilities of reconciling private, collective and public economic interests and needs;<br>• explain the role and use the opportunities of various civil society institutions, i.e. professional associations, consumer protection associations and producers, in particular;<br>• argue and competently express own opinion on socio-political issues;<br>• exercise public control over the activities of public authorities and personal participation in the formation and functioning of state institutions. | ***Leadership***<br>The ability to influence other people in terms of a person who is intelligent, reliable, humane, courageous and disciplined<br>***Social influence***<br>The ability to measure the impact on the human environment and society as a whole, aimed at creating an idea of themselves, other people, groups and social phenomena.<br>An indicator that measures consequences, not results. |

*those who are not classed as 'entrepreneurs' in the sense of creating new business opportunities"* [34].

Entrepreneurship and social competences are of utter importance for developing hard and soft skills, which can be carried out with the help of digital technologies by experiencing adaptability in a momentum, similar to the response to the unprecedented circumstances of COVID-19 when schools and universities had to take measures and as safeguards adopt the "new normal" – remote study as part of the learning process.

Interactive learning on the stated topic leads to the conclusion that the globalization of the modern world is associated not only with the introduction of innovative technologies in all spheres of public life, but also with political crises caused by hybrid wars. It is important to analyze the socio-economic factors that are affecting and will affect the transformation of reality in the future.

## 5 Conclusions

The study unveils the strategies for remote study, online and distance, and active learning. A survey on the emotional and value attitude of students to remote study, especially distance learning, showed that the vast majority of students positively evaluate it, including the following benefits: saving time, availability of teaching materials, creating a comfortable personal educational environment, increased confidence and reduced stress, mobility, convenience, development of digital competence. It is noteworthy to specify that there are students who are dissatisfied at remote study. However, the percentage of students who gave a negative assessment is low, which makes it possible to draw conclusions about the improvement of education through the use of digital and coaching technologies in remote study in the area of the humanities and social sciences.

To this extent, the student becomes not only an object of study, but also an active participant in doing the subject, creating a situation / case of success, resulting in larger motivation for self-education and self-development as long as the student starts experiencing this success because of high quality in remote study. All this provides a basis for the development of the student's competences so dramatically actualized in the 21st century.

It is relevant to consider the recommendations that will promote the development of digital competence of students at a variety of educational institutions. They are increase of hours / introduction to the curriculum of dis-

ciplines aimed at the formation / development of digital competence; development of soft skills (conversations and dialogues in a coaching format), the ability to comprehensively solve problems, cooperate, communicative literacy, in particular.

Experts of the World Economic Forum have made a forecast of current competences until 2025, among which are the spread of technology and interaction skills – leadership and social impact. The paper exemplified some aspects of remote study at the two Ukrainian universities, Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine. Remote study strongly associates with the digital and coaching competences anticipated critical for the successful future of Ukraine.

Largely, the competence potential of the humanities and social sciences aims at creating links between academia in higher education, the formation of collective knowledge necessary for the orientation of young people in the modern labor market.

Among the promising strategies of remote study for the humanities and social sciences at Kryvyi Rih State Pedagogical University and the National University of Life and Environmental Sciences of Ukraine are the development of three-factor support for active learning: assessment support, emotional support and information support. Digital and coaching competences as innovative in the modern higher education take the lead. In order to prevent affective behavior of students in the learning process, teachers need to pay special attention to the issue of support, which underlies the relevance of further research in the area.

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# Training techniques in the education of simultaneous interpreters using specialised equipment

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**Abstract.** The article deals with the search for ways to improve the training of simultaneous interpreters in accordance with modern requirements for their professional activities. It has been suggested that special training should be incorporated into the training of these professionals to develop and improve a range of specific abilities, skills and attitudes. They are classified into five groups (linguistic, cognitive, psychological, physical, technical). Particular attention is paid to the technological support for the work of the simultaneous interpreters. A training programme for simultaneous interpreters has been developed and its effectiveness has been tested. It is proposed to conduct training sessions under the modelling of real working conditions of simultaneous interpreters.

## 1 Introduction

Simultaneous interpreting is considered a relatively young form of translation, but it is one that is gaining in importance. Many organisations, including the United Nations and the European Union, as well as multinational companies, need simultaneous interpretation services to ensure smooth, accurate and rapid communication with their foreign employees and business partners. In the business world, simultaneous interpreting is used at international events: meetings and conferences, trade fairs and exhibitions, discussions, etc.

Simultaneous interpreting as a method of speech mediation between different languages requires special equipment. During this type of simultaneous interpreting, the interpreter is in a special, soundproof interpreting booth and receives the speech through headphones. While making the interpretation, which takes place almost simultaneously, i.e. synchronously, he speaks into a microphone. This translated speech is transmitted to the participants of the event, who perceive it through headphones. Simultaneous interpreting places very high demands on the interpreter, both mentally and physically. Above all, there must be a high degree of concentration and coordination in perceiving what is being said, understanding and translating. The physical strain of being in a confined space, on the one hand, and the vocal strain, on the other, are considerable. Given such a complex and multifaceted workload, it is necessary to find ways of specifically preparing interpreters for such activities in a targeted manner.

The *aim of this article* is to analyse the content of a specific training developed for implementation in the training of simultaneous interpreters and to determine its effectiveness by conducting a pilot study.

## 2 Literature review

Simultaneous interpreting is a very demanding activity for the interpreter and requires maximum concentration, experience and a range of skills and abilities. Researchers note above all the heavy cognitive load of the simultaneous interpreters during direct interpreting [1–3]. Accordingly, future interpreters must be prepared to interpret with an awareness of possible cognitive stress. According to scientists, the stress can be reduced by mastering different simultaneous interpreting strategies. For example, the interpreter translates a “fast” speaker differently from a “slow” speaker. In addition, it is necessary to learn how to “compress speech” and focus on key segments of speech. It is precisely these aspects of training for simultaneous interpreters that both domestic and foreign researchers note.

In particular, when considering the professional training of prospective interpreters, N. V. Zinukova focuses on linguistic, translation, psychological and psycholinguistic prerequisites for the content of interpreting training and believes that special importance should be given to the psychological model of interpretation [4, p. 4]. According to C. Chabasse, it would be very simplistic to describe simultaneous interpretation as the direct verbal transmission of oral information from the source language to the

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target language [5, p. 64]. At the same time, while it is important for an interpreter to have multitasking skills, as G. Watts points out [6], this does not mean that the simple multitasking model can be transferred to interpretation. An interpreter must learn to consciously use certain strategies, exercise constant initial control of his or her speech, and physically hear what he or she is saying. Interpreters must therefore learn how to operate the headset, microphone desk, etc. [7]. By having a perfect command of the equipment of their workplace in the booth they will be able to carry out lexical, grammatical and phonetic control and then avoid errors in interpretation [5, p. 79], [8].

A. Chmiel, S. Ghiselli, describing practical offerings of tasks and exercises to prepare interpreters for simultaneous interpreting, note that the formation and improvement of specialised skills occurs only when the students are motivated and able to repeat learning activities. Therefore, based on this understanding, it is necessary to determine the frequency and typology of exercises for students. It is also important to get feedback [9, 10]. B. Moser-Mercer proposes modelling the learning environment for simultaneous interpreting to take account of the development of this type of interpreting in the 21st century, i.e. by incorporating into the training the acquisition of skills necessary in the age of new technologies [11]. On the other hand, a number of researchers have focused on modelling the cognitive actions of the simultaneous interpreter [11, 12]. F. Ibanez considers the possibility of practising cognitive operations through special training for interpreters. In his view, interpreters should keep themselves fit with regular memory training exercises and support this training with breathing techniques [13]. The importance of training in the education of simultaneous interpreters is also confirmed by the fact that the European Commission has created a special resource that is offered for interpreter training, in the form of a series of training exercises, theoretical materials, video and audio recordings for training [14].

## 3 Result and discussion

### 3.1 Theoretical and technological background of the training

Before the actual training, it was advisable to determine the direction of the training in order to develop the specific skills needed by an interpreter for simultaneous interpreting.

Based on the analysis of scholars' works and preliminary practical research, we have identified a number of skills and abilities of simultaneous interpreters that are most necessary for carrying out their professional activities. Their general list was structured into five groups, namely: speech, cognitive, psychological, physical, and technical (table 1).

However, when looking for effective methods of implementing training techniques for developing the above list of skills and abilities of simultaneous interpreters, it is necessary to take into account the fact that their work in modern conditions will mostly take place with the use of specialised tools. In particular, they constitute a set of equipment that includes at least an interpreter desk, equipment for receiving the input signal with the incoming speech and transmitting the output signal with the target speech, devices for receiving the signal with the input speech, etc. With this in mind, we developed a series of training sessions combining the formation of skills and abilities from different groups, taking into account the real working conditions of an interpreter, simulated in a training laboratory. A picture of such a laboratory is shown in figure 1.


**Figure 1.** Training laboratory for simultaneous interpretation.

It should be noted that all training sessions took place in this laboratory.

### 3.2 Developing training content for simultaneous interpreters

The following criteria for selecting skills and abilities were used as the basis for developing the content of the training:

- control of one's own psychological and physical state while performing a certain technological operation of the interpreter at the desk,
- perception and reproduction of the speech content using the technical equipment of the interpreter's booth,
- preparation of the workplace and its equipment for the simultaneous interpreting session.

Based on the defined criteria, five training sessions were developed and implemented: "Attention! Get ready to air", "Listen to everything, don't say everything", "Breathe calmly, don't panic", "Listen, convert and produce", "Working in pairs, ready to help".

The methodology for implementing this training technology implied a number of requirements, namely

- a clear sequence of training sessions,
- the duration of each session is one astronomic hour,
- the number of participants is a maximum of twenty people,
- reflection and analysis after each session.

**Table 1.** Skills and abilities of simultaneous interpreters.

| Skills and abilities groups | Skills and abilities |
|---|---|
| *Speech skills* | Recognising words and phrases<br>Understanding the content of a speech<br>Determining the contextual meaning of words<br>Identifying the most important elements of speech<br>Speech compression<br>Semantic reformulations<br>Lexical substitutions<br>Grammatical transformations<br>Producing adequate output speech |
| *Cognitive abilities* | Listening comprehension<br>Memorising<br>Forecasting |
| *Psychological abilities* | Stress resistance<br>Reaction speed<br>Concentration of attention |
| *Physical abilities* | Speech volume<br>Speech tempo and lagging behind the speaker<br>Articulating and expressing speech<br>Intoning<br>Breathing techniques<br>Physical condition monitoring and control |
| *Technical skills* | Connecting the headset<br>Operating the interpreter desk<br>Selecting a channel<br>Adjusting audio quality and volume<br>Operating the microphone |

Considering the first requirement, the sequence of the training sessions followed the following logic: interpreter preparatory activities (preparation of the workplace and equipment, psychological adjustment, physical condition control); perceptual and language-production activities (separate operations with the interpreter desk, perception of source speech and its interpretation, overcoming emotional stress); simulation of real interpreter activities (operating basic interpreter desk functions, interpreter conversion and productivity activities, monitoring psychological state and overcoming physical exhaustion). Therefore, the conduct of certain sessions was structured as follows: "Attention! Get ready to air", "Listen to everything, don't say everything", "Breathe calmly, don't panic", "Listen, convert and produce", "Working in pairs, ready to help".

The duration of each session was set at one astronomic hour, as the interpreter's own activities are very strenuous and it was decided not to exceed these time limits in order to maintain proper physical and psychological well-being.

The limiting factors for the number of participants in the training were the availability of facilities for each participant to work individually in an interpreter booth, to ensure that all planned aspects were practised, and that the trainer was able to give due attention to each participant.

In order to evaluate the effectiveness of a training session that has just been conducted, there is a discussion immediately after the session to obtain feedback from the participants and the trainer's recommendations.

### 3.3 Conducting training sessions in the laboratory for simultaneous interpretation

The first in the series of sessions was a session on "Attention! Get ready to air". The aim was to prepare the interpreter in a comprehensive way before the start of the actual simultaneous interpreting session. The main part of this session was to work on setting up the interpreter desk. The interpreter desk is the main equipment of the interpreter's workplace, which allows him/her to ensure the speaker's interaction with that part of the audience in a foreign language by providing the audience with a interpretation of the speaker's speech in a language that is comfortable to listen to. Such booths are usually installed in special interpreter booths. The laboratory where the training took place is equipped with a so-called full-size permanent booth meeting the international standard ISO 2603:2016 "Simultaneous interpreting – Permanent booths – Requirements". A picture of the booth is shown in figure 2.

Today there is a large variety of interpreter desks available, which may differ in design, functionality, placement of controls, how to perform certain actions, etc. However, most of them have a basic set of functions, including the one used in the training. The main actions that can be performed using the remote control include: switching the microphone on and off, controlling the audio input and output, selecting channels to transmit interpretation, communicating with the operator, requesting help, interacting with the operator, etc. The content of the training session "Attention! Get ready to air" included practicing those

**Figure 2.** Permanent booth for simultaneous interpreting.

actions that will ensure the preparation of the workplace equipment for direct interpretation, in particular: checking the functioning of the microphone, connecting the headset, setting up the required input channel, etc. (figure 3). In addition to the technical aspect, an important part of this session was the implementation of a psychological and physical work attitude: concentrating on future interpreting activities, controlling vocal ability, overcoming the excitement before starting work. For this purpose, breathing exercises were performed to normalize well-being, lower the excitement threshold, and adapt the vocal connections to prolonged speech activity. For example, they offered to inhale, counting to two, then hold their breath for a second and exhale, counting to four.

**Figure 3.** Preparing the equipment for the interpreter's workplace.

The second in the sequence was the session "Listen to everything, don't say everything". The participants of the training took this title at first with some incomprehension – how is it possible to interpret not everything, since the task of the interpreter is to achieve the most complete correspondence between the interpretation and the original. However, we proceeded from an understanding of the essence of simultaneous interpretation as a combination of the interpreter's continuous perception of a speech in one language with an almost simultaneous reproduction of its content in the other language. To this end, we focused on an exercise to develop the skills of separating the key information in a speech and presenting it clearly and logically during the interpreting session. Given that simultaneous interpreting takes place under critically constrained and sometimes time-poor conditions, one of the basic techniques of this type of translation is compression. This situation may also be further complicated by the rapid tempo of the speaker's speech, due to both the characteristics of certain languages (in particular, the tempo of speakers of Germanic languages is faster than Slavonic languages) and the individual characteristics of the speakers. Under these conditions, it is difficult or even impossible for a beginner to understand and fully reproduce what is being said. Generally speaking, interpretation theory holds that the simultaneous interpreter perceives an utterance which is characterised by redundancy of information. In addition, the interpreter's ability to perform this type of activity, i.e. the speed of their thought operations and their verbal expression, also has a significant impact. All of these factors can lead to errors of varying levels in the interpreter's output. The solution is to deliberately reduce the volume of the speech when interpreting, i.e. "listen all but speak not all", thus implementing a strategy of compression in simultaneous interpretation. Compression is useful if the speaker's pace is too fast, if there are repetitions or words that are not important in the speech.

During the training session, participants interpreted sentences and paragraphs from a foreign language, while consciously removing certain elements in the target language. Working with bilingual speeches, they practised the ability to modify a sentence, shorten or summarise it without changing the content of the phrase.

As interpreters constantly need to monitor the quality and volume of the audio signal with the speaker's speech, which directly affects the effectiveness of the simultaneous interpretation, this session also included practising the microphone desk facilities, which allow for the adjustment of the sound level in the headphones and the built-in speaker (figure 4). The proposed speech compression techniques in simultaneous interpreting also included replacing words, phrases and sentences with shorter words, phrases and sentences; removing segments of redundant information and redundant words. In parallel, probabilistic prediction techniques were also involved.

The voice is one of the interpreter's most important tools, as it serves to convey messages. In order to adequately reproduce the content of a speech and contribute to its optimal comprehension, it is important to practice clear articulation, correct intonation and appropriate volume.

Therefore the training session is designed to teach prospective simultaneous interpreters how to use their voice correctly. A necessary task is to learn proper breathing technique, which helps the interpreter to regulate effort and, in addition, to overcome the stress that inevitably accompanies the simultaneous interpreting process.

**Figure 4.** Practising the microphone desk tools for audio quality control.

As the work of a simultaneous interpreter requires the ability to control and regulate their own psychological and physical well-being, the session "Breathe calmly, don't panic" was included in order to develop this ability. Simultaneous interpreting is associated with stress, which can be reflected in negative experiences on an emotional level - anxiety, nervousness, insecurity, hopelessness, helplessness, worry, apprehension and fear. Typical reactions to stress in interpreters are anxiety and fear. Therefore, during this session, efforts were directed towards achieving a positive mood, emotional control, inner calm, determination, and self-confidence. This requires getting rid of anxious thoughts, concentrating and being ready to be active. The best way to achieve this state is through various relaxation techniques designed to achieve a physically relaxed state, which additionally supports a calm and relaxed psychological state. On a psychological level, there is a correlation: if one is relaxed, one cannot experience fear.

According to S. Baumann [15, p. 103], a person's psychological state is reflected in the way they breathe. Such feelings as fear, nervousness, excitement, anxiety and malaise lead, for example, to shallow, rapid breathing. Conversely, when a person is relaxed and focused, breathing is deep and slow. The exercise begins with a deep inhale, starting the breathing cycle: inhale, exhale and a short pause. Further breathing should be natural. The peculiarity of this psychohygienic breathing is that the exhalation is lengthened.

The session also involved working with affirmations, which meant asserting oneself, gaining confidence in one's abilities, affirming one's abilities and thus strengthening one's own self-confidence. An important point was the affirmative self-talk ("I am calm and focused", "I am well prepared and in control", "I am looking forward to showing my skills"). The focus of the training was on the fact that thinking patterns that are already firmly established are difficult to change. They were therefore advised to practice these new patterns of positive thinking on their own every day.

In order for an interpreter to perform their activities properly, they must try to achieve an optimal level of activation, that is, an appropriate level of psychological and physical arousal. Performance increases as the level of arousal increases, but only by the average level of activation. If excitement continues to rise after that, performance will fall. This is why training aims to actively regulate the level of arousal. On the one hand you need to calm down, on the other hand you need to become active and mobilised. A calming self-talk is suitable for this purpose, as well as a powerful breath to overcome physical lethargy. This is done by deliberately taking a deep breath for about two seconds, followed by a normal exhalation for one second. This process is repeated three to five times.

To increase concentration, it is advisable to develop personal rituals to help the interpreter stabilise himself psychologically (e.g. placing things in a certain order, wearing a talisman, etc.).

An important training session in the overall structure of the training was the session "Listen, convert and produce". When talking about the difficulties of simultaneous interpreting, the fact that the interpreters have to reproduce the target language speech almost simultaneously with listening is usually emphasised. This puts a certain strain on the synchronisation of listening and speaking processes. But much less attention is paid to the use of translation reformulations of various kinds (lexical, grammatical, lexical-grammatical, semantic) in simultaneous interpretation. Reformulations allow, on the one hand, to reproduce the information of the source speech in a concentrated form and, on the other hand, contribute to relieving the interpreter of the stress that arises from the pressure of the lack of time to produce speech in the target language. This is why we have included translation reformulations in the training programme.

The task involved such types of reformulation of the original phrase: using nouns instead of verbs or vice versa in the translated phrase; formulating the beginning of the sentence differently from the way the speaker started it; rephrasing the sentence heard as a whole; transforming the sentence structure – dividing it into simple ones if it is complex, using synonyms instead of words used in speech.

These reformulations have become commonplace in the work of experienced interpreters, and are therefore recommended for training and coaching interpreters. For example, "Keeping sentences short and simple (KISS)", which involves dividing long and complex sentences of the original speech into several shorter ones, not only makes it easier for the interpreter, but also makes it easier for the listeners to perceive and understand the speech.

In order to achieve the goal of the training session "Listen, convert and produce", the participants of the training session were set from the very beginning to always focus on the thoughts and ideas rather than on the individual words of the speaker.

This training session was conducted at the interpreter's workplace in the booth.

The final session in the series of training sessions was "Working in pairs, ready to help". Given the rather heavy cognitive, emotional and physical load on the interpreter

during the simultaneous interpretation session, the duration of his/her continuous work is limited to 30–40 minutes. At the end of this period of work, a coordinated handover of the changeover to the partner should take place. However, it may happen that the interpreter will not be able to stand the entire period and will need to be replaced early by a colleague. This leads to the need for separate preparation of the interpreter to hand over the changeover to his/her partner. During the training session we practised a changeover mechanism that can be initiated by the interpreter providing the interpreting at the moment (active) as well as by the interpreter resting (passive).

The practical aspect of the exercise involved practising the coordinated work of two interpreters working in pairs on separate desks in the booth (figure 5). This consisted of practising a sequence of actions that involved the active interpreter alerting the passive interpreter of the changeover intent and performing appropriate technical operations by both interpreters on their own desks, thereby ensuring that the target speech signal was transmitted to the appropriate channel without delay.

**Figure 5.** Practising interpreters working in pairs.

During this training session, special attention was paid to the psychological readiness of the passive interpreter to accept a rotation and become fully involved in simultaneous interpreting. Particular emphasis was placed on developing the passive interpreter's ability to step in in an emergency situation, i.e. when the active interpreter suddenly feels unwell.

## 4 Analysis of the pilot study results

In order to verify the effectiveness of the developed and conducted training, in which 17 participants took part, the formation of skills important for the simultaneous interpreter was compared according to several criteria using appropriate methods.

Concentration and selectivity of attention was determined using the H. Münsterberg method, designed to diagnose the occupational suitability of workers in areas with increased neuropsychological stress [16].

The dynamics of changes in stress resistance were examined on the basis of the S. Cohen and G. M. Williamson self-assessment of stress resistance test [17]. This test aims to determine confidence in one's ability to cope with personal problems and to control one's state in different situations.

The methodology "Motivation of success and fear of failure" by A. A. Rean is focused on determining the respondents' goal orientation, their attitude towards successes and failures, their performance under time constraints, which reflects the working conditions of a simultaneous interpreter [18].

In addition, the level of change in the development of verbal, technical and technological skills was determined by the training participants performing appropriate control tasks on these aspects.

The dynamics of changes in the skills and abilities of the training participants are shown in figure 6.

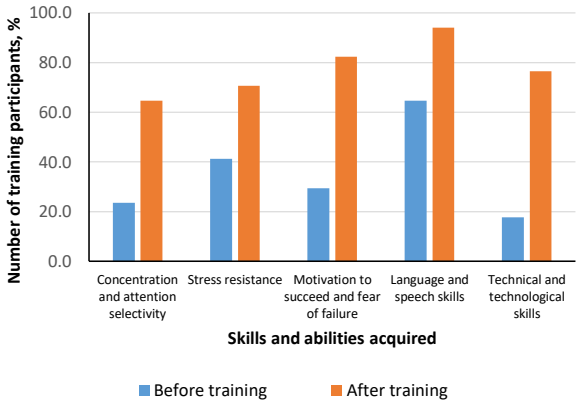


**Figure 6.** The dynamics of changes in the skills and abilities of the training participants.

A comparison of the state of formation of skills and abilities important for a simultaneous interpreter revealed differences in their development among the training participants. The smallest difference between the initial and final scores was obtained for the speech skills. We consider this to be quite logical, since the students who registered for the training already had a sufficiently high level of foreign language skills, which allowed them to plan their future professional activities as a simultaneous interpreter. The greatest progress was recorded in technical and technological skills, as their proficiency increased from 17.6% to 76.5%. In our opinion, this can be explained by the use of special equipment during all training sessions, as they took place in a specialised simultaneous interpretation laboratory with a interpreting booth.

## 5 Conclusions

To be successful in simultaneous interpreting as a special type of translation, interpreters need to possess a number of specific abilities, skills and abilities. Based on the analysis of scholarly work, the experience of interpreter practitioners and practical research, the important skills and

abilities that interpreters need most to carry out their professional activities have been identified. In this case, they are classified into five groups (speech, cognitive, psychological, physical, and technical), which can be the basis for developing special exercises to be used in the educational process. A special emphasis is placed on the technological support of simultaneous interpreters and it is suggested that the technical and technological aspect should be taken into account in the training of these specialists.

Based on the content and technological background, a training programme for the training of simultaneous interpreters was developed and its effectiveness in the educational process was tested. The training included five sessions: "Attention! Get ready to air", "Listen to everything, don't say everything", "Breathe calmly, don't panic", "Listen, convert and produce", "Working in pairs, ready to help". On the one hand they were all aimed at comprehensive training of the interpreter in a simulated real working environment in a fixed cabin with the appropriate equipment, and on the other hand, each of the sessions was focused on reinforcing a particular skill. The training skills included practical use of the available language knowledge in the process of perception, understanding and reproduction of the speech content using the technical equipment of the interpreting booth; constant control and correction of psychological and physical state during all the activities of simultaneous interpretation; work with the equipment of the interpreter's workplace during the simultaneous interpretation process – from its preparation to the completion of the interpretation session. The results of the assessment of the dynamics of changes in the skills and abilities of the training participants showed the greatest increase in the technical and technological skills, which was facilitated by the simulation of the simultaneous interpretation process in a specialised laboratory.

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# Computer-assisted interpreting systems in the education of simultaneous interpreters

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**Abstract.** The article deals with the analysis of the potential of existing terminology support systems for simultaneous interpreting and the experience of their use in universities. Based on the study the possibilities of their use in the educational process of domestic institutions of higher education in the training of interpreters were identified. It is proposed to choose the software products InterpretBank, Interplex, Interpreter's Help for training simultaneous interpreters. It has been found that the proposed programmes contribute to the students' ability to create their own glossaries on specific subjects, fill them in in different ways and use them directly when interpreting. The feasibility of practising CAI tools in a specialised simultaneous interpreting laboratory has been proved.

## 1 Introduction

The increase in the number of international contacts at various levels, the growing cooperation of multilingual partners, the growth of multinational companies and the intensification of their common discussions of topical issues make it necessary to provide interpretation for many international events – conferences, negotiations, meetings, etc. Interpreters, in particular those who provide simultaneous interpreting, play a key role in these events, as interpretation activities have recently shifted towards simultaneous interpreting.

Universities that train interpreters clearly respond to the needs of the interpretation market and increase their focus on their training by increasing the number of training places, offering new study programmes, modifying existing programmes and implementing new modules and subjects. Many of the adjustments to the content of interpreter training are related to the latest developments in information technologies, which are aimed specifically at meeting interpreter needs. Therefore, it is relevant to investigate the issues concerning the implementation of world experience in the educational process of Ukrainian and Chinese higher education institutions that train interpreters.

*The purpose of this article* is to analyse the potential of terminology support systems for simultaneous interpreting and the experience of their use in universities and to identify the possibilities of their use in the educational process of domestic institutions of higher education in the training of interpreters.

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## 2 Literature review

Recently, there has been a significant increase in the attention of scholars and practitioners to the use of computer-assisted interpreting (CAI) for terminological support of interpreting, in particular simultaneous interpreting. The urgent need to provide simultaneous interpreters with modern tools is convincingly demonstrated by the results of a survey conducted by Corpas Pastor and Fern, supported by representatives of London Imperial College and the University of Wolverhampton. Based on responses from respondents belonging to more than 40 translation associations in America and beyond, the authors reached the following conclusion: "In general we can clearly state that technology tools shed a whole new light on the profession and constitute a whole new range of possibilities for interpreters" [1]. A similar view on the importance of the impact and promise of CAI tools is expressed by Fantinuoli, noting that "computer-assisted interpreting is slowly changing the interpreting landscape and the statements of some scholars are very clear with regards to the potentiality of CAI tools" [2]. Concretising the potential of CAI to support interpreters, Fantinuoli sees it both in computer-assisted preparation in conference interpreting [3], and during the translation process itself [4]. Rütten [5] highlighted the features of some of the tools that can be useful for interpreters. The view that it is impossible to do without them in the present situation has been consistently defended in the papers of Corpas Pastor [6], Ro-

dríguez et al. [7], Sandrelli [8, 9] justifies the relevance of interpreters' use of information technologies by their efficiency. Given the importance of new realities in the work of translators, Krüger suggests rethinking the essence of translation competence with a focus on the technological component [10].

At the same time, it can be stated that in the last five years publications have appeared which not only point to the need for changes in curricula and training programmes for translators in terms of implementing or enhancing the acquisition of modern interpreting tools, but also propose concrete ways of implementing these changes. In particular, Rodríguez-Castro considers that the environment in which translation takes place is changing rapidly, and therefore the traditional translation curriculum needs to be refined to include additional translator competencies to bridge the gap between the learning process and industry practice, which is developing [11]. Suggestions for changes in curricula made by other researchers relate to modifications in the technological training of interpreters [12], developing multimedia models to study CAI tools [13, 14], innovations in mastering the specificities of terminology resource management [15], incorporating CAT tools and ICT in the translation and interpreting training at the undergraduate level [16], and even integrating computer-assisted translation tools into language learning [17].

## 3 Result and discussion

### 3.1 Research on computer-assisted interpreting systems in the universities

Given the increasing use of computer-assisted interpreting systems during simultaneous interpreting, in particular at conferences, the question arises of how interpreters can be trained to use these systems during their university studies. In order to consider this aspect of interpreter training, we have looked at the experience of universities. A summary of the research carried out on the software products studied at these universities is presented in table 1.

Looking at the list of software products to support interpreting, we noticed that some of them are not only used in the teaching process at universities, but have also been developed by university academics. In particular, Claudio Fantinuoli, who teaches the course "Interpreting and Translation Technologies" at Johannes Gutenberg-Universität Mainz (Germany), is the developer of the software product InterpretBank. In fact, InterpretBank is a start-up based on a university project of the University of Mainz. This software development is now becoming increasingly widespread among users, including globally. It is worth noting that it is used by an organisation such as the Organisation for Economic Cooperation and Development (OECD). It is therefore not surprising that, apart from the University of Mainz, a number of universities around the world are interested in InterpretBank. This is a logical step on their part, since the programme has already been implemented in the educational process, tested and proven to be effective. As shown in tables 1, InterpretBank is the programme studied in number of universities worldwide.

The developers of Interpreter's Help are not university staff, but also offer an academic subscription for students and teachers that enables them to create their own glossaries. This programme is therefore appropriate for use in students' self-study or autonomous learning. Obviously, this focus of the programme accounts for its less widespread implementation in interpreter training.

It is worth drawing attention to the wide range of software products with which the University of Heidelberg familiarises its students. These include, among others, the following programmes: Interpretbank, Interpreter's Help, Intragloss, Interplex, LookUp Pro, HeidelTerm CCT Maps. Understandably, they are not all studied by students with the same level of detail, but this list provides them with information about the availability of programmes on the market and the possibility of applying them in their future careers. Interestingly, the University of Heidelberg is also developing The Heidelberg Conference Interpreting Corpus (HeiCIC), which covers material in eight languages. This corpus has a visionary purpose, as the collected materials can be used to create glossaries, for use in CAI, etc. Students are also involved in the HeiCIC project and this gives them the opportunity to gain practical skills in the use of resources for computer-assisted interpreting systems in cooperation with experienced interpreters involved in the project.

We also note that some universities (Chinese University of Hong Kong (Shenzhen) (China), New Bulgarian University (Bulgaria)) do not specify in their curricula and programmes of courses for interpreters the software products they offer for study, meaning them only in general terms – Interpreting (CAI) tools. In our opinion, these universities obviously leave room for a wide choice of available software products, which can be made by both students and teachers. One limiting factor is the pricing policy of the developers and owners of the software products, because they are not free. However, as mentioned above, academic programmes are offered, a discount for students, and a discount for former students who continue to use the chosen product in their future careers as well.

Taking into account the existing experience of universities, the availability of software products based on the academic offer and the easy navigation, it can be concluded that three software products are the most preferred choice for students to study, namely: InterpretBank, Interplex, Interpreter's Help.

### 3.2 Development of the content of the module "Terminology Support Systems for Simultaneous Interpreting" and its implementation

The module "Terminology Support Systems for Simultaneous Interpreting" has been developed and implemented within the course "Basics of Creating Specific Glossaries". This choice of course and the name of the module was primarily due to the fact that the interpreter's main work in training for simultaneous interpreting with the use of CAI

**Table 1.** Computer-Assisted Interpreting tools in the universities.

| **University** | **Simultaneous interpreting technology / Software products** |
|---|---|
| *Europe* | |
| Johannes Gutenberg-Universität Mainz/Germersheim (Germany) | InterpretBank |
| TH Köln (Germany) | InterpretBank<br>Interpreter's Help |
| University of Heidelberg (Germany) | Interpretbank<br>Interpreter's Help<br>Intragloss<br>Interplex<br>LookUp Pro<br>HeidelTerm CCT Maps (upcoming) |
| Universität Leipzig (Germany) | InterpretBank |
| University Surrey (Great Britain) | InterpretBank |
| University of Essex (Great Britain) | InterpretBank |
| Zürcher Hochschule für Angewandte Wissenschaften (Switzerland) | InterpretBank |
| Universiteit Gent (Netherlands) | InterpretBank |
| Universiteit Leuven (Netherlands) | InterpretBank |
| Universität Wien (Austria) | InterpretBank |
| Leopold-Franzens-Universität Innsbruck (Austria) | InterpretBank |
| The Josip Juraj Strossmayer University of Osijek (Croatia) | InterpretBank |
| Univerzitet u Tuzli (Bosnia and Herzegovina) | InterpretBank |
| Università degli Studi Internazionali di Roma (UNINT) (Italy) | InterpretBank |
| University of Bologna/Forlì (Italy) | InterpretBank |
| New Bulgarian University (Bulgaria) | Interpreting (CAI) tools |
| *Asia* | |
| İstanbul Yeni Yüzyıl University (Turkey) | InterpretBank |
| Hacettepe Üniversitesi (Turkey) | InterpretBank |
| Chinese University of Hong Kong (Shenzhen) (China) | Interpreting (CAI) tools |
| *North America* | |
| The University of North Carolina at Charlotte (USA) | InterpretBank |
| The Middlebury Institute of International Studies at Monterey (USA) | InterpretBank |
| Bellevue College Washington (USA) | InterpretBank |
| University Ottawa (Canada) | InterpretBank |
| *Latin America* | |
| Universidad Autónoma de Baja California (Mexico) | InterpretBank |
| The University of the West Indies (Trinidad and Tobago) | InterpretBank |

systems consists precisely in the making of special glossaries. Such glossaries, which are formed on the basis of source material for interpretation or closely related material, saved in specialised formats, form the basis for the operation of these systems and are directly linked to the general concepts for their creation in the structure of the course.

Taking into account the experience of universities in studying CAI systems, the possibility to access functional versions of this software, the results of own experience with different systems, three systems were included in the developed module, namely: InterpretBank, Interplex, Interpreter's Help. The content of the module was structured in such a way as to focus the future interpreters' attention on the creation of the main type of terminology resource – glossaries in each of the programmes, on the one hand, and to give them the opportunity to test the usability and efficiency of their use in a simultaneous interpretation laboratory environment, on the other hand. In addition, emphasis was placed on the specific features of each system, which provided additional advantages in their use.

When familiarising students with the InterpretBank system, it was primarily the opinion that it is a software for interpreters to search for information during simultaneous interpreting sessions and to prepare for conferences in a systematic way. InterpretBank has a modular structure. Each module is an independent software fragment designed to solve a specific task of the simultaneous interpretation workflow. However, these modules are interlinked and work seamlessly together as a coherent tool. InterpretBank's structure consists of four modules, in particular: the preparation module, the terminology editor, the memorisation module and the search module. It is the terminology editor and the search module that have been the focus of most attention, while the information about the other modules has been of a more general nature.

An important step in mastering the terminology editor was the creation of a system of glossaries (figure 1), which should ensure that terms are structured according to certain characteristics in order to be used effectively in all phases of the preparation and execution of simultaneous interpreting. Of course, either it is advisable to structure the terminology entries within the glossaries by sector, by the name of the event or by another feature, that ensures their identification.

Since considerable efficiency in filling glossaries and sub-glossaries in InterpretBank can be achieved by importing entries, a separate part of the practical exercises was included in the module structure to acquire such skills. This is also used to practise the use of the system's tools, which allow the import of terminology entries, appropriately structured and saved in xlsx, xls, ods, docx, doc, odt, tbx files.

A created glossary or sub-glossary is the basis for working with InterpretBank not only during simultaneous interpreting, but also during the preparatory phase for the event. In particular, a separate module in the system (memorisation module) makes it possible to support the interpreters in learning the terms, which will be used during the conference and concentrated in the respective glossaries. The students learned the terms through this module in two modes: manual and automatic.

As mentioned above, considerable attention was given to the search module, since this is what provides terminology support for the interpreter directly during simultaneous interpreting at the workplace. In particular, the students were taught how to set up a term search in the languages, where among the options one can select all at once or individually defined ones. Depending on the letters of the query entered, the system generates a list of terms found in the glossary. The entered query is stored in the search box for up to three seconds, and the search results are displayed in the window that opens until the query is changed. Considering these features of the system encouraged students to develop qualities such as concentration, focus, instant decision making, etc. Such exercises had a particular effect when the relevant modules of the system were used, when the students were directly in the interpreter's booth at the workplace where the simultaneous interpreting session was simulated (figure 2).

The inclusion of the Interplex system in the structure of the training module was largely because it allows an extremely efficient search for words and expressions, even when the interpreter is working in an interpreting booth. The advantages of the system are the ability to search for queries in a large number of glossaries, which can be concentrated in the form of a terminology base. As Interplex has been developed primarily for the purpose of terminological support for simultaneous interpreting, it has concentrated on the creation and use of terminology bases and glossaries. These have been the focus of future interpreters. Interplex provides the possibility to create multiple termbases with many glossaries in each termbase, allowing for the concentration of terminology data according to different criteria.

It is possible to add to the created termbase by entering terms directly in the structure of the Interplex window or by importing structured entries from files in txt, xlsx, docx formats. It was quite logical that the students learned such skills quite easily, as they already had the skills to structure terminology data in such formats.

With a terminology database prepared and open in the Interplex structure, this system can be used as an effective tool for terminological support for simultaneous interpreting (figure 3). During the lab sessions the students practiced the search for translation of terms by full matching of the queries entered in the search box with the available entries in the terminology database, by partial matching, search in all glossaries of the open terminology database, in certain glossaries of the termbase, etc.

Unlike the two previous systems in the structure of the module "Terminology Support Systems for Simultaneous Interpreting", the Interpreter's Help system is different in that it is a cloud-based system. Since the work with this system is based on the use of terminology databases, it was logical to first train future interpreters to create and use them (figure 4). It took a fair amount of time to learn how to create the termbases, as the system allows to do this in three ways: by entering terms manually; by importing terminology records from a file (importing is possible from docx, xls, xlsx, csv files); by extracting terms from texts.

Each of these ways has its own advantages, which, if their features are used correctly, allow for a maximum acceleration of the process of forming terminological bases. All of them therefore needed to be separately recognised and mastered. A positive effect of this was that a significant number of operations were similar to those already learned when mastering the previous systems. The students did the fastest in mastering the manual entry of terms.

The method of importing terminology entries from a file was not very complicated either. To implement this method of completing the terminology database, the students first need to prepare the terminology records in tabular form and save them in one of the file formats: docx, xls, xlsx, csv, ods. The structuring of terms is classical, i.e. it involves having columns in a table of how many languages the term will be entered. This approach is fairly unified and its application in Interpreter's Help system has actually replicated what has already been tried and tested in other systems.

The way of filling in terminology bases by extracting terms from texts that originate for translation or are thematically similar has proved to be more difficult for the students. This is due to the fact that suitable tools for such operations are not present in all CAI systems. In the Interpreter's Help system, this function is available and can be implemented at the beginning of the creation of a terminology database (figure 5).

The window structure allows inserting text passages in any language available in the terminology base into the relevant fields. With this tool, the focus of the students was on analysing the text to identify the term and extracting it to the terminology database.

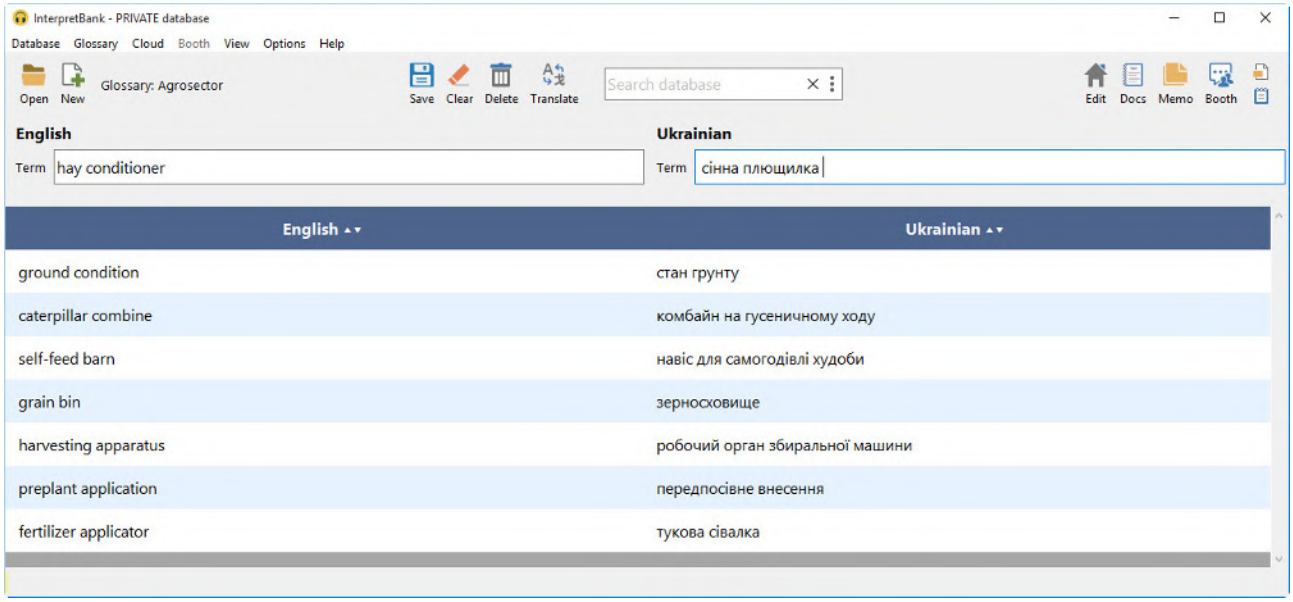


**Figure 1.** Creating a glossary in the system InterpretBank.

**Figure 2.** Working with the InterpretBank system in the interpreter's booth.

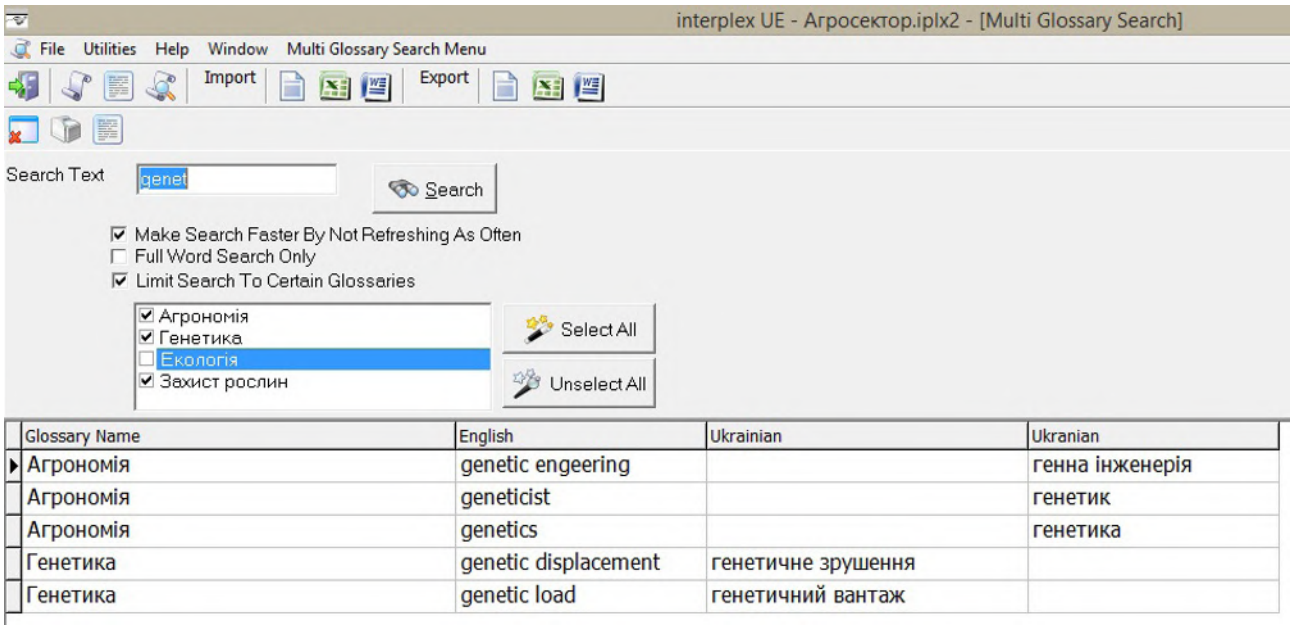


**Figure 3.** Terminology bases in the Interplex system.

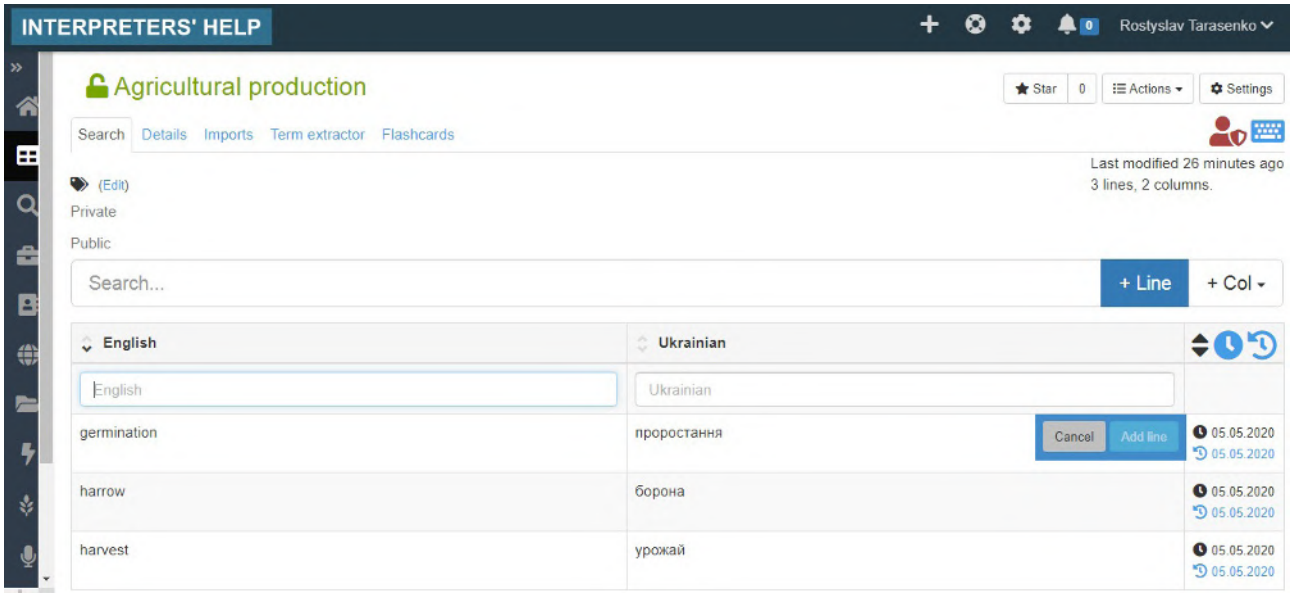


**Figure 4.** Creating a base in Interpreter's Help system.

To directly search for a term in the termbase, a skill the students practised in a simultaneous interpreting lab environment, it is necessary to enter it in the search bar. When entering even the initial letters of a term, the system automatically starts suggesting the entire list of entries in which the entered combination occurs. It is highlighted in yellow (figure 6). Further actions can be directed either to select a term from the suggested list or to create a more complete query to get more relevant search results.

### 3.3 Analysis of the difficulties of implementing the module "Terminology Support Systems for Simultaneous Interpreting"

After the students had studied the module "Terminological Support Systems for Simultaneous Interpretation", we conducted a survey to identify the skills that need more attention during practical training in order to correct the relevant aspects of the module. Forty-two students took part in the survey and were asked to indicate the skills that caused them the most difficulties during their studies. The results are presented in table 2.

According to the survey data, the students found it easiest to learn how to create a subglossary, which makes

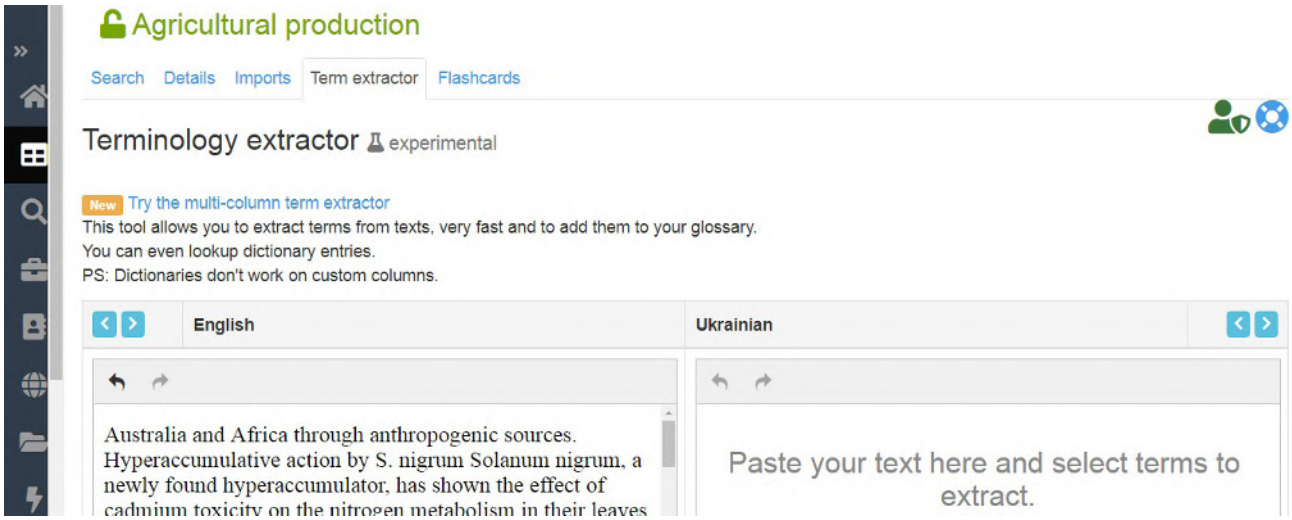


**Figure 5.** Extracting in Interpreter's Help system.

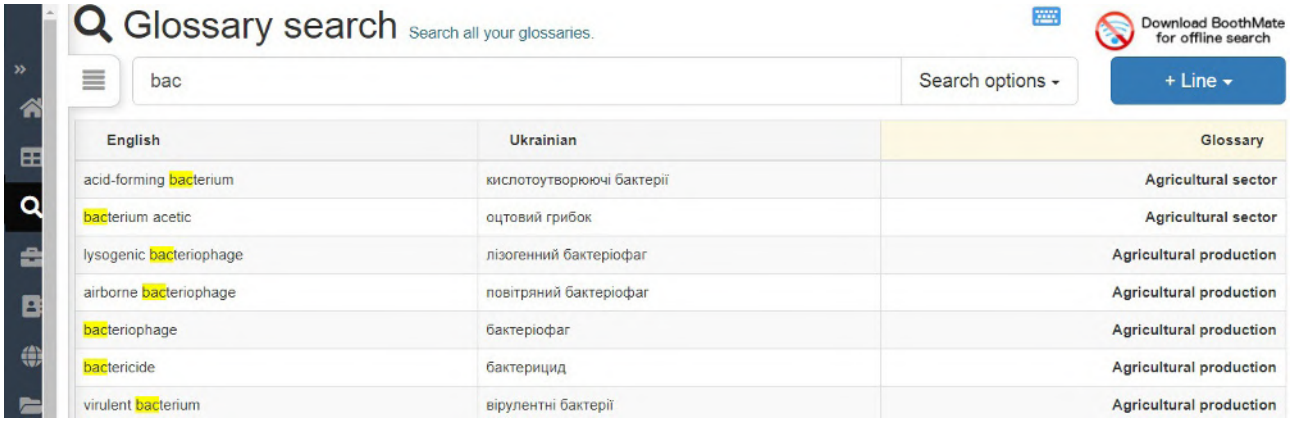


**Figure 6.** Search for terms in the Interpreter's Help glossary.

**Table 2.** Difficulties with the skills of working with systems to support simultaneous interpreting.

| Skills | Number of students who indicated them |
|---|---|
| Creating a glossary | 12 |
| Creating a subglossary | 5 |
| Creating a terminology base | 8 |
| Structuring terms | 6 |
| Manual entry of terms into the database | 7 |
| Importing terminology entries | 8 |
| Extracting terms from texts | 11 |
| Search for terms by full match | 9 |
| Search for terms by partial match | 7 |
| Working in real time | 26 |

sense, because once they have learned how to create glossaries, it is much easier to perform such operations. Practically no difficulties were caused by the manual entry of terms into the termbase. The search for terms was somewhat more difficult to learn, especially when it was done by full matches. The result of the terminology database survey was not entirely expected, as this is not a simple operation. However, it was by no means the most difficult for the students, due to their prior training in desktop and cloud-based CAT systems such as SDL Trados and Memsource [18]. On the other hand, more than half of the students found real-time work in an interpreter's booth challenging, as such activity is complex and requires a range of skills to be formed and coordinated, maximum concentration for a certain amount of time, prior preparation from the subject of interpreting, etc.

Based on the students' responses we have identified the skills that need to be given more time to practise - creating a glossary, extracting terms from texts and searching for terms with full matches. Furthermore, the focus will be primarily on practising the use of the learnt tools in the interpreter's booth, which can be fully achieved in a specialised simultaneous interpretation laboratory.

## 4 Conclusions

The market for translation services, and subsequently the translation industry, has recently undergone significant

changes. Most of these are due to the development of information technologies and the constant improvement of specialised software products designed to support translation. Simultaneous interpreting, as a special type of translation, requires additional skills from the interpreter in the aspect of using CAI tools. This, in turn, predetermines the need for improvement and modification of interpreter training programmes, strengthening their technological component, orienting the content towards learning modern technologies of simultaneous interpreting support. Consideration of the experience of foreign universities, the possibility of accessing functional versions of this software, the results of our own experience with the various systems have shown the advisability of introducing the relevant software products, in particular InterpretBank, Interplex, Interpreter's Help, into the content of interpreter training. They can be effectively studied by implementing a separate module in one of the professional courses. A special effect in mastering these software products can be achieved by practising the individual elements in a specialised laboratory in which a real simultaneous interpreting process is simulated. Studying the three systems in parallel strengthens the acquisition of skills in joint basic operations, and mastering specific functions ensures that prospective interpreters are able to choose the best set of tools for different tasks in the preparation and translation process. The practical implementation of the developed module has shown its effectiveness and also made it possible to identify ways to further improve the study of computer assisted simultaneous interpreting systems. The proposed programmes contribute to the students' ability to create their own glossaries on specific subjects, fill them in in different ways and use them directly during interpreting.

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# Future biology teachers training for professional activity on the basis of sustainable development

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**Abstract.** The article deals with one of the possible ways of modernization of pedagogical education in Ukraine in order to train teachers of the new generation and to provide conditions for the formation and development of modern alternative models of teachers' professional and personal growth on the principles of sustainable development. The ideas and ways of integrating education for sustainable development and Biology teachers professional training have been determined. It has been substantiated the methodological system of Biology teachers training for professional activity on sustainable development ideas. Its system-forming factor is the idea of combining the activity approach to acquiring knowledge with their ethical reflection, comprehension of personal value in professional and everyday life. The content of the suggested methodological system is made up of the following academic disciplines: compulsory – "Methods of Teaching Biology and Fundamentals of Health Studies" and elective. The efficiency of the corresponding methodological system of Biology teachers training on the basis of quality indicators of the knowledge acquisition (completeness, awareness, consistency and systematicity) has been proved.

## 1 Introduction

Reforms of the education system in Ukraine, its improvement and quality enhancement caused the necessity of the transition to a new type of humanistic-innovative paradigm of education, which involves the establishment of man as the highest universal human value and his subject-subject interaction with the objects of wildlife. Correspondently there is a need for a significant rethinking of the essence of the educational environment in higher education institutions, structured around certain conceptual dominants generated by changes in the modern scientific picture of the world and value-oriented models of interaction in society [1, p. 123].

The transition to a new nature-oriented education will lead to a reorientation of the value system, in which nature will act as self-worth, man will perceive himself as an element of a single natural community, a part of the system, but not its owner [2, p. 21].

The concept of sustainable development as a leading paradigm of modern civilization has an interdisciplinary nature and is considered in many aspects. It is focused on such a mindset and way of life formation of all the inhabitants of the planet, which will ensure long-term thrifty and harmonious development of Man and Nature [3, p. 9].

The settling of this problem is connected with the content of future teachers training, which is actualized by the need of adjustment the objective and the content of Biology teachers professional training to the requirements of the concept of sustainable development.

Thus, the development and substantiation of a methodological system of Biology teachers training for professional activity in secondary schools based on the ideas of sustainable development is *the goal of the article.*

*Research tasks*:

- to highlight the ideas of the concept of sustainable development, which should be included in the content of future Biology teachers training;
- to identify the ways of integration of education for sustainable development and Biology teachers professional training;
- to develop and substantiate experimentally the efficiency of methodological system of Biology teachers training for professional activity based on the ideas of sustainable development.

## 2 Methodology

### 2.1 General background of research

It is generally known, that teachers training must meet the public inquiries formulated in the Concept of Pedagogical Education Development [4], professional standard for teachers of general secondary education [5], state standard of basic secondary education [6], take into account global trends and recommendations of influential international organizations concerning teachers training. The international and Ukrainian program documents formulate

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the basic principles of the concept of sustainable development and the main directions of its implementation, including the environmentalization of public consciousness through the use of education systems and media [7, 8]

The analysis of a number of research results on the relationship between environmental knowledge and attitudes showed that today there is a need for organic inclusion of the system of emotionally-valuable attitudes formation and environmentally responsible behaviour of youth into the higher school educational process [9]. In our opinion, modern biological education should be focused on providing knowledge with value-based sense [10, pp. 6–12].

Many studies have substantiated the need for interdisciplinary and transdisciplinary education for sustainable development [11, 12], the development of universitywide programs of sustainable development [13, 14], as well as models of transnational cooperation of higher education institutions for sustainable development [15]. It is important that education for sustainable development contributes to the formation of key competencies, including the ability to learn throughout life [16].

The problem of education for sustainable development was the subject of research of a number of domestic scientists, who have substantiated the theoretical and methodological principles of implementation of sustainable development ideas in youth education, have developed the concept of the subject "Education for Sustainable Development" studying and its educational and methodological support [17, 18], have developed recommendations on education for sustainable development of adult citizens [19]. However, the problem of developing ways and methodology of Biology teachers training for professional activity based on the ideas of sustainable development has not yet been properly studied.

### 2.2 Instruments and procedures

To achieve the abovementioned tasks, a number of *research methods* have been used, namely:

- comparative analysis;
- modeling to develop the methodological system for Biology teachers training for professional activity based on the ideas of sustainable development;
- systematization and generalization to highlight the main ideas of the concept of sustainable development, which should be included in the content of future Biology teachers training generalization of pedagogical experience, scientific observation, interviews, questionnaires in order;
- expert assessment, pedagogical experiment quantitative and qualitative analysis of research results using methods of mathematical data processing.

Experimental verification was carried out at Ternopil Volodymyr Hnatiuk National Pedagogical University during 2015–2020. In general, almost 450 students of the Faculty of Chemistry and Biology participated in the survey. 156 students participated in the diagnostic experiment. A questionnaire was conducted to study the opinion of the students of the second (master's) level of higher education on:

- the relevance and expediency of the formation of students' ideas of sustainable development;
- readiness to implement these ideas in the educational process;
- diagnostics of the level of formation of students' personal attitude to nature and their mindset moral and value orientations (level of personal property).

At the second stage of our experimental methodology we analyzed the achievements of scientists on education for sustainable development; the content of academic disciplines for Biology teachers training and identified the ideas of sustainable development which should be included in the content of methodological training of future teachers. Their expert assessment on the intelligibility and expediency of inclusion them in the content of Biology teachers professional training was conducted.

The obtained conclusions are the basis for the development of a methodological system for Biology teachers training for professional activity based on the ideas of sustainable development. One of the main tasks of the system is to master the knowledge component of professional competence concerning the implementation of education for sustainable development in the content of school biological education. It combines two ways of integrating education for sustainable development in the content of Biology teachers professional training: organization of nature-oriented educational environment in higher education on the basis of the concept of sustainable development in which the model of behavior is transmitted using the method of imitation; carrying out special activities to prepare students for the formation of schoolchildren's ideas of sustainable development.

We understand the educational environment as the system of influences and conditions of personality formation with a given model of behaviour, as well as opportunities for his/her development, contained in the social and spatial subject surroundings. Corresponding educational environment will contribute to the formation of environmental culture as a factor of sustainable development based on awareness of the value of nature and man as its component. We used methods and techniques of forming a value attitude to nature, aimed mainly at the inner world of the individual, at the process of transformation of the objectively necessary into the subjectively significant. They are realized both during the process of rational cognitive activity and during the emotional and value-based evaluation activity as for the adherence to the principles of sustainable development in all spheres of society. Searches, doubts, excitement should go along with the training, involving all participants in this process. It is obvious that for this it is necessary for the lecturer to rely not so much on knowledge obtained from books, supplemented by personal experience, but on his own knowledge, achieved through suffering in creative pursuits, supported and supplemented by information from books [20, p. 4].

The basis of the training methodology involves humanistic interpersonal communication, partnerships, and

principles of equal dialogue. That is, pedagogical communication is the main mechanism for achieving major goals of education. For this reason, the problem of students' dialogical skills formation becomes actual, which is realized in two interrelated ways: through the organization of the training process in higher education on the basis of partnership in the system "teacher-student" and purposeful activities of future teachers' appropriate skills forming [21, 22].

The conducted analysis of the ways of implementation of the ideas of sustainable development in the content of future Biology teachers professional training [23–25] allowed to highlight the main principles of education for sustainable development. On the basis of their expert assessment, it has been determined that the main ideas of the concept of sustainable development, which should be included in the content of future Biology teachers training are the following:

1. All the elements of the environment regarding nature systems depending on the possibility of consumption or use are divided into two categories: conditions – environmental factors that change in time and space, but are not exhausted; resources – all environmental factors of surroundings, which are consumed or used by all living beings, reducing their number. Man overuses nature, because his super-needs are caused by social character of consumption. Mankind has to live not only in the dimensions of the present, but also be confident in the possibility and stability of its future. All the elements of the environment regarding nature systems depending on the possibility of consumption or use are divided into two categories: conditions – environmental factors that change in time and space, but are not exhausted; resources – all environmental factors of surroundings, which are consumed or used by all living beings, reducing their number. Man overuses nature, because his super-needs are caused by social character of consumption.

2. Mankind has to live not only in the dimensions of the present, but also be confident in the possibility and stability of its future. The issue of the formation of human biosociality is considered in connection with the environment of his life and the causes of the ecological crisis of today (biological, ecological, social).

3. Conditions of natural and anthropogenic environment determine human health, and at the same time the level of development of society (economy, health care, and education) determines the state of health of its population.

4. There exists a direct and inverse relationship between a healthy lifestyle of people and the state of the environment. Healthy lifestyle is environmentally and economically expedient for every person, the state and the planet as a whole.

5. Main principles of sustainable development, which are decisive in constructing the content of both Biology as a school subject and future teachers methodological training respect and care for all living beings and their groups (bio(eco)centrism); improving the quality of human life; preserving the viability and diversity of manifestations of life on Earth; ensuring sustainable use of renewable resources; minimization of depletion of non-renewable resources; change of individual positions and activities.

6. The main constituent elements of education for sustainable development are as follows: self-cognition, self-learning, and independent decision-making in everyday life. The basic idea on which the content and methodology of teaching are built is the following: a student is an active creative individual, capable of cognition and self-development; applying knowledge in practice and imparting the "wisdom of life" knowledge for everyday life to schoolchildren. Possibility to discover and create one's own way of life and own values.

7. Self-analysis, self-criticism and correction of one's own way of life are regulators of the model of behaviour. Human's self-preserving behaviour as a key to his health and well-being ensures adaptation to changing environmental conditions.

The highlighted principles form the basis of the suggested methodological system of Biology teachers training for professional activity based on the ideas of sustainable development.

Experimental methodological system combines three methods to include additional information in the educational process: multi-disciplinary, single-disciplinary, mixed. According to the multi-disciplinary method it is advisable to include material on the issues of sustainable development of nature in the content of compulsory academic disciplines (components) diffusively, in particular "Methods of Teaching Biology and Fundamentals of Health Studies". Along with the environmentalization of the content of academic disciplines, the study of some elective courses of bio(eco)ethical direction has been introduced, namely: "Methodology of "Lessons of Sustainable Development" Course Teaching", "Bioethics and Biosafety", "Ecological and Naturalistic Activities of Schoolchildren". Mixed method involves the study of sustainable development and bio(eco)ethics problems in the combination of multi-disciplinary and single-disciplinary inclusion of additional information.

In addition, it is offered to study the problems of teaching a course "Lessons of Sustainable Development" as a part of teaching methodology of the following courses ("Biology and Fundamentals of Health Studies") [18, pp. 64–85]. It is aimed at the improving of teachers' methodological competence as to the formation of students' habits of environmentally balanced behaviour in everyday life on the basis of value attitude to the environment.

The discipline "Methodology of "Lessons of Sustainable Development" Course Teaching" is included in order to form students' readiness for education and upbringing on the basis of sustainable development, development of skills and abilities to conduct lessons using training forms, project and research extracurricular and public environmental and educational activities, etc. The syllabus of the discipline consists of two modules [18, pp. 64–73]:

1. Theoretical principles of studying the subject "Lessons of Sustainable Development" in basic secondary school (the main regulations of the Concept of Sustainable Development, peculiarities of the organization of education for sustainable development).

2. Modeling of cognitive activity of the subjects of training in the course of the discipline studying (construction of the content and technology of studying the course for various classes of the basic secondary school).

In the syllabus the studying of problems of methodology of teaching the school subject "Lessons of Sustainable Development" as an element (module) of the mandatory component of Biology teaching methodology there is a list of issues appropriate for preparation for the implementation of ideas of sustainable development. It is planned to study environmental education technology, taking into account the principles of sustainable development, in particular: peculiarities of the pedagogy of "empowerment" (motivation and inspiration for actions) and its role in environmental education and upbringing; methodology of creating eco-teams, conducting lessons, home audits, organization of project and research activities during extracurricular work [18, pp. 84–85].

In general, the suggested methodological system involves the study of the following elective courses: "Methodology of "Lessons of Sustainable Development" Subject Teaching", "Bioethics and Biosafety", "Ecological and Naturalistic Activities of Schoolchildren". Here is a brief description of the disciplines. We will not attract your attention to the peculiarities of the course "Methodology of "Lessons of Sustainable Development" Subject Teaching", as they have been described above.

The expediency of studying the course "Bioethics and Biosafety" is stated by the fact that without proper attention to bioethical education, any program to implement the ideas of the concept of sustainable development cannot be considered as a holistic formation from the standpoint of pedagogical science. In our opinion, one of the ways to construct a strategy of human behaviour in the biosphere, society and family is to form the young people's mindset based on the concept of bio(eco)centrism. This is induced by realizing the great life complexity in its terrestrial biosphere boundaries, the catastrophic consequences of its conquest and transformation. However, despite all the global changes in cognition of world creation fundamentals, the essence of life, humanity continues to try to solve problems, based mainly on knowledge of the organismic level of life organization, forgetting about the system-structural organization of the biosphere, the existence of integral, living systems of higher level of organizations (species, biosphere) on earth [10].

The experience of teaching the course "Bioethics and Biosafety" proved that it contributes to the formation of both general and professional students' competencies. They involve availability of knowledge about the ways of solving creative tasks connected with the evaluation of the activities of historical figures and the relationship between the subjects of social and natural life in terms of bio(eco)ethical interaction; definition and characterization of different systems of ethical values; strategies of constructive nature-transforming and nature-preserving activity; ability to apply the skills of ecological culture and popularize and instill them in professional and public bio(eco)ethical activities, the ability to make ethically well-considered decisions.

Professional competence includes mastering of different psychological and pedagogical methods of bio(eco)ethical education (identification, reflection, empathy, labilization, fear method, creative therapy, etc.), the ability to apply them in education, to form students' critical thinking, responsibility for their own actions; the ability to reflect on their own role and actions in nature and society [26, pp. 35–42].

The expediency of including the course "Ecological and Naturalistic Activities of Schoolchildren" in methodological system is caused by the fact that ecological and naturalistic activities based on the ideas of the concept of sustainable development allow to realize the activity component of future teachers' environmental competence maximally. The main course objectives are as follows: students' mastering the methods of organizing various forms of extracurricular ecological and naturalistic work, aimed at forming younger generation's active life position, a conscious attitude to nature; teaching responsibility for the state of the environment, which corresponds to the norms of public morality and law accepted in society; stimulating schoolchildren to practical environmental, educational and inventive work in the field of natural and agricultural sciences. To solve these problems, it is important to master special active and interactive methods of teaching and education, aimed at involving schoolchildren in the search for new effective solutions in obtaining knowledge; teaching conscious participation in teamwork and ways of collective interaction; combination of elements of game and scientific research; teaching to evaluate their own actions and capabilities; use of various sources of information; development of schoolchildren's creative abilities and interests in various activities for sustainable development [27].

The effectiveness of the suggested methodological system of Biology teachers training for professional activity based on the ideas of sustainable development was tested at the third stage of experimental research (formative experiment). Two groups of students, namely experimental groups (E) and control groups (C) were singled out. During the experiment the students of E groups were taught according to our suggested methodological system (studied a complex of described elective disciplines), and the students of C groups were taught only "Methods of Teach-

ing Biology and Fundamentals of Health Studies" from the block of compulsory disciplines. The first diagnostic survey was carried out at the beginning of the experimental work and the second one after its completion with the aim of determining the effectiveness of the suggested methodological system. The conclusion was made based on the results of checking the level of formation of the content component of future teachers' professional competence regarding the implementation of the ideas of sustainable development in biological education of schoolchildren of general secondary schools. With this aim we used qualitative analysis of the level of formation of separate quality indicators of the entirely learned knowledge were studied, namely: completeness, awareness, consistency and systematicity. These indicators are most closely connected with the changes in students' knowledge that they have received during the formation of the content component of future teachers' professional competence regarding the implementation of the ideas of sustainable development in the educational process of modern secondary school.

The indicator "knowledge completeness" was determined by the amount of all the knowledge about the subject of study (ideas of the concept of sustainable development which were specified by us). Students' answers were arranged in groups according to the following criteria: complete correct answer; incomplete correct answer; no answer. The indicator "knowledge awareness" is characterized by understanding of links between all the components of the content of education, ways of acquiring knowledge, ability to justify them. Students' answers were also arranged in three groups respectively: correct answer; incorrect or partly correct answer; no answer. Since, we consider systematicity as precondition of knowledge consistency therefore, the indicators "consistency and systematicity" were studied together. Respondents' answers were arranged in four groups: correctly correlated concepts of different levels of generality concerning main ideas of education for sustainable development and the ways of their realization; one violation was made in the ratio of concepts; two or more violations were made in the ratio of concepts; no answer. Validity of difference in indicators between separate groups was estimated with the help of $\chi^2$ criterion.

## 3 Results

The results of the study showed the following: 132 students (84,6 %) believe that the content of academic discipline "Biology", reconstructed in some way, forms schoolchildren's mindset on the basis of the concept of sustainable development, 18 students (11,5 %) are convinced that the scientific facts themselves may have educational role, so the teacher does not need to apply upbringing efforts in the classroom, 6 students (3,9 %) think that Biology has nothing to do with upbringing. Answers to the question "What values of nature and universal human values should be brought up at Biology lessons?" showed that 70 respondents (44,9 %) did not answer this question. 86 masters (55,1 %) singled out the following values among the values of nature: the value of each species of living beings; fauna and flora; the value of nature as a source of knowledge and experience for man; the value of life and admiration of the nature beauty; careful attitude to nature; environmental ethics; the idea that nature is a coherent whole and man is a part of it. The universal human values that should be brought up at the lessons by Biology teachers include: kindness; health; large-heartedness; tolerance; love, mercy; careful attitude to each other.

To diagnose the level of formation of students' personal attitude to nature and their mindset moral and value orientations (level of personal property), we suggested a questionnaire to identify the relationship between views on nature and morality. 98 students (62,8 %) are aware of the importance of knowledge about the ideas of sustainable development in everyday life, the rest is aimed only at studying the classical content of Biology. Responding the question if the received biological education gives you the opportunity to answer the question "What is life and according to what laws it develops?", 131 of the surveyed (84 %) gave affirmative answer; 8 respondents (5,1 %) answered negatively; 17 respondents (10,9 %) could not answer. Responding the question "Did it help to answer personal questions about the meaning of life? (your future life, purpose, etc.)" 18 students (11,5 %) answered – yes; 116 respondents (74,4 %) – no; 22 students (14,1 %) answered that they were not interested in such questions. Some respondents take up Biology as an academic discipline that is not related to their real life, they do not realize the prospects of their application in their daily activities.

Thus, the results of the survey showed that the educational process in higher school has significant potential opportunities and prospects for the formation of future Biology teachers' ideas of sustainable development and their preparation for the appropriate aspect of professional activity.

The effectiveness of methodological system of Biology teachers training for professional activity based on the ideas of sustainable development was tested during the formative experiment in which 448 students (192 students in control (C) groups and 256 in experimental (E) groups) took part.

The results of examination of the effectiveness of the suggested methodological system of Biology teachers training for professional activity based on the ideas of sustainable development, which are reflected in the change of students' knowledge quality of experimental (E) and control (C) groups, are presented in the table 1.

The obtained data (table 1) according to the indicator "knowledge completeness" allowed determining that the students from experimental groups acquired more complete knowledge. 87,1 % of respondents from these groups gave complete and correct answers. There were only 61,5 % of students who answered in such a way in control groups. 2,0 % of students from experimental groups and 5,7 % of students from control groups did not answer the question.

The students of experimental groups are better aware of the acquired knowledge than their colleagues from control groups. Correct answers were given by 86,3 % of students from experimental groups and 33,9 % of experiment

**Table 1.** Results of examination of the students' knowledge quality concerning the ideas of the concept of sustainable development

| Indicators of knowledge quality | Answer groups | Number of students, whose answers correspond to the arranged groups | | | |
|---|---|---|---|---|---|
| | | Control groups | | Experimental groups | |
| | | No | % | No | % |
| Completeness* | I | 118 | 61,5 | 223 | 87,1 |
| | II | 63 | 32,8 | 28 | 10,9 |
| | III | 11 | 5,7 | 5 | 2,0 |
| Awareness** | I | 65 | 33,9 | 221 | 86,3 |
| | II | 107 | 55,7 | 28 | 10,9 |
| | III | 20 | 10,4 | 7 | 2,8 |
| Consistency and systematicity*** | I | 54 | 28,1 | 132 | 51,6 |
| | II | 55 | 28,6 | 56 | 21,9 |
| | III | 60 | 31,3 | 50 | 19,5 |
| | IV | 23 | 12,0 | 18 | 7,0 |

* I – correct complete answer; II – correct incomplete answer; III – no correct answer.
** I – correct answer; II – wrong answer; III – no answer.
*** I – correctly compared concepts of different levels of generality; II – one violation has been made in the comparison of concepts; III – two or more violations have been made in the comparison of concepts; IV – no answer.

participants from control groups, respectively. 55,7 % of students from control groups (in comparison with 10,9 % of students from experimental groups) gave incorrect or only partially correct answers about the ways of obtaining knowledge concerning the concept of sustainable development and the means of their substantiation. 10,4 % of students from control groups (in comparison with 2,8 % of students from experimental groups) are not aware of the difference in the ways of obtaining knowledge and the means of their substantiation (indicator "knowledge awareness").

The analysis of the results obtained according to the indicator "knowledge consistency and systematicity" showed that the quality of knowledge acquisition according to this indicator is higher for students from experimental groups than for those from control groups. 51,6 % of students from experimental groups managed to compare the concepts of different levels of generality in a correct way. In control groups such answers make only 28,1 %. One violation in the comparison of concepts was made by 21,9 % of students from experimental groups and 28,6 % of students from control groups, respectively. Two or more violations in the comparison of concepts were made by 19,5 % of students from experimental groups and 31,3 % of students from control groups, respectively. Also, more participants from control groups (12,0 %) than from experimental groups (7,0 %) did not answer the questions.

For greater reliability of the obtained conclusions, a statistical analysis of the results of the quality of students' mastering the knowledge about the main ideas of the concept of sustainable development and methodology of their implementation in the educational process of modern secondary school was carried out using the criterion $\chi^2$. It confirmed that to train using experimental methodology enhances the quality of students' mastering appropriate knowledge, which is reflected in the change of students' grades (points), and these changes are not accidental.

## 4 Discussion

Thus, the conducted study showed that to ensure that education meets the requirements of today, it is necessary to expand the content of disciplines including information about the concept of sustainable development, which would combine the spiritual and material aspects of science that is to "humanize" knowledge. The results of experimental study on Biology teachers training for professional activity based on the ideas of sustainable development testified the effectiveness of the suggested methodological system, the system-forming factor of which is the idea of combining the activity approach to the acquisition of scientific knowledge about nature and the activation of ethical reflection of its laws by students. Its introduction contributes to the creation of an educational environment that allows to increase the level of environmental education of future Biology teachers and to form the ability to implement the ideas of sustainable development in the educational process of secondary schools.

## 5 Conclusions

We consider that that the study is valuable for the improvement of the system of pedagogical education in general and the natural sciences field in particular regarding the creation of a training base for teachers of new generation with ecological style of thinking based on the ideas of sustainable development, with a high level of responsibility before present and future generations for the results of their activities in natural and social environments.

The suggested methodological system of Biology teachers training for professional activity based on the ideas of sustainable development will contribute to quality of education in higher education institutions, ensure the functioning and development of a competitive market of educational services in the field of professional development of natural sciences teachers.

The prospects for further study consist in the development of motivational-value and activity criteria of the effectiveness of methodological system of Biology teachers training for professional activity based on the ideas of sustainable development. It is expedient to develop methodological systems for training teachers of other academic subjects in the field of science education for professional activities on the basis of ideas of sustainable development.

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# Categorical-ontological approach to information support of educational activities

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**Abstract.** An important basis for information support of educational activities is the effective presentation of knowledge and standardization of training tasks based on ontological models of learned subject areas. The competence approach to the organization of the educational process and the requirements for the training of specialists from the point view of enterprises and organizations, in which they will carry out their professional activities, requires the development of a comprehensive model of educational processes and objects that are participating in them, based on high-level abstractions. On the basis of the results obtained in this work, the methodology of informational support of educational activities was further developed on the basis of: organizing the educational process and standardization of education based on a categorical-ontological approach; construction and use of relevant ontologies and knowledge bases; automation of data processing by forming and executing queries to the content of ontological models. The use of the results of categorical-ontological modeling allowed to reconcile the interests of active agents of the organization-technical systems, the subjects of educational activity and the ability of students to acquire the necessary knowledge and skills.

## 1 Introduction

The speed of renovation of engineering and technical knowledge and competencies is steadily increasing. In most industry sectors there is a decrease in the time of the innovation cycle – the time between scientific development and the introduction of technology in production. This is especially true in the field of information technology (IT) education. Technical skills are also rapidly evolving. Many students currently studying in university will eventually work for professions that do not yet exist, and the skills they will have to possess are not yet defined. For many students, re-training will become a common practice, as we enter into an era of continuing education. At the same time, engineering problems and tasks themselves change in connection with the penetration of technology into all spheres of life and economy. Technical systems become more complex and interconnected. Solving these problems and managing such systems requires new approaches that take into account not only their technical component but also their impact on social, environmental, economic and other aspects.

At present, educational strategies for the development of STEM-STEAM-STREAM education [1] have been developed in technologically developed countries and include various specialized programs for different levels of education, designed as a set of interdisciplinary integration approaches for each STEM discipline. STEM-based teaching methods are aimed at addressing the challenges of multidisciplinary education through deeper understanding of subjects related to different natural sciences, united in one educational program.

In order for students to learn to take non-standard, creative decisions, it is necessary to include the components of STEAM (Science, Technology, Engineering, Arts and Mathematics) in education. This is especially important when using multidisciplinary training programs combining natural sciences and other disciplines [2]. The international educational project ERASMUS+ "Innovative Multidisciplinary Curriculum in Artificial Implants for Bio-Engineering BSc/MSc Degrees" is carried out at the Department of Computer Information Technologies of the Donbass State Engineering Academy (DSEA). ERASMUS + project "BIOART", which also includes a four-party contract and cooperation between DSEA, Zaporizhzhia National Technical University, the state institute "Sytenko Institute of Spine and Joint Pathology National Academy of Medical Sciences of Ukraine" and PJSC "Motor Sich" (Zaporizhzhia) in the field of improving of medical products design and education.

The agreement on cooperation with the Donetsk Physical-Technical Institute of the National Academy of Sciences of Ukraine (Kyiv) and the PJSC "Motor Sich" have been concluded for the expansion of cooperation with the scientific institutions and universities of Ukraine, the development of creative connections and the implementation of joint work. Such cooperation fully corresponds to STREAM technology and allows complex formation of key professional, social and personal competences of young people.

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It is known that STEAM technologies determine the educational organization's strategy and determine the educational process, as well as the technologies used in its organization. For the effective implementation of the principles of STEAM and enhancement of students' motivation, a continuous improvement of the structure of the educational process is required, based on the development of e-learning methods using modern information and communication technologies and global networks [3, 4]. It is also necessary to improve the content of disciplines that provide the knowledge, skills and competence of graduates.

The totality of knowledge and skills that a student receives in the process of learning taking into account applied technologies forms a model of the learning process that more or less corresponds to the model of future professional activity. Therefore, the development and improvement of the content of education should be based on an analysis of the directions of technology development in the subject area of expertise. The time of replacement of standards should correspond to the time of the life cycle of existing concepts and technologies at the time of its adoption, taking into account the prospects for the development of this subject area. The complexity of performing these tasks requires constant research in this area, which results in recommendations for improving the content of the educational process of training specialists in the field of information technologies [5, 6], as well as new technologies for training and knowledge control [7, 8].

The competent approach to the organization of the educational process and the mandatory consideration of requirements for the training of specialists from the enterprises and organizations in which they will carry out their professional activities, requires the development of a comprehensive model of processes taking place during training, and objects taking in their participation, based on high-level abstractions.

An important basis for the information support of engineering activities is the effective presentation of knowledge about the work of the subject area (SA) and the standardization of tasks and educational process based on ontological models of investigated SAs. In the process of learning, students acquire knowledge in the field of future professional activities. Some of them are fundamental, and some are aimed at the development of modern technologies and tools for professional work. Providing the necessary correlation between these parts determines the effectiveness of learning. Both parts change in time, the field of activity of the corresponding specialty expands [5, 6].

In these conditions, it is necessary to constantly clarify the boundaries of the field of specialists, the allocation of new branches of knowledge. All this requires constant replenishment of knowledge and skills of the graduate in the subject area and adjustment of the educational process. The solution to this problem will improve the competitiveness of graduates in the labor market. Taking into account these tasks, the future of higher education is connected with the processes: integration of education, science and innovations; the use of technologies based on the participation of students in innovation activities, research works, etc., which provides a competent approach to education [5], the growth of knowledge and skills through the active participation of students in the process of education.

An important basis for informational support of engineering activities is the effective presentation of knowledge about the work of SA and standardization of tasks and educational process on the basis of ontological models of investigated SAs [9]. This approach allows formalizing the available knowledge for each, including complex, organizational-technical system (OTS). The advantage is the ability to separate models of knowledge from algorithmic and software that uses these models in the process of data acquisition and processing. The use of ontology editors and ontology model exchange formats allows to adjust and scale such models in manual and automated mode, in the process of changing goals and tasks of data processing or the conditions of the OTS [10, 11]. An ontology can be used for automatic deduction in axioms and application of methods of artificial intelligence. An important feature of ontology is the presentation in one model of not only generalized, conceptualized knowledge, but also actual information, results of operational accounting in the SA [12].

High-level SA modeling allows to reconcile the interests of active OTS agents, subjects of educational activity and the ability of students to master the necessary knowledge and skills. However, an ontological model, which is constructed in general terms on the basis of accumulated data on the work of SA, has a number of significant disadvantages. When designing it, an analyst should not be guided by formal rules and restrictions. Ability to perform verification of the ontological model provides categorically-ontological (CO) modeling [13–15]. Its essence is to use the method of verification of ontological models in the process of knowledge engineering on the basis of objects of the category theory and their relations. The application of such a method introduces the mathematical foundations into the process of knowledge engineering, provides verification of the results of conceptual modeling based on the evidentiary power of topological design patterns [16, 17].

In the process of learning, students acquire knowledge in the field of future professional activities. Some of them are fundamental, and some are aimed at the development of modern technologies and tools for professional work, as well as taking into account the specifics of a specialist within the framework of SA. Providing the necessary correlation between these parts determines the effectiveness of learning. Both parts change in time, the field of activity of the corresponding specialty expands.

The purpose of the work is to use an ontological approach to formalizing knowledge about the educational process during the formation of multidisciplinary educational programs for the education of bachelors and masters in the field of information technologies with different training specializations.

## 2 Categorical-ontological modeling of the subject area of the formation of multidisciplinary educational programs

The methodology for choosing information support for the structure and content of educational and professional programs is based on the following main components: world-class documents aimed at improving the education system as a whole, in particular [6]; laws and documents regulating the educational process in the state [18, 19]; educational standards and recommendations of professional associations (ASME, ACM, AIS, IEEE, ABET, etc.) [20, 21], which reflect the state of development of science, technology, and industry in this area of professional activity. For the information content of the program and disciplines, these documents are of particular importance so that the disciplines of educational programs include the study of advanced technologies in the field of professional activity of students and can be adapted following the development trends of this subject area.

The taxonomy of educational activity developed on this basis with selected features and their meanings is shown in figure 1. Concepts and relationships between them, shown in this figure, reflect the structure of educational activity. The department is part of the university and prepares students for a specialty corresponding to its profile, scientific, personnel and material and technical resources. The specialty of training specialists and masters allows future employees who have received the required qualification level to participate in the implementation of a certain type of economic activity, performing professional duties in accordance with the job description of their workplace. Using their professional skills, employees perform various work functions, which are generally distributed by type (research, control, design, technological, forecasting, organizational) and levels (stereotyped, operational, technological, research).

In the process of implementing the work functions, the workers (bachelors and masters) perform various tasks of activity, which also differ in types (professional, social, production, social, etc.). Qualitative performance of such tasks must be ensured by appropriate knowledge and understanding of production and scientific tasks and algorithms for their solution. From the viewpoint of educational activity, the functions and tasks of future employees should be ensured by the formation of students of different competencies. Competences are accordingly supported by the skills formed during the study of disciplines of different cycles.

The formed skills determine the volume and content of educational disciplines and vary by type (subject-practical, subject-intellectual, sign-practical, sign-mental) and the level of formation (the ability to perform actions on the basis of material media, at the expense of constant mental control, automatically on skills levels, etc.) [5, 6].

Thus, the development of the content of masters training in the field of IT requires the consistent implementation of the following tasks:

- the formation of typical production functions in accordance with the classifier of occupations and types of economic activity;
- determining the preparation level of bachelors or masters for the fulfillment of these functions and key competencies for this educational-qualification level;
- development of these competences for the field of professional activity;
- the formation of skills that differ from the requirements for bachelor's "level of formation" abilities;
- development of the composition and content of disciplines, within which formed the necessary knowledge and skills.

Consider the mathematical apparatus and methodology for modeling the subject area, which were used in this study. Today conceptual models based on category theory (CT) are actively introduced for solving practical tasks in physics, biology and what is more important for the subject in hand in computer science. Category theory provides means to implement knowledge engineering and to support life circle of knowledge bases on mathematical basis using objects, morphisms and their solutions. Such objects and solutions that form commutative diagrams [17, 22] can be used as typological design patterns for conceptual models. Thereby using this approach an analyst can justify the correctness of modeling results, when knowledge is formalized in the form of ontological models as one of the closest in type to diagrams of category theory. Apart from that the approach enables to find missing objects or morphisms in a particular ontological model as well as ontology alignment using rigorous mathematical tools.

Sketch theory is a logical development of category theory [23–25]. When the two theories are used together analysts can develop mathematical constructions using such a descriptive picture format as graphic charts. At the same time correctness and adequacy of categorical models are established on the basis of axioms and theorems of category theory.

When such an approach is implemented in the form of verification technique of a particular ontological model, analyst formalized concepts, relations and restrictions are presented as rigorously mathematical. It is implemented through placing restrictions of category theory on elements of an ontological model. The restrictions of category theory are described by axioms and theorems of the theory. Let us consider the developed technique on a simple example from a subject area "Task modeling of intellectual processing and data analysis". Concepts and relations between them that characterize a IDP task description aspect and manipulations with data according to the IDP aim and expected systemic impact are provided in figure 2. Let us call a model free of any restrictions on relations between class samples presented by utilized concepts as a particular ontological model. It presents a particular piece of knowledge of an analyst in terms of a considered aspect of a subject area and one of the options of possible formalization (the extent to which it is correct

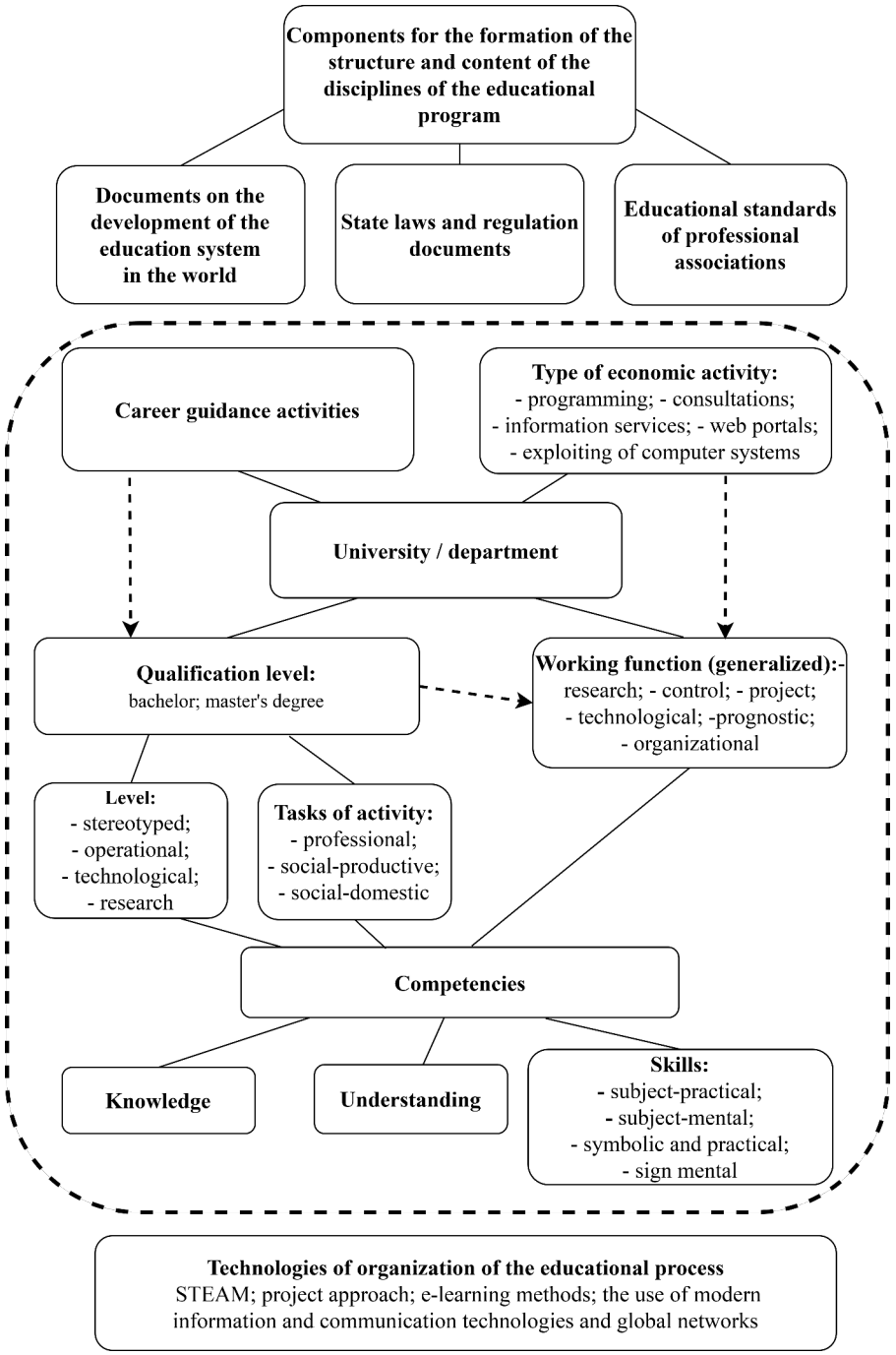


**Figure 1.** Taxonomy of educational activity with selected attributes of concepts.

depends on many circumstances and the result can not be mathematically verified).

The diagram in figure 3 has been obtained as a result of application of the verification technique based on category theory. The diagram is a category theory commutative diagram constructed in accordance with the graph in sketch theory [22, 25]. Arrows used in the diagram represent morphing objects in category theory. Commutative property means equal ways (composition of morphisms) that are used to display some concept samples in others.

When a particular ontological model is developed no restrictions on types of relations between concepts except for subject area semantics (according to the way the analyst understands it) are placed. Thanks to commutativity and using category theory notions the analyst has managed to put aside some relations and either reconsider or add other relations. Diagram presented in figure 3 has been developed on the basis of “pushout” typological pattern marked on the diagram with “PO”. In category theory it is described mathematically and its properties are substantiated including the so called universal property. The application of the property has enabled to discover “achieved-through” morphism that makes the whole diagram commutative. The morphism is very important for the seman-

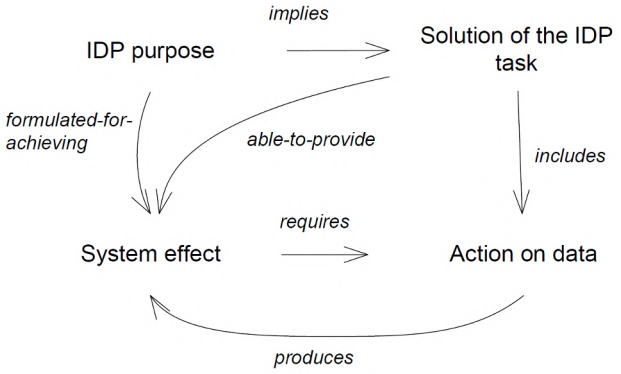


**Figure 2.** A piece of particular ontological model for solving the task of intellectual processing and data analysis in general terms.

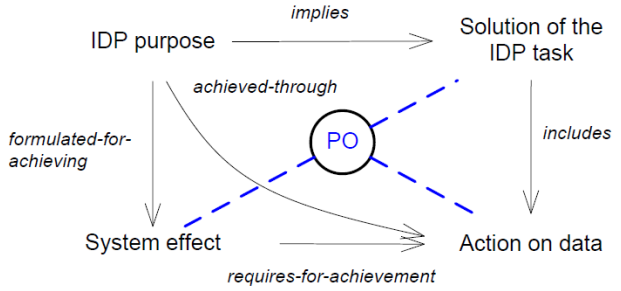


**Figure 3.** A commutative diagram for a piece of ontological model to address the IDP tasks verified on the basis of category theory [26].

tics of the subject area. The establishment of such restrictions corresponds to development of cones and cones for commutative diagrams [23, 24]. Similarly, this approach proposed by the authors can be applied to formalize knowledge and modeling in other subject areas. Researchers can use this approach to verify subjective ideas about the processes and objects that participate in them, as well as about the transformations that these objects undergo.

It was carried out the development of categorical-ontological model of the SA "Contents of education, presentation of knowledge and process of learning". High-level modeling allows to reconcile the interests of active agents of the OTS, the subjects of educational activity and the ability of students to master the necessary knowledge and skills. Figure 4 shows the model of the SA developed within the framework of this work, the content of education, knowledge representation and training, using the possibilities provided by the SA modeling. An approach within the theory of categories in the simulation of this SA allows abstracting from the internal structure of individual objects of a verified ontological model, as a category, and the physical content of morphisms that map objects on each other, as well as to determine the minimum necessary transformations of data and models based on topological properties of the category. This model uses objects of category theory (pushouts "PO" and coproducts "+" on the figure) [13, 17].

For the category A the coproduct $X_1 \coprod X_2$ of two objects $X_1$ and $X_2$ with two morphisms-injections $X_1 \xrightarrow{i_1} X_1 \coprod X_2 \xleftarrow{i_2} X_2$ such that for any given object and two morphisms $f : X_1 \to Z$ and $g : X_2 \to Z$ there is a unique morphism $\alpha : X_1 \coprod X_2 \to Z$ which does the commutative corresponding diagram is defined.

Pushout for two morphisms $\alpha : A \to B$ and $f : A \to C$ is an object $D$, and two morphisms $d_1 : B \to D$ and $d_2 : C \to D$, which generate the corresponding commutative diagram, and for all objects $D'$ with morphisms $d_1' : X_1 \to D'$ and $d_2' : C \to D'$ there is a unique morphism $d' : D \to D'$.

The SA model reflects the requirements of educational standards to the assimilated amounts of knowledge and the results of mastering skills in the process of acquiring the competencies required by the OTS for the implementation of various types and tasks of economic activity by students. However, this model also includes a factor limiting the learning process to learner's ability to perceive knowledge and skills, as well as methodological and organizational capabilities of the educational process (represented by the object "Student image in the education system") in the process of achieving the required qualification level.

Consider based on the ontological approach the requirements for the content of education and the process of developing a multidisciplinary educational curriculum for masters in the field of information technology. Such analysis allows to structure the information about the educational process and provide a coherent image of ensuring its quality. The advantage of ontological models is also the flexibility in the process of their development and modification [10–12].

Data for the ontology design during the formation of higher education standards for various specialties and levels of training are contained in the requirements of the Ministry of Education and Science of Ukraine (MESU) for the development of standards and other documents regulating the process of education in higher educational institutions [27]. The high-level ontology of concepts was developed that describe the essence of the educational process and the relationship between them. The fragment diagram of such ontology is shown in figure 5.

The developed models of SA standardization of educational process based on the competence approach was used in the formation of the Education Standard for the preparation of masters of the specialty "Design Information Technologies" (DIT, now "Computer Sciences") in the course of the work of the relevant commission of the MESU. The ontology for the information support of the developed standard, verified with this categorical-ontological model, was also developed. In the process of forming and agreeing sections of this standard, the primary positions at which magistrates may work, the competencies that are expected from employees at such positions, and the skills displayed by such competencies are defined.

On the basis of the ontological approach to the modeling of business processes taking place in the subject area

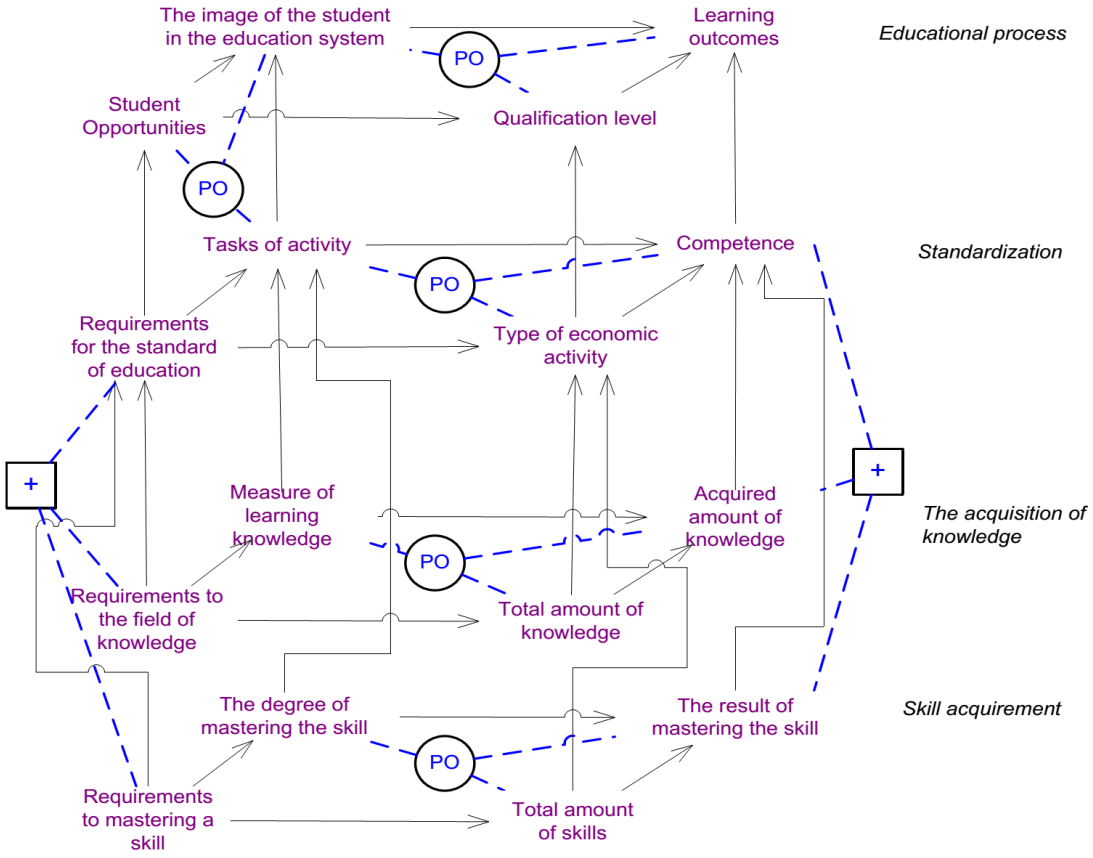


**Figure 4.** Categorical-ontological model of the subject area "Contents of education, presentation of knowledge and learning process".

"Master's training in the field of DIT", and using the developed taxonomy of educational activities, the content development of the disciplines of the specialty DIT was completed. In accordance with the proposed methodology, on the basis of economic activity types supported by the specialty and the work duties of the corresponding qualification level, a list of competencies to be formed for students in the framework of the educational process was determined. Subsequently, for the necessary competencies, skills were identified which should be formed when studying the topics (sections) of the relevant content modules of the professional training of masters in the field of DIT.

## 3 Results of ontological modeling of competencies and construction of queries to the model

The proposed classification of competencies and the high-level terminology of the subject domain "Knowledge and skills for product design" were presented in the form of an ontological model. Object Properties of this model, which map different concepts on each other, are based on the results presented in figures 1–3. This model, described in OWL / RDF [28], was implemented using the ontology editor Protégé [29]. Its terminology (TBox fragment) is visualized using plug-ins Protégé VOWL and OntoGraf [30]. The results of the visualization are shown in figure 6 and figure 7.

The extensional (ABox fragment) implementation within the framework of the obtained model allows using it to extract information when making decisions on the development of specific trajectory educators in educational institutions. Table 1 shows examples of query generation for this ontological model on SQWRL [31]. This query language based on first-order logic allows to obtain the necessary information on the results of processing the ontological models described in the OWL language.

Clauses of SQWRL queries use concepts from the TBox of an ontological model and some special expressions [32]. The results of the execution of these queries allow the decision-maker to support his activity. Experimental verification of the proposed approach and the developed software package was carried out for the subject area of the BIOART project. For this project an artificial implant is the technological product for which the necessary competencies and the corresponding educational content are selected using queries to the ontological model. Figure 8 shows a fragment of the individuals of entities of the applied ontology of the subject area "Master's Degree of IT in Medicine", which specifies some of the masters expected from the IT skills that provide professional competence, as well as the production skills of graduates as employees in the field of information-communication technologies in medicine (for the artificial implant design).

Modern implants are complex products that include mechanical parts and electronics. The task of the implant

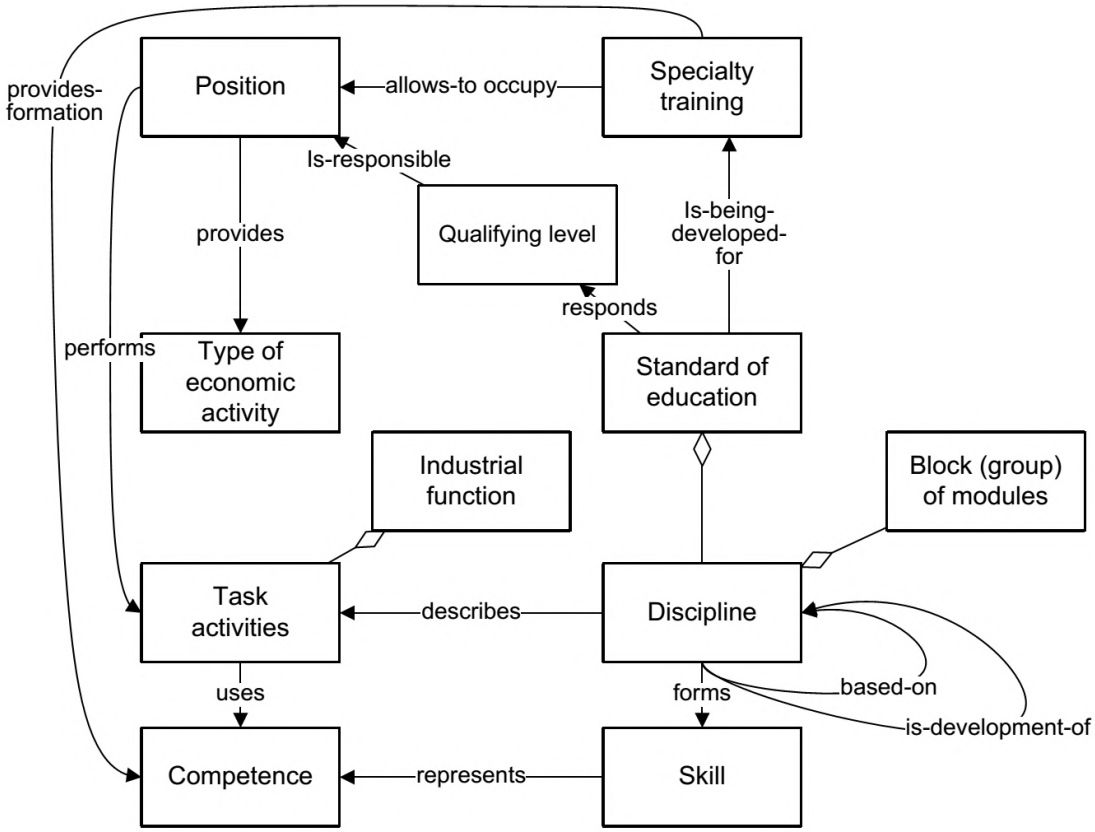


**Figure 5.** A fragment of the ontology for the subject area "Educational process", which was developed using categorical-ontological model.

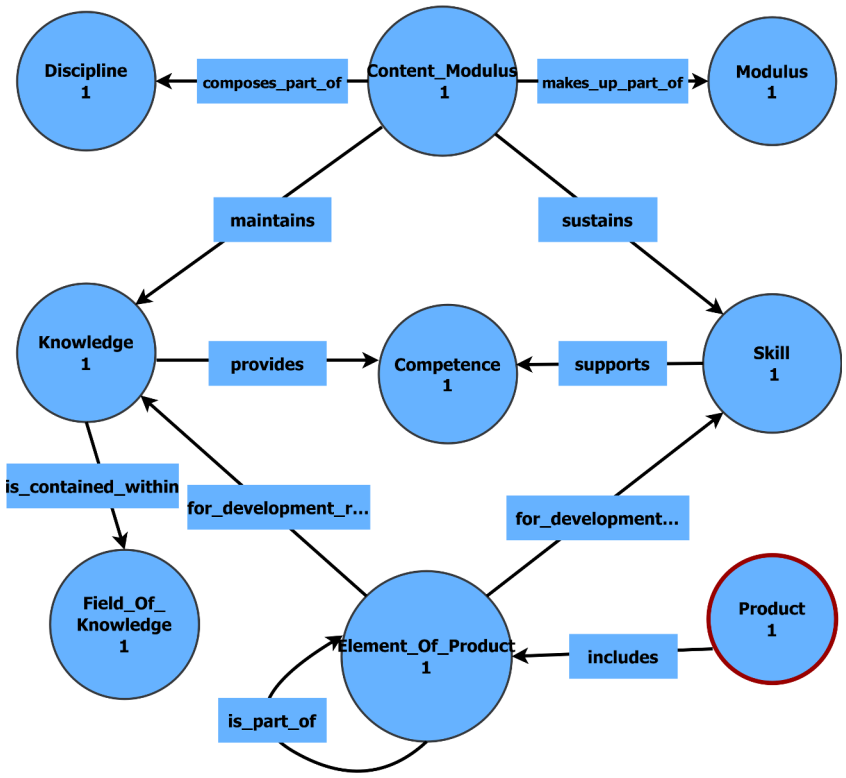


**Figure 6.** Visualization of the ontological model of the subject area "Knowledge and skills for product design", described in OWL / RDF using the plug-in Protégé VOWL.

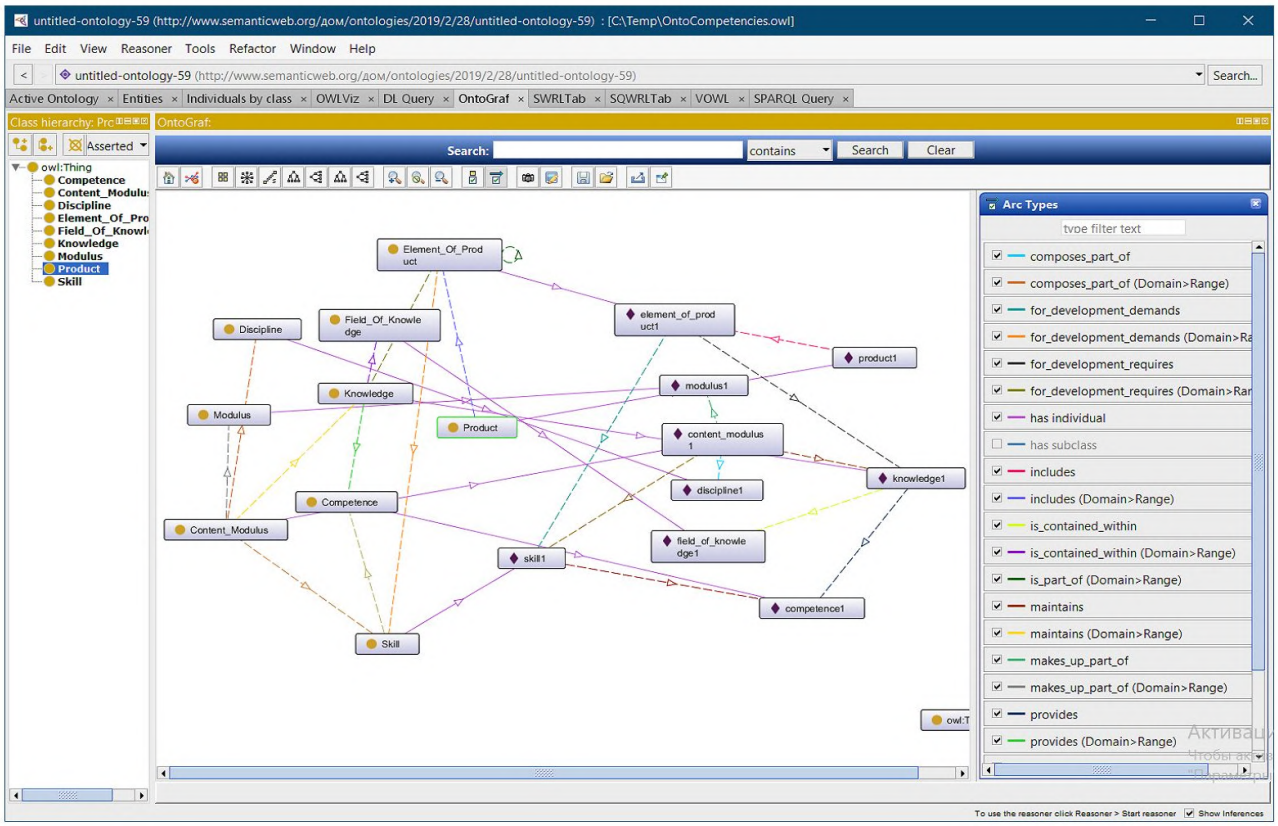


**Figure 7.** Visualization of the ontological model of the subject area “Knowledge and skills for product design”, described in OWL / RDF using the plug-in Protégé OntoGraf.

**Table 1.** Queries to the ontological model of the subject area “Knowledge and skills for product design”

| N | Queries in natural language | Queries in SQWRL |
|---|---|---|
| 1 | What competencies do students need to develop the specified technological products, taking into account relevant skills that require such competencies? | `Product(?p) ∧ Element_Of_Product(?e) ∧ Skill(?s) ∧ Competence(?c) ∧ includes(?p,?e) ∧ for_development_demands(?e,?s) ∧ supports(?s,?c) -> sqwrl:select(?s,?c) ∧ sqwrl:columnNames("Skills", "Competencies")` |
| 2 | What competencies do students need to develop the specified technological products, taking into account relevant knowledge that supports such competencies? | `Product(?p) ∧ Element_Of_Product(?e) ∧ Knowledge(?k) ∧ Competence(?c) ∧ includes(?p,?e) ∧ for_development_requires(?e,?k) ∧ provides(?s,?c) -> sqwrl:select(?k,?c) ∧ sqwrl:columnNames("Knowledge", "Competencies"))` |
| 3 | What competencies do students need to develop the specified technological products, and which disciplines provide for such competencies? | `Product(?p) ∧ Element_Of_Product(?e) ∧ Knowledge(?k) ∧ Skill(?s) ∧ Competence(?c) ∧ includes(?p,?e) ∧ for_development_requires(?e,?k) ∧ provides(?k,?c) ∧ supports(?s,?c) ∧ Content_Modulus(?cm1) ∧ sustains(?cm1,?s) ∧ Discipline(?d1) ∧ composes_part_of(?cm1,?d1) ∧ Content_Modulus(?cm2) ∧ maintains(?cm2,?k) ∧ Discipline(?d2) ∧ composes_part_of(?cm2,?d2) ). sqwrl:makeSet(?set,?p) . sqwrl:groupBy(?set,?p) -> sqwrl:select(?c,?p,?d1,?d2) ∧ sqwrl:columnNames("Competencies", "Product","d1","d2") ∧ sqwrl:orderBy(?c)` |

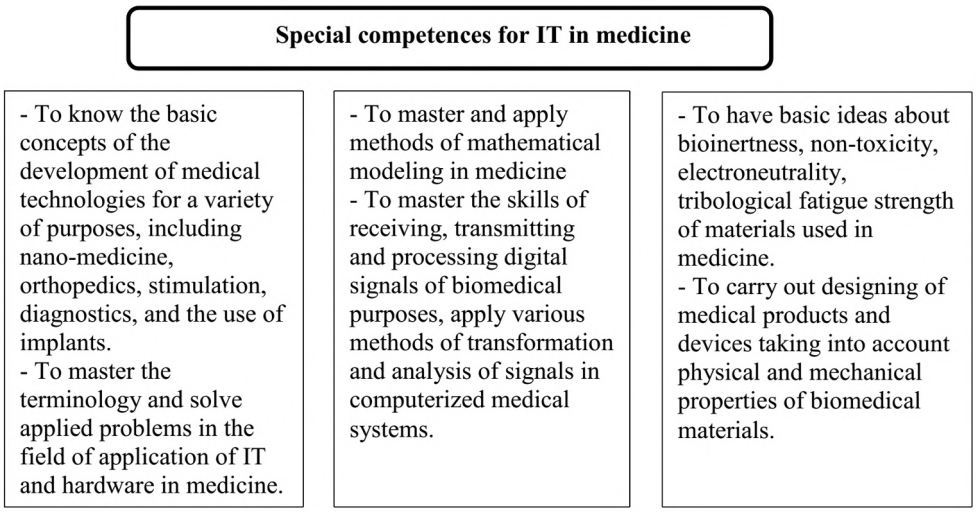


**Figure 8.** Fragment of the ontology of the subject area "Master's Degree for IT Specialty in Medicine" (for the artificial implant design) [2].

mechanical part is to ensure the strength of the structure, its kinematics, and the longevity of the work after installation to the patient. Electronics allows you to control the parameters of a person and an implant, as well as transmit the necessary information for storage in a control system or for controlling an implant. The third component of the overall system is the software subsystem, which ensures the joint operation of its elements, the logic of processing the received data. The competencies that students should receive on the basis of the developed curriculum should be grouped and formulated in accordance with these components of the implant.

The results obtained above and the application of the ontological approach allowed to properly formalize the knowledge of business processes in organizational-technical systems involved in the development and production of biomaterials, measuring and control devices and technological processes for the receipt and use of implants. The categorical-ontological model of the educational process standardization, developed and presented above, has helped to identify and formulate requirements for the content and scope of the acquired knowledge and the results of the acquisition of skills in the process of acquiring the students the competencies necessary for the implementation of the types and tasks of economic activity in the field of bioengineering, as envisaged by the project BIOART.

## 4 Conclusions

1. It has been determined that an important basis for information support of engineering activities is the effective presentation of knowledge and standardization of training tasks based on ontological models of investigated subject areas. The competence approach to the organization of the educational process and the requirements for the training of specialists from the part of enterprises and organizations, in which they will carry out their professional activities, requires the development of a comprehensive model of learning processes and objects that participate in them, based on high-level abstractions.

2. The presentation by the categorical-ontological approach of competences, skills and knowledge for the implementation of the educational process in the preparation of masters in the field of information technologies in medicine allowed to systematize the plans and content of training, to develop a draft standard and its methodological support. The list of competences to be obtained by a student who will be trained in the courses and disciplines of the bioengineering profile developed within the framework of the BIOART project is proposed and substantiated.

3. Thus, on the basis of the results obtained in this work, the methodology of informational support of engineering activities was further developed on the basis of: the construction and use of relevant ontologies and knowledge bases, organizing the learning process and standardization of education based on a categorical-ontological approach.

4. Within the framework of the development of STEM-STEAM-STREAM education, a number of scientific works are carried out on the DSEA, students study engineering disciplines that are necessary for the formation of a modern engineer and specialist in the field of information technologies. In the process of learning, students master a number of technologies that are the basis for the implementation of modern software systems for various purposes: for engineering, medicine and other fields of activity. The use of the results of categorical-ontological modeling of the SA allowed to reconcile the interests of active agents of the OTS, the subjects of ed-

ucational activity and the ability of students to acquire the necessary knowledge and skills.

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# Modeling of ecophobic tendencies of consciousness of higher education students

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**Abstract.** The article reveals the peculiarities of the formation of strategies for the development of ecological consciousness (ecophilic educational strategies) of higher education students on the basis of digital models of ecophobic tendencies (intentions, values). Based on the application of the developed "Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial epoch"" an experimental study of ecophobic and ecophilic intentions and values of higher education students. This mini-questionnaire reveals the environmental aspects of consciousness by actualizing the culture and psychology of everyday life. Based on the application of digital and mathematical modeling, ecological and value comprehension of the results of experimental research conducted using this mini-questionnaire, a model of "Archaic ecophobic intentions and values" was formed. This model contains the following digital models: "Matrix of coefficients (weights) for determining ecophobic intentions and values" and "Cluster model of ecophobic intentions and values". Based on the application of these digital models, the concept of sustainable development and other concepts and approaches, three ecophilic educational strategies have been developed: "Synergistic strategy of personal security through care for the Earth"; "Strategy for harmonization of needs based on care for the Earth"; "Strategy for harmonization of human-Earth interaction". When using the "Matrix of coefficients (weights) to determine ecophobic intentions and values" determines the system-organizing value and the dominant influence of the "Synergistic strategy of personal security through care for the Earth". This strategy has a genetic and semantic connection with the basic vital (vital) value – food security (individual and collective). The application of this strategy can be relevant in educational theory and practice and in everyday life (life, work) to optimize and minimize human needs.

## 1 Introduction

The use of digital models in education is a direction that is correlated with the goals of sustainable development, in particular the 4th ("Quality Education") and the 9th ("Industrialization, Innovation and Infrastructure") [1]. As modern innovative technologies, digital and mathematical models are actively used in education: in health pedagogy in order to prevent the development of heart disorders in physical education classes ("Hemodynamic digital models") [2], in mathematical ecology [3] etc.

In the 21st century, there are ecologically oriented changes in the consciousness of Homo Sapiens, which contribute to the transformation into Homo Ecologikus [4]. Consciousness is totally and systematically changed on the basis of a system of ecological values and intentions. In relation to the "ecologically-revolutionary" and "ecologically-constructive" ideas of A. Peccia [5], we consider these ecophilic changes in the consciousness of modern man as a defining and system-organizing spiritual-mental and socio-cultural condition for achieving sustainable development goals [1] and accordingly as such that can ensure the existence of humanity and the planet Earth. In this aspect, the ideas of ecologically and socially oriented changes in the capitalist way of life are presented in the report of E. U. Weizsäcker and A. Wijkman to the Club of Rome [6]. Speaking about the relevance of ecologically oriented transformations of human consciousness and socio-cultural sphere, the decisive factor is the thesis presented in the "Human Development Report 2020" [1]: "The report calls for a just transformation that will expand human freedoms while reducing the global burden".

From an anthropological standpoint in this aspect as an important methodological condition is the need to take into

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account the phenomenon of human consciousness. Man and his consciousness are a central and determining factor in socio-cultural, technological and environmental transformations. A certain type of consciousness and as its components rationality, values, intentions are inherent in a certain type of person and, accordingly, is determined by epoch, culture, religion, technological and socio-political systems. Accordingly, there is the influence of consciousness on the world and socio-cultural sphere. That is, considering the problem from an anthropocultural standpoint, we can say that there is a mutual influence and determination in the system "consciousness – culture". A significant component of consciousness are typical ideas, attitudes, values, intentions, stereotypes, cognitive schemes, mythologies that are primarily primary and "natural" are manifested on a daily, "everyday" and everyday levels.

Man is a creature that exists primarily in "his daily life". Everyday life is considered as a component of the life world "Lebenswelt" (according to E. Husserl) [7] and as its structuring principle. Everyday life is accordingly manifested in all spheres of human life activity. In M. Heidegger's system of defining existentially oriented ideas, Husserl's "Lebenswelt" (Life World) is represented as "Alltäglichkeit" or "alltägliche Lebenswelt" ("everyday life") and "everyday life".

In this study, consideration of the development of environmental consciousness from anthropological and value positions determines the need for its understanding in the framework of anthropology [8–11] and the psychology of everyday life, as such, which is a manifestation of sociocultural and communicative nature of man [8]. F. H. Tenbruck [11] considers everyday life as a "representative culture" that is recognized and perceived. It is at the level of everyday life that "naturally" and "authentically" system-organizing intentions, values, meanings and ideas are formed, formulated, comprehended, exist and transformed, which often become strategic and defining in human life and professional, sociocultural and environmental activity.

Given the inertia of socio-cultural processes, we actualize the need to analyze ecophobic trends present in the minds of modern man. Ecophobic as well as ecophilic tendencies [12] have been characteristic of many traditional societies. They manifested themselves most in the modern era in the format of an industrial technological-technocratic society, which carried out an active, systematic and constant "attack" on nature and the Earth. To some extent, the "eternally new" idea of linear and "constant" progress, as well as the corresponding sociocultural, technical, industrial and economic achievements, as well as socio-political and cultural catastrophes manifested in the format of wars and revolutions can be interpreted as a manifestation of ecophobic tendencies. Which in the collective and individual consciousness has existed since ancient times. Accordingly, in this aspect, the essence that must be perceived and understood is not only environmental activities, but above all the preservation of the planet [1] including biodiversity, climate catastrophe prevention and significant climate change [13] and others.

Accordingly, to achieve the goals of sustainable development [1] by forming environmental consciousness determines the need for diagnosis, understanding and correction of ecophobic tendencies (in the sense – values, attitudes, intentions, stereotypes, mythologists, etc.) of modern human consciousness. Knowledge of the specifics of ecophobic tendencies is a necessary cognitive and value prerequisite for the development of "symmetrical" ecophilic educational strategies, as those aimed at the formation of environmental awareness and the greening of education and socio-cultural sphere. Relevant in this aspect is the diagnosis, consideration and digital representation of models of ecophobic tendencies of consciousness as a specific system of values (anti-values), intentions and attitudes. The defining aspect of this study is the educationally and competence-oriented greening of socio-cultural space, including collective and individual consciousness. Now greening is one of the defining and system-organizing areas of modern science and culture. The problems of greening of education, culture, including consumer, management and business are reflected in the studies of S. D. Fassbinder [14], J. Isakova and M. Pchelnikov [15], I. Zaharia and S. Zaharia [16], S. Dutta [17]; O. V. Mudrak et al. [18]; M. B. Yevtuch et al. [19].

This paper presents the results of a study of students of higher pedagogical education, including postgraduate. The relevance of the choice of this category of persons who are socially active is due to the fact that due to the peculiarities of professional activity, they are considered as potential carriers of environmental awareness. In relation to the realization of the goals of sustainable development [1], future teachers and working teachers are considered as agents of change.

In the scientific pedagogical literature, the issue of constructing digital models of development of ecological consciousness of students of higher education institutions, including the development of educational ecophilic strategies based on the study of ecophobic tendencies (intentions and values) is insufficiently covered. Given the importance of this problem for the greening of education and the implementation of sustainable development goals, it is defined as relevant.

*The purpose of the study*. Modeling of ecophobic tendencies of consciousness of higher education students.

## 2 Methods of the research

The following methods were used in the study: environmental [1, 18–20] anthropological [4, 10, 11, 21] culturological [22], psychological [23], competence, problem, axiological, transdisciplinary, ethological [24], humanistic.

Applied ecological, anthropological and pedagogical concepts: sustainable development [25]; greening [15, 17, 19] new humanism; the doctrine of functional systems of P. K. Anokhin [26]; human nature [27], observance to the full extent [27], nous (mind, thought, intelligence) [27], harmony [27], care of one self (epimelesthai sautou) (interpreted by M. Foucault) [27, 28].

*Use of own methodological developments*.

Using the methods of mathematical and computer modeling, and anthropological and ecological concepts, a model of "Archaic ecophobic intentions and values" was developed (see "Results"). This model is also formed on the basis of the application of the Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial era". This model is the basis for the formation of ecophilic educational strategies.

*Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial era"*:

1. Are there harmful animals and plants that need to be destroyed so that nature is cultivated and developed for the good of man? (Yes / No / I don't know)
2. Swamps should be drained if possible so that there is more land and harmful microorganisms and animals are not bred in the swamps? (Yes / No / Don't know)
3. Is the world created to meet the needs of mankind? (Yes / No / I don't know)
4. To provide humanity with food, it is necessary to win back land for agricultural land in the wild. Is this an indicator of the development of civilization? (Yes / No / I don't know)
5. Wild plants and animals that cannot be used for food and for the needs of industry are not needed and occupy a place in nature where there could be useful species? (Yes / No / I don't know)

The mini-questionnaire consists of five questions. This minimized number of questions is due to many factors. The mini-questionnaire questions reflect typical phenomena that reveal traditional for industrial societies of modern ecophobic cultural trends and behavioral patterns. Accordingly, these systemic issues also reveal typical ecophobic ways of concentration and formation of meanings. There are relatively few such typical ways of conceptualization, so the number of questions in the questionnaire is insignificant – 5. An important factor is the appeal in matters of mini-questionnaire to the culture and psychology of everyday life in which accumulate both ecophobic and ecophilic traditions, values, interpretations. In turn, ecophobic tendencies deposited in everyday life can be revealed in issues that are concise, "simple" at first glance, conceptualizing and that do not "overweight" with their number.

The purpose of this survey was to identify at the level of "everyday consciousness" (attitudes, ideas and trends) [8–11] defining and system-organizing ecological values and their antipodes – anti-values, intentions, interpretations, metaphors. Ecophilic values in this mini-questionnaire are represented by the kingdom of plants and animals and the "unique" authentic landscapes of the Earth, including, for example, swamps, as well as the world as a whole.

Anti-values that are typical of the industrial age are represented in the format of expansive growth and primitive and pragmatic notions of useful and harmful to man and to humanity. The emphasis in the representation of anti-values is on the idea of "collective good" (a system of typical ideologues characteristic of totalitarian societies) in the form of food, "common good". Contextually, the idea of "Enemy" in the form of "harmful animals and plants", "useless" landscapes – "wildlife", swamp is also actualized. Congruently to the idea of the enemy the archetype "Warrior" is actualized [23]. These anti-values reflect the archetypal level of consciousness [23] with the corresponding archetypes "Warrior", "Struggle", "War", which manifests itself in the form of war with nature, fears of the unknown and chaos, which are swamp, wildlife, harmful and unnecessary animals, plants, microorganisms.

Ecophilic values are revealed in the mini-questionnaire by actualizing the archetype of "Harmony" and the idea of nous (mind, thought, intelligence) [23]. These ecophilic values are generally more complex and accordingly require a certain level of cognition, prudence, moderation and spirituality. It is more difficult to understand the expediency of a swamp than to see in it a "set' of sewage, moisture and "terrible" animals and pathogenic bacilli.

The mini-questionnaire of "Ecophobic consciousness of the industrial age" is called to illustrate the manifestation of the typical "ecophobic spirit" or the spirit of struggle with nature with the Living, which manifests itself in the form of ideas, metaphors, intentions, values, psychological attitudes of the industrial age. Year, man-made miracles and catastrophes (such as the Chernobyl accident), that is, the total barbaric cultivation "of nature and its transformation into a commodity, a product followed by" exponential "consumption". The ecophobic spirit and the corresponding tendencies of the industrial epoch due to the inertia of socio-cultural processes continue to exist in the modern realities of postmodernism. Therefore, the purpose of the mini-questionnaire is to determine these ecophobic intentions, values, attitudes, ideas and trends of both individuals and their presence in the collective consciousness.

Consider in more detail the conceptual basis of this mini-questionnaire and its in-depth structure (figure 1), which models the existential, intentional, axiological, biological and psychological preconditions and components of ecophobic consciousness. The defining and conceptualizing starting point on the basis of which the mini-questionnaire is developed is the idea that everyday life is considered as a defining and system-organizing dimension of human existence in which both ecophobic and ecophilic tendencies are formed and manifested. Therefore, the mini-questionnaire is formed at first glance on the basis of "simple" and fairly clear questions that reflect everyday life [10, 11]. The next aspect is the existentiality and vitality (vitality) of the issue, which is relevant in the mini-questionnaire questions. The basic contextual ideas, intentions, values and meanings of survival and security of both the individual and the family and the species Homo Sapiens are contextually laid down in the questions.

The number of questions is deliberately limited. This makes it possible to conduct a survey quickly without the active involvement of the intellectual component. It is important to determine the deep existential intentions and values "immersed" in the collective unconscious [23]. As

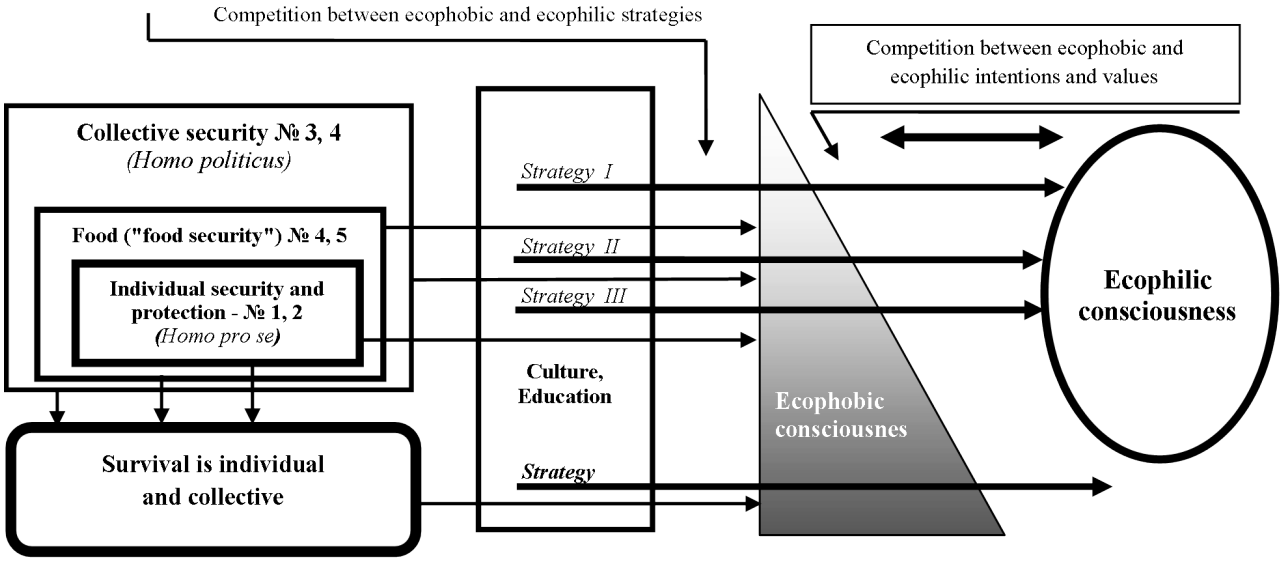


**Figure 1.** Conceptual scheme of the semantic structure of the Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial era". № 1, 2, 3, 4, 5 in the figure indicates the question number in the mini-questionnaire.

noted, the mini-questionnaire is based on the ideas: vitality and survival through protection and safety. These ideas are revealed through: coverage of the problem of vitality by actualizing the safety, protection and salvation of the individual, which is reflected in the first two questions (questions № 1, № 2); presentation of the problem of vitality through the possibility of obtaining and eating food, which in the semantic context includes the problem of preventing hunger and accumulation of resources, wealth which is initially understood and interpreted as food, reflected in the last two questions (questions № 4, № 5); actualization of the issue of vitality and survival, which is revealed through unity with humanity, with the team, in collective security, presented in questions № 3 and № 4. The mini-questionnaire also presents the idea of collectivism, social and cultural nature and the corresponding socio-cultural way of its existence in the "megasystem" "Humanity or within a certain group, through collective survival, including the prevention of dangers and active food production (questions № 3, № 4). Question 4 reflects both individual and collective food security. Thus, the mini-questionnaire actualizes the idea of individual and collective survival and security, including food security. The core of the system of questions and relevant meanings is individual survival by minimizing dangers (questions № 1, № 2) and providing food (questions № 4; № 5). The periphery surrounding the core is collective security. That is, the question is the understanding of man as an individual or in itself – (Latin Homo pro se) and political man (Latin Homo Politicus) (used in the sense as a person in the family, team, collective) and social (Homo Socialis). Such an individualized interpretation of the instincts of preservation and the corresponding basic vital intentions and values correlates with the Western tradition of individualism and liberal ideology.

An attempt is made to actualize in the mini-questionnaire deep, archaic, existential, respectively, "saturated" with mental energy problems, which are included in individual and collective systems of survival and security. To some extent, the mini-questionnaire simulates an archaic consciousness in which the main thing is to survive and "eat". This "archaic" layer of consciousness exists in all people. We present this layer as basic congratulatory intentions and values. By its biosocial nature, it is essentially "pro-archaic" and correlates with behavior determined by the "reptilian brain", which determines the basic biologically determined behavioral strategies – survive and defend, eat, attack, reproduce. These basic life aspirations and strategies are also inherent in animals. In humans, they become decisive and important in crisis situations, in pathology, in the presence of psychological or mental disorders and insufficient socialization and inculturation (human entry into culture). At the same time, man as a teleological being differs from animals primarily in higher goals, values and intentions. Simplification and reduction of man and the reduction of his high aspirations to biological instincts is characteristic of industrial societies, crises of society, wars.

Considering the problem of ecophobic consciousness from an anthropocultural standpoint, it can be noted that education, individual life path and experience can transform these "archaic" or rather "protoarchaic", and in fact biological-psychological survival patterns based on food and protective instincts. in socially, culturally and personally acceptable and environmentally oriented behavior. It is important that this energetically and vitally "saturated" "archaic layer" of consciousness (more precisely the subconscious) is represented by basic vital intentions and values, which is responsible for food, sexual and protective behavior can actively influence decisions and ways of life. Accordingly, basic vital intentions and values can also largely determine ecophobic tendencies of consciousness and behavior, representing them as personally signifi-

cant and acceptable, as well as contribute to the formation of ecophobic orientation of consciousness and personality. These anthropobiological ideas and ideas on the basis of which the mini-questionnaire was developed, are primarily formed on the basis of knowledge that human conservation instincts (food, protective, sexual) and their corresponding behavior are not aimed specifically at conservation – environment, biodiversity or planet Earth. The logic of nature is clear – an individual using biologically defined ways of survival and existence will not be able to cause significant harm to the environment. In fact, the individual as well as the group (ethnic group, tribe) without the use of technology and science and the necessary social and cultural organization have a very limited and local impact on nature and the Earth.

At the same time, we can talk about the "ecophilic nature of man", which is revealed and manifested precisely through culture. Hypothetically, this can be seen as a "socio-cultural instinct to preserve the environment", which still needs to be identified and explored as a separate phenomenon, provided that it exists as such. This is just a hypothesis.

Thus, the mini-questionnaire reflects the "ecophilic neutrality" or indifference of human nature. This human "ecophilic neutrality" in interaction with the environment may acquire a certain ecophobic "color" and direction. This is due to the fact that nature, environment, Earth for living beings as well as for man is a background and a given. Accordingly, man naturally perceives the environment as an inexhaustible resource and as such a "compatible being of the World", which is infinite and exists always and "forever". Thus, the environment and the Earth are not initially included as an actual component of the defining intentions and significance for man in his biological, existential and "pre-cultural" or "non-cultural" state. Such states of "ecological savagery" can also exist in the context of socio-cultural adaptation of a person due to the fact that the ecological dimension and significance and value of preserving the Earth and the natural environment in culture are not purposefully updated, and contextual ecological meanings are absent or minimal.

The mini-questionnaire represents a layered structure of intentions, values, motivations, attitudes, which are both anthropobiologically determined and existential. We can discuss what should be at the core – food, collectivism (collective security) or individual protection and security. It depends on age as a person, on cultural and historical specifics, situational factors, features of education and upbringing, which actualize and make more significant this or that. For example, people who have suffered from hunger have the ability to center food in the mind as a determining value, those who were at war represent protection and security as the main thing. Accordingly, these aspects, in addition to the individual, are also in the collective memory of peoples as humanity as a whole.

This structuring of mini-questionnaire questions with the formation of a certain hierarchy correlates with the concept of pyramids of needs (hierarchical model of human needs) A. Maslow [29]. According to this concept of A. Maslow in our mini-questionnaire, the first two questions (questions № 1, № 2) reflect the physiological needs underlying the pyramid; the fourth and fifth questions (№ 4, № 5) illustrate the need for security; the third (№ 3) question corresponds to the need for belonging (friendship, love, communication).

*Digital technologies and mathematical methods*. In order to achieve these purposes, we used: Microsoft Excel spreadsheets to perform calculations to determine ecophobic intentions and values [30]; Knowledge Analysis Weka system [31] and SimpleKMeans cluster analysis method for data clustering [32, 33]; mathematical methods of linear algebra for the development and implementation of the "Matrix of coefficients for determining ecophobic intentions and values". The WEKA SimpleKMeans algorithm was used based on the Euclidean measure of distance to calculate the distances between instances and clusters. It is considered in more detail by us in the article "An empirical comparison of machine learning clustering methods in the study of Internet addiction among students majoring in Computer Sciences" [32, 33].

## 3 Results and discussion

The system-organizing content-semantic line of our research is the development of ecophilic educational strategies based on the analysis of ecophobic tendencies of consciousness. We form ecophilic strategies as competitive with ecophobic ones. That is symmetrical or congruent (figure 1). Defining in this methodology is that ecophobic tendencies represented in the format of the model are the basis for the development of ecophilic strategies. Consider the developed model of "Archaic ecophobic intentions and values" (figure 2), which is formed on the basis of analysis and interpretation of the results of the Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial era". This mini-questionnaire reflects ecophilic and ecophobic intentions and the corresponding values and anti-values. This model is also developed using generalizations and environmental ideas formed on the basis of the concepts of A. Peccei [5], reports of the Club of Rome [1, 6], environmental [1, 18, 20, 25], anthropological [4, 10–12, 21], ethological [24] and culturology [22] approaches.

This model (figure 2) has several successive layers. It consists of a "core" and two layers: I – "Vital-anthropological" (core); II – "Pathological circle of ecophobic transformations of consciousness"; III – "Ecophobic consciousness" (ecophobic intentions and values) and ecophobic cultural tendencies. We consider the phenomenon of consciousness somewhat reduced, mainly focusing on the intentions and values (and anti-values) on the basis of which the Fedorets-Klochko mini-questionnaire of the Ecophobic Consciousness of the Industrial Age was formed.

The core ("Vital-anthropological layer") of this model reflects the basic greeting intentions and values and, accordingly, is formed by three components: 1) individual security and protection; 2) food security (individual and collective); 3) collectivism, collective security. We call

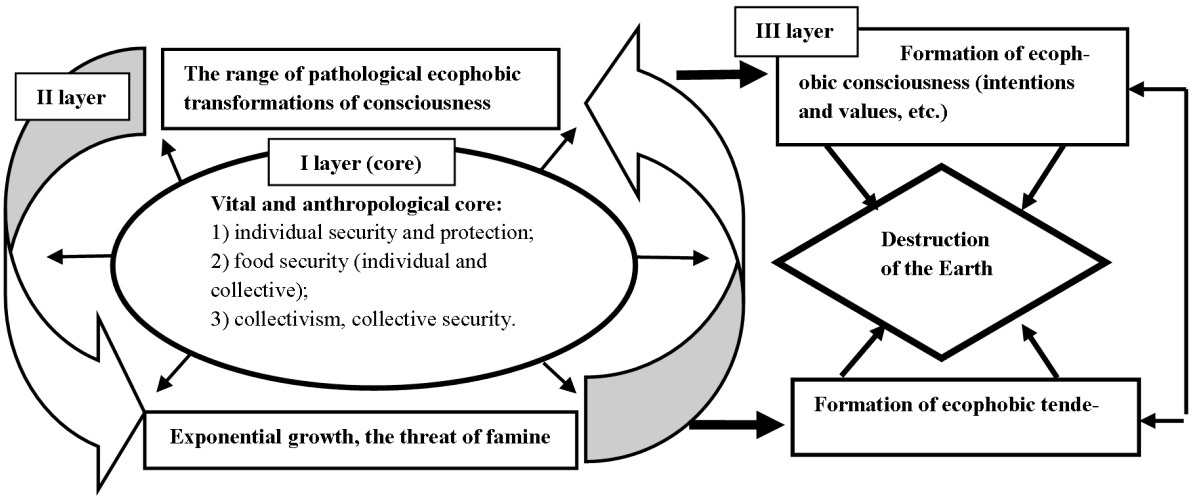


**Figure 2.** Structural and logical scheme of "Archaic ecophobic intentions and values".

this nucleus "Vital-anthropological" because in it the vitality of man and human nature are revealed in the corresponding aspirations. It reflects the vitality (vitality) that is inherent not only in man but also in all living beings, which reveals to us the kinship of living things and the systemic and unity of the biosphere. According to the sphere of instincts, this level, as noted, reflects the instincts of conservation: protective (personality and species), food, sexual. At the same time, the components of the nucleus are considered "environmentally indifferent". They are represented as anthropobiologically determined basic living (life) intentions and values. These components can be arranged in a hierarchy format, or relatively independently. In this way, both functional and hierarchical connections and interactions are defined between them. The variability of the interaction of these components may be manifested in the specifics of ecophilic and ecophobic values (and anti-values) and intentions. These components that form the core are environmentally indifferent (neutral). They become ecophobic due to the introduction of civilizational tendencies of exponential consumption and fear of hunger or other problems.

Fear of nature by its forces and its grandeur is characteristic of archaic societies. Accordingly, in such societies, ecophobia could be manifested, for example, by "barbaric" burning of forests for primitive agriculture and protection from enemies and wild animals, as well as the total destruction of certain species in order to provide food and others.

In an industrial society, ecophobia has different origins and nature than in the archaic and traditional. It is a significant component of the ideologies and socio-cultural intentions and values that underlie "barbaric" industrialization, collectivization, business and profit by destroying the environment. Ecophobia is also an ideological and methodological prerequisite for the development of totalitarian societies formed on the basis of different ideologies (communism, etc.). At the same time, ecophobia in industrial societies is realized in the format of mega-projects of drainage, "flooding", climate change, etc. Powerful ecophobic cultural and professional value-semantic contexts are mainly formed and effectively influence nature and society. Another aspect of industrial societies that is close to archaic is the threat of famine to large masses of the population. Accordingly, it requires the development and implementation of targeted food security policies by harming nature.

In this model, the layer (II) which is a system of factors, conditions and triggers implementing ecophobic transformations of basic vital intentions and values ("protection-security", food, collectivism) is the exponential growth of needs, production and consumption and fear of probable hunger. Pointing to the factor of fear, we are guided by the ideas of ethology. Within ethological notions, fear is one of the factors determining the direction of personality and behavior and which, together with anxiety, can be unconscious and at the same time manifest itself in appropriate ecophobic decisions and stereotypes of thinking and lifestyles. We call this layer "Pathological circle of ecophobic transformations of consciousness" (figure 2). We define this circle as pathological, because mostly attempts to solve global problems by local measures lead to even bigger problems. This understanding is also due to the fact that the man of the industrial age, who was obsessed with the idea of progress in its simplified ideological version, lost understanding of the expediency, extent and limits of influence on nature and thus violated the harmony between themselves and the environment. Mostly the man of the industrial age positioned himself as a fighter with nature, as a titan who makes "superhuman" and "supernatural" accomplishments. Accordingly, for this epoch the influence on the individual and mass consciousness of the corresponding archetypes [23] of the Titans is relevant, in particular Sisyphus (think of the idea and archetype of "Sisyphus' work"), Prometheus – the idea and archetype of hero and heroic work, which often destroys nature or at least nature. the man himself. Exit from the "pathological circle" is possible through the formation of qualitative ecophilic changes of consciousness that harmonize the interaction of man and the Earth and through the development of new environmentally oriented

technologies. This pathological circle, which is a system of influences, ideologies, meanings, risks and threats is complex and "composed" of many problems, as well as dynamic and dependent on socio-cultural, mental, psychological and other factors of influence.

Using digital technologies, we can present the model of "Archaic ecophobic intentions and values" in an expanded way, presenting its quantitative characteristics. Therefore, this model also includes the following digital models: 1) "Matrix of coefficients for determining ecophobic intentions and values" and 3 scales that reflect them; 2) "Cluster model of ecophobic intentions and values". These digital components were developed as a result of experimental research.

*Experimental study*. In the study, in order to determine ecophobic intentions and to build the above digital models, the Fedorets-Klochko mini-questionnaire of the Ecophobic Consciousness of the Industrial Age was used (see "Methods"). 162 students took part in the research. This number of participants was determined after preprocessing of test data, in particular, checking for missing values. The sample consisted of students – future teachers and teachers who studied in advanced training courses in postgraduate education. Teachers and future teachers of various specialties were studied, namely: teachers of physical culture, computer science, mathematics, ecology, elementary school. That is, the sample was quite heterogeneous in pedagogical specialties and age. The study was conducted in 4 institutions of higher education in Ukraine: the Municipal Institution of Higher Education "Vinnytsia Academy of Continuing Education", Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University, the Municipal Institution of Higher Education "Vinnytsia Humanitarian and Pedagogical College", Berdyansk State Pedagogical University. Based on the analysis and interpretation of the research results, 3 digital models were formed.

"Matrix of coefficients for determining ecophobic intentions and values" and 3 scales that reflect them. This matrix (table 1) is formed by conducting an expert assessment to determine the significance (weight) of each question of the Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial era" in the system of basic vital intentions and human values which include: 1) individual security and protection; 2) food security (individual and collective); 3) collectivism, sociality, collective security. The authors of the article and industry experts (5 experts) were experts on the formation of coefficients. The consistency of the opinions of the authors of the article and the experts was checked using the concordance coefficient. The value of the concordance coefficient is 0.93, according to Pearson's chi-squared test it is significant [34].

Thus, the resulting matrix provides an opportunity to understand and represent each of the mini-questionnaire questions not only as a separate result that characterizes a certain basic value and intention, but also as a continuum that reveals the integrity, systemicity, permeability and structure of each mini-questionnaire question. It also makes it possible to determine the weight and significance in each mini-questionnaire question of each of the three basic vital intentions and values. Accordingly, basic con-

**Table 1.** "Matrix of coefficients (weights) for determining ecophobic intentions and values" in the form of a table and quantitative representation of the answers of the Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial epoch".

| Question | Individual security and protection | Food security (individual, collective) | Collectivism, sociality, collective security |
|---|---|---|---|
| № 1 | 0.7 | 0.2 | 0.1 |
| № 2 | 0.7 | 0.2 | 0.1 |
| № 3 | 0.1 | 0.3 | 0.6 |
| № 4 | 0.1 | 0.4 | 0.5 |
| № 5 | 0.1 | 0.7 | 0.2 |

gratulatory intentions and values, by disclosing them in the context of certain issues, can be presented as a scale that determines the ability to quantify them and form an appropriate model (table 2, table 3). The data in table 2 were obtained by calculating the sum (separately for individual security and protection, food security (individual, collective) and collectivism, sociality, collective security) of the product of the corresponding value of the number of answers "yes" to the corresponding coefficient of table 1. The data in table 3 were obtained by calculating the sum (separately for individual security and protection, food security (individual, collective) and collectivism, sociality, collective security) of the product of the corresponding value of the number of answers "no" to the corresponding coefficient of table 1.

**Table 2.** Table of answers (positive), which distribute the ratio of basic vitamin substances and values and, accordingly, illustrate environmental tendency (intentions and values).

| Individual security and protection | Food security (individual, collective) | Collectivism, sociality, collective security |
|---|---|---|
| 51.5 | 35 | 32.5 |

**Table 3.** Table of answers (negative), which are distributed in relation to the basic living room intentions and values, which, accordingly, illustrate the ecophilic tendency (intentions and values).

| Individual security and protection | Food security (individual, collective) | Collectivism, sociality, collective security |
|---|---|---|
| 189 | 229.9 | 187.1 |

The maximum values of indicators on three scales are respectively: individual safety and protection – 275.4; food security (individual and collective) – 291.6; collectivism, collective security and expansion – 243 (table 4). The maximum values of indicators on three scales are formed on the basis of distribution of answers of the mini-questionnaire concerning three groups of basic vital inten-

tions and values taking into account "Matrix of coefficients (weights) for definition of ecophobic intentions and values". The scale reflects the total maximum value and, accordingly, can have both ecophobic and ecophilic interpretation.

**Table 4.** The maximum values of indicators on three scales are respectively: individual safety and protection – 275.4; food security (individual and collective) – 291.6; collectivism, collective security and expansion – 243.

| Individual security and protection | Food security (individual, collective) | Collectivism, sociality, collective security |
|---|---|---|
| 275.4 | 291.6 | 243 |

*Cluster model of ecophobic intentions and values*. This model was developed using the system Weka [31], algorithm SimpleKMeans [32]. As a result of the study, 4 clusters were formed. This number of clusters was selected by preliminary evaluation (using validity indices for testing Dunn, DB, SD, CDbw and S_Dbw) and experimental verification (using other clustering methods, splitting data into 3–5 clusters). We will analyze and interpret the results.

Cluster 0 has the following centroids according to the mini-questionnaire questions – no, no, no, no, no. This cluster contains 105 elements, which is 65% of the answers. In quantitative representation, it represents the dominant group in which ecophilic intentions and values are system-organizing, systemic and cross-cutting.

Cluster 1 is formed by centering the answers to the questions – undefined, no, undefined, no, no. This cluster is formed by the answers of 13 people and is – 8%. Quantitatively, this cluster is relatively small, but at the same time significant. The presence of indifferent responses in this cluster indicates the lack of formation in individuals of this group of ecophilic intentions and values. Therefore, even a relatively small volume of this cluster indicates the possibility of some socio-cultural impact that may have ecophobic connotations. In addition, the presence of "environmentally indifferent" intentions also indirectly creates a competitive strategy for ecophilicity.

Cluster 2 is formed by centering the answers to the questions – yes, yes, no, undefined, no. This cluster contains the answers of 20 people and is – 12%.

Cluster 3 is formed by centering the answers to the questions – yes, no, no, no, no. This cluster combines the answers to the questions of 24 people and is – 15%.

Cluster 2 and Cluster 3, despite some differences, reflect the presence of ecophobic intentions and values represented to a greater or lesser extent. In total, this is 27%, which is almost a third of the entire sample. This indicates the presence of a significant number of people who are more or less characterized by ecophobic tendencies of consciousness (in this case, intentions and values). The influence of these people on the socio-cultural sphere and cultural and educational space can be significant because the professional activity of the teacher contributes to the translation of existing intentions, values, attitudes, stereotypes and more.

*Conceptualization of ecophilic educational strategies.* Based on anthropocultural positions, the basic and system-forming in the development of ecophilic consciousness is the understanding of culture, including education as a determining and "constructive" factor [5, 20–22]. Accordingly, the ecophobic intentions and values present in a person under the influence of culture and education can be transformed into ecophilic or, conversely, strengthened in their direction (figure 3). That is, culture and education can act as a factor of transformation, "cultural filter" or, conversely, "amplifier" of certain trends. First of all, this applies to the essentially existential in its power powerful, representative [11] systemic, "through" factor, which is the culture of everyday life [8–11]. Accordingly, the basic vital intentions and human values formed on the basis of the "transformation" of conservation instincts (protective and food, including individual and species component) under the influence of culture and education can acquire an ecophilic orientation. This anthropocultural idea underlies this development of ecophilic educational strategies (figure 3). The ideological and methodological basis for the development of these strategies is also the concept of Sustainable development, which we consider as a defining, structuring and system-organizing cultural phenomenon and a manifestation of the "instinct of self-preservation of mankind" at the socio-cultural level.

In this methodology, we turn to the technological and value reflection of the teachings of P. K. Anokhin on functional systems [26]. In the semantic framework of this doctrine, behavior, values and meanings are presented as specific dynamic and targeted combinations of structures and functions of the body and the mental sphere, ie are functional systems between which there may be competitive relations. According to the theory of functional systems, ecophobic and ecophilic values, intentions, metaphors, ideas, reflections and experiences are considered as specific functional systems between which there can be competitive interactions that can be purposefully actualized. Thus, this approach is aimed at the development of ecophilic consciousness is formed on the basis of the idea of actualization and formation of competitive strategies. That is, we do not purposefully act on ecophobic tendencies, but "displace" them and deactivate them with the help of competitive ecophilic strategies as those that correspond to the harmonious nature of man and the goals of sustainable development. An important aspect of this methodology is its liberal nature. It is a natural right and desire of every person to choose any strategy. At the same time, ecophobic tendencies against the background of the developed system of ecophilic strategies can be defined by a person as irrelevant and, accordingly, desemantized. Accordingly, in this methodological system, ecophilic strategies are formed congruently with ecophobic intentions and values.

In this methodology, we also apply the idea of polarity, the essence of which is that psychological phenomena can have a polar or antagonistic direction. Under the influence of external conditions, the polarity can be changed

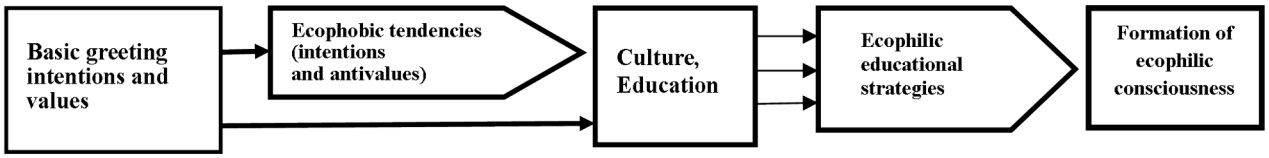


**Figure 3.** Structural and logical scheme of formation of ecophilic strategies.

to the opposite. Therefore, we are talking about the possibility of transforming ecophobic tendencies of the psyche into ecophilic by developing appropriate strategies that take into account the psychological phenomenon of polarity. In the formation of ecophilic strategies we also use: the archetypal psychology of C. G. Jung [23], the meaning and direction of which is the actualization of the archetype of harmony; existential philosophy and psychology used to reveal the existential dimension of man as tangent to the existence of the Earth; ancient Greek concepts of harmony [27] and self-care [27, 28] (M. Foucault), which are interpreted ecophilically oriented; greening [15, 17, 19], the concept of "Care for the Earth" by A. Gore [20].

Ecophilic strategies are developed through ecological and value comprehension of three basic vital intentions and values (individual security and protection; food security; collectivism and collective security). Accordingly, the model of "Archaic ecophobic intentions and values" makes it possible to identify ecophobic tendencies of the psyche on the basis of which ecophilic strategies are formed as competitive (figure 4). We present the main ecophilic strategies, which are formed in relation to the three basic vital intentions and values and congruently to the relevant ecophobic tendencies (figure 4): "Synergistic strategy of personal security through care for the Earth"; "Strategy for harmonization of needs based on care for the Earth"; "Harmonization of human-Earth interaction".

Individual security and protection is interpreted in existentially oriented formats of care, as protection not only of the individual but also of the Earth. This strategy is defined by us as "Synergistic strategy of security of the person by care of the Earth" (figure 4). This strategy meets the goals of sustainable development, in particular the 3rd "Good Health and Well-Being", the 5th "Gender Equality". The essence of this strategy is the security of the individual by preserving the Earth and caring for it. Determinant in the formation of this strategy is the concept of A. Gore "Care for the Earth" [20]. The system-organizing anthropological aspects of this strategy are self-knowledge, existentialization, the development of emotional intelligence and intellectualization aimed at knowing oneself as a person closely "connected" with the Earth, the formation of gender equality. Human aggression is thus transformed into care for the Earth and care for one self [28]. This strategy can be implemented through the development of: self-absorption, self-knowledge [28], reflection, poetry, music, self-knowledge through nature, care for one self [28], self-care as an Earth Man [19], self-care in the world, care about the Earth [20], the formation of peaceful and communicative strategies for conflict resolution (including technology and practice of nonviolent communication), spiritual poetic visions of nature and the Earth [19, 22], compassion, desecularization. Accordingly, the essence of man changes, which becomes not only active, active but also caring, directing this concern to the planet Earth.

Food security (individual and collective) is interpreted as a reasonable, rational and harmonious use of nature, which includes an environmentally friendly understanding of the world around us. That is, we actualize the competition between the attitude to the surrounding world as a potential food or other resource and knowledge of the Earth, which is boundless in its essence. An important aspect of this strategy is the minimization, optimization and harmonization of human needs. This strategy is defined by us as "Strategy for harmonization of needs based on care for the Earth" (figure 4). The defining aspect of this strategy is intellectualization aimed at learning about the outside world and the Earth. Accordingly, motor activity is also presented as a technology of cognition and as a way of being (special motor ontology). This strategy is implemented through the development of: motor activity, physical culture [19], sports, intellectualization, "ecophilic rationality", wisdom, emotional intelligence, cordiality, compassion, the ability to admire landscapes and individual natural objects (stone, wood, etc.) of the Earth. etc. This strategy meets the goals of sustainable development [19, 22] in particular the 4th ("Quality Education"), 12th ("Responsible consumption and production"), 14th ("Preservation of marine ecosystems"), 15th ("Preservation of terrestrial ecosystems"). Accordingly, there are transformations of the Digestive (food) Man, who tends to accumulate material resources in the Man of the Movement, in the Man who knows himself and the world, the Man of the Heart, who "accumulates" spiritual and intellectual values.

Collectivism, collective security is a basic vital intention and value that reflects the socio-cultural and political essence of man, as well as presents the essence of man as a species of Homo Sapiens. Ecophilic strategy, which is developed on the basis of this attributive quality of human is defined as "Harmonization of human-Earth interaction" (figure 4) [19, 22]. This strategy meets the goals of sustainable development [1, 22] in particular the 11th ("Sustainable Cities and Settlements"), the 13th ("Combating Climate Change"), the 14th ("Partnership for Sustainable Development"). Implemented through the development of: collective hiking and travel that reveal the value and beauty of the Earth; discussions; seminars; dialogical-maevtic practices; collective ecological projects of social-ecological, political-ecological, cultural-ecological direc-

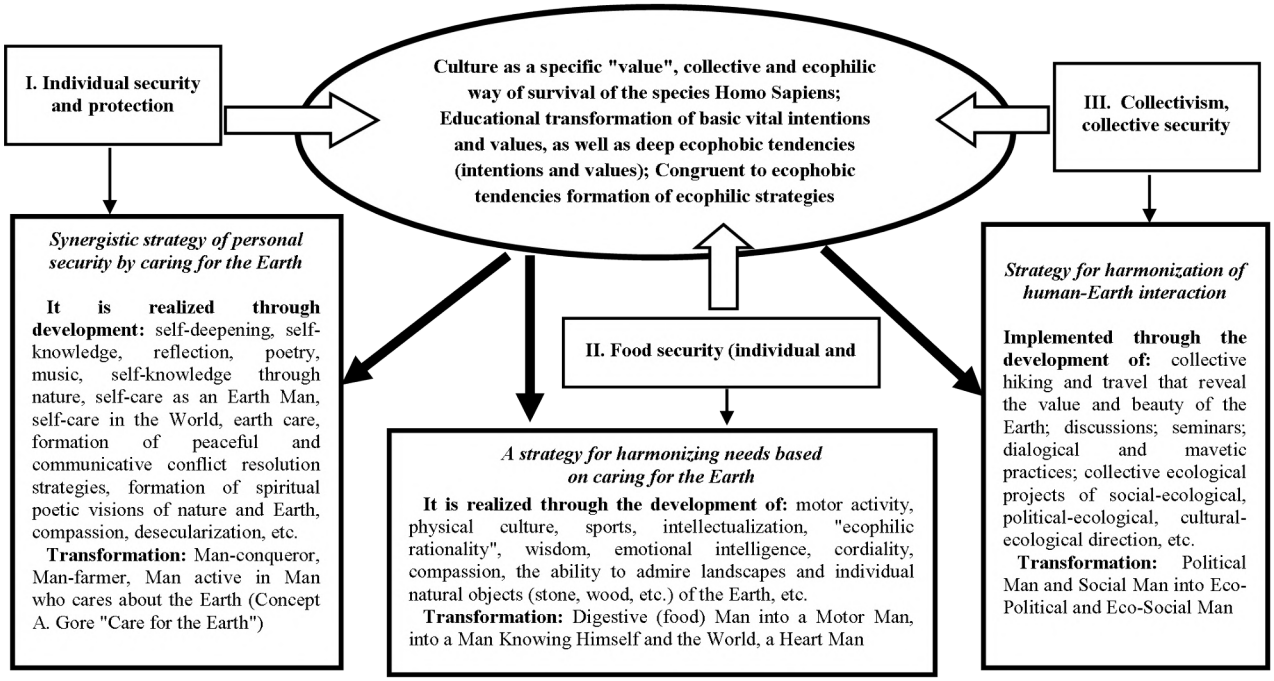


**Figure 4.** Structural and logical scheme of transformation of ecophobic intentions and values (anti-values) into ecophilic educational strategies under the influence of education and culture.

tion, etc. At the same time, there is a transformation – of a Political Man, a Social Man, respectively, into an Eco-political Man, an Eco-Social Man.

Applying for development of ecophilic educational strategies "Matrix of coefficients (weights) for definition of ecophobic intentions and values" we consider that the maximum values of indicators on three scales are formed on the basis of distribution of answers of Fedorets-Klochko's mini-questionnaire and the values of "Food Security (Individual and Collective)" (291), slightly lower for "Individual Security and Protection" (275.4) and even lower for "Collectivism, Collective Security" (243). We interpret this as the need to pay special attention to the development and implementation of a "Strategy for the harmonization of needs based on concern for the Earth", which ecophilically interprets food security. Accordingly, this strategy should be the most relevant in the socio-cultural space compared to others.

Analyzing the quantitative indicators of responses (positive), which are distributed in relation to the basic congratulatory intentions and values and accordingly illustrate ecophobic tendencies (intentions and values), we highlight the most significant ecophobic intentions and values related to "Individual security and protection" (51%). For comparison, the indicators of "Food Security (individual and collective)" (35%) and "Collectivism, collective security" (32.5%) are almost at the same level. Ecologically and value-wise comprehending the indicative distribution, we make a generalization that the problem of ecophilic impact on "Individual safety and protection" is insufficiently updated and developed. Therefore, individual security is mainly understood as the formation of protection systems against a potential "enemy" who is outside in the environment and can be personified with natural, including terrestrial phenomena. Such ideas and tendencies are an "atavism" of archaic consciousness. Because often modern man has more problems in himself, becoming a force that destroys itself through active influence on the environment. The gap of almost a third of other indicators also indicates a hidden fear and anxiety about the unknown, which is potentially dangerous and, accordingly, associated with nature with its forces and essences. These interpretations tell us about the need to develop a "Synergistic strategy for personal security through care for the Earth" based on the development of reflection, value and existentially oriented understanding of man himself and the Earth and nature. Accordingly, the direction of existentialization, self-knowledge, self-knowledge of oneself and one's human nature through the "external" nature of the Earth is decisive. Relevant within the framework of this strategy are the ideas of cosmism, mysticism (as anthropopractices of self-improvement), the direction of desecularization, as well as the application of environmentally oriented experiences of Eastern anthropo practices of qigong, yoga and others.

We take into account when developing ecophilic educational strategies "Cluster model of ecophobic intentions and values". In summary, we note that this model can be presented in the format of three leading trends: I "Ecophilic" – Cluster 0 (65%); II "Ecophobic" (27%) – Cluster 2 (12%) and Cluster 3 (15%); III "Environmentally Indifferent" (13%). The quantitative distribution of ecophobic and ecophilic tendencies (intentions and values) presented in the cluster model indicates to us a signif-

icant influence of ecophobic tendencies, which is almost a third. This influence can be significant and dominant in the decision-making process, in stressful situations, in everyday life, in everyday life, in professional activities, which is an important anthropobiological, anthropocultural and personal prerequisite for the destruction of the Earth. Accordingly, based on the analysis of the above trends, we consider it important to develop an ecophilic strategy – "Strategy for harmonization of needs based on care for the Earth". It is this strategy that has significant limiting potential against negative influences compared to others. This influence is due to the actualization of ecophilic trends in the culture of everyday life and in professional culture. Accordingly, this can minimize the negative impact on the Earth at the level of culture, including professional.

## 4 Conclusion

Digital modeling of the development of ecological consciousness is carried out by developing ecophilic educational strategies. The development of ecophilic educational strategies is based on the use of digital models and ecological and value understanding of man and his consciousness as a multidimensional anthropological, social and cultural phenomena.

A component of the experimental study was a survey of students of higher education institutions using the developed "Fedorets-Klochko mini-questionnaire "Ecophobic consciousness of the industrial epoch"". This mini-questionnaire is based on the idea of the importance of culture and psychology of everyday life. Because in the culture of everyday life, both ecophilic and ecophobic tendencies (intentions and values) of the individual can be clearly, systematically and authentically manifested and formed.

Based on the methodological and value reflection of the phenomena of existence and competition of ecophobic and ecophilic tendencies (intentions and values), as well as by ecological and value comprehension of the results of experimental research, the model "Archaic ecophobic intentions and values" is formed. This model contains the following digital models: "Matrix of coefficients (weights) for determining ecophobic intentions and values", "Cluster model of ecophobic intentions and values".

Based on the application of these digital models and other concepts and approaches, three ecophilic educational strategies have been developed. These strategies are formed in relation to the three basic vital intentions and values (individual security and protection; food security – individual and collective; collectivism and collective security) and ecophobic tendencies (determined by the mini-questionnaire) that correspond to them. These are the following strategies: "Synergistic strategy of personal security through care for the Earth"; "Strategy for harmonization of needs based on care for the Earth"; "Strategy for harmonization of human-Earth interaction". The ideological and methodological basis for the development of these strategies is the concept of sustainable development. The model of "Archaic ecophobic intentions and values" was used in the formation of the system of these strategies. In addition, in the development of ecophilic educational strategies used: ecological and value potential of anthropology, namely the culture and psychology of everyday life; C. G. Jung's archetypal psychology; existential philosophy and psychology; the idea of competitive strategies is formed on the basis of P. K. Anokhin's doctrine of functional systems; the phenomenon of polarity of psychological phenomena (values, intentions, attitudes, motivations, emotions); liberal ideology; ancient Greek concepts of harmony and self-care (interpreted by M. Foucault); the concept of "Care for the Earth" A. Gore.

The application of the "Matrix of coefficients (weights) to determine ecophobic intentions and values" reveals the maximum values of indicators on three scales, which are the largest for the basic vital intention and the value of "Food security (individual and collective)" (291), slightly lower for "Individual security and protection" (275.4) and even less for "Collectivism, collective security" (243). These indicators reveal the environmental significance of the "Strategy for harmonization of needs based on concern for the Earth". This strategy, which ecophilically interprets food security and behavior, is relevant in psychology and anthropology of everyday life, in professional activities. That is, it relates directly to the "Alltägliche Lebenswelt" (German) ("Everyday Life" by M. Heidegger) and aims to harmonize human life in everyday life, not in stressful conditions, but in professional activities, in education, in everyday life, in the family being. Accordingly, this strategy contributes to the peaceful and harmonious existence of man through rationalization, minimization, optimization of their needs, as well as through intellectualization, intercultural communication, development of physical activity (physical culture and sports).

Summarizing and interpreting the results of the "Cluster Model of Ecophobic Intentions and Values", which also underlies the development of ecophilic educational strategies, we can identify three leading trends. Representing these tendencies in quantitative representation we allocate: I "Ecophilic" – Cluster 0 (65%); II "Ecophobic" (27%) – Cluster 2 (12%) and Cluster 3 (15%); III "Environmentally Indifferent" (13%). Significant influence of ecophobic tendencies is defined which in quantitative representation makes almost a third (27%). Ecophobic tendencies can have a systemic, defining and dominant influence. This influence can be manifested in the decision-making process, in stressful situations, in crisis situations in society and to a lesser extent in everyday life, in everyday life, in professional activities. An ecophilic strategy that is competitive with ecophobic intentions and values manifested in stressful and crisis situations is a "Synergistic Strategy for Individual Security by Caring for the Earth". This strategy reflects the impact on the basic vital value – individual security and protection. Although certainly ecophilic strategies, which are a system aimed at systemic influences act integratively.

Formed on the basis of digital models and ecological, pedagogical, anthropological and humanitarian approaches and concepts, ecophilic educational strategies represent a competence-oriented "intellectual-value-

activity" system of influences. This system formed by ecophilic strategies can actively influence human consciousness through the impact on vital areas (individual and collective security, including food). The application of ecophilic strategies can be relevant for educational theory and practice, as well as everyday conditions (life, work) to optimize and minimize human needs. The development of educational ecophilic strategies based on digital models contributes to the realization of sustainable development goals through the formation of a new ecologically oriented person – Homo Ecologikus, an attributive feature of which is ecophilic consciousness.

In the future, we plan to develop digital models using a systems approach and risk theory to determine the risks of ecophobic consciousness and the prerequisites for the development of ecophilic consciousness.

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# Methodological aspects of revealing the metacognitive potential of a teacher in the context of the development of his health-preserving competence

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**Abstract.** The article presents the results of a study aimed at improving the methodology and techniques for developing metacognitive strategies in postgraduate education as important aspects of health competence of physical education teachers. The concept of "Logos of health-preserving competence of a physical education teacher" has been developed. The logo of health-preserving competence of a physical education teacher is presented as a developed and professionally oriented metacognitive sphere of a teacher for the effective implementation of student health. An important component of the logo is the development of reflexive, self-reflexive, prognostic, goal-setting intellectual skills and stereotypes. The Logos of Physical Education Teacher's Competence Logos includes the Logos-Narrative constitutive competence. The "Logos Narrative" reveals the main ideas, values, algorithms, interpretations, visions, the purpose of the strategy of professional health care. To study "Methods of integrative use of metacognitive and archetypal phenomena to improve the health competence of physical education teachers", two questionnaires were used to study the meta-cognitive strategies of physical education teachers. All issues had an axiological dimension and are doctrinal and institutional. The issues highlight the role of humanism and charity as determinants of the relevant modern Ukrainian Eurocentric trends in education reform. Wilcoxon's T-test was used to process the test results. The positive dynamics of learning outcomes aimed at updating the goals of cognitive strategies is determined.

## 1 Introduction

Health-preserving competence of physical education teachers is important both for the preservation of life and health and for a broad and humanistic understanding of the phenomenon of the child as a psychological, physical, spiritual being; imbued with joy and the spirit of freedom, which are manifested primarily in motor activity As a tool of professional activity, this competence is aimed at considering both relatively simple typical issues and a positive solution to complex and atypical situations, threats and problems, primarily related to maintaining not only the health but also the lives of children in physical load conditions [1].

Accordingly, it is important to prevent pathology, which under the influence of physical activity can form as acute (i.e. occur quickly and without preconditions) and requires rapid, correct and intellectualized actions to prevent or minimize risks to life and health. To solve the above problems, which have a systemic, multidimensional, anthropological, psychological, motor nature in the field of health competence is insufficient to develop problem-based and prevention-oriented algorithms, strategies and knowledge about a person and the human body in the normal situation and in the context of certain disorders prevention This primarily includes the formation of healthy thinking of a physical education teacher based on a deep knowledge of human nature in the conditions of physical activity. Accordingly, health-preserving thinking as a specific cognitive professional phenomenon determines the structure and effectiveness of strategies and ways to save the lives and health of children. Integrative and reflexive cognitive abilities of the teacher and "cognitive prerequisites" aimed at self-organization, reflection, assessment of one's own cognitive sphere, goal-setting, as well as readiness for intellectual activity are practically significant components of health-preserving thinking.

This aspect, first of all, includes the need for relative formation of specialized knowledge, "meta-knowledge" and "metacognitive" strategies, as well as the actualization of valuable mental skills and technology-oriented understanding of their optimal competence – based on ap-

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plication and further development. The development of meta-cognitive strategies is important in this direction. Therefore, we are talking about the importance of updating metacognitive strategies, metcognitive thinking and knowledge. Indicative intellectual components can ensure the development of health-preserving competence of a physical education teacher as an effective professional toolkit. Metacognition as an intellectual and reflexive phenomenon was studied by Flavell in the late twentieth century [2, 3]. He identifies metacognitive knowledge, feelings, goals, objectives, actions (or strategies) [3], skills, experiences. Metacognitive studies have been studied by Koriat [4] who speaks of their conscious and unconscious dimensions. Purposeful application of such metacognitive phenomena as self-assessment and self-management of cognition, as well as self-regulation, self-organization and self-control [5, 6], is relevant for the formation and practical application of health knowledge; to reveal the creative potential of the individual. The use of metacognitive phenomena in the concept of self-regulation of learning (SRL) is educationally significant [7]. For the disclosure of the significance of our problems, the studies of Aktağ et al. are important [8] and Bulut, [9], that indicate the need to develop the metacognitive spheres of physical education teachers and other teachers, considering this as an important component of their qualification improvement.

The value-ethical understanding of the teacher's role as a specialist, who is a person who reveals and forms in students eudemony, arete, kalokagatia, harmony as defining metastrategies of maintaining and shaping their health, personal and intellectual growth is important in this aspect. Thus, important ways of a teacher's self-improvement in our opinion are the relative actualization of his/her metacognitive sphere [10] and the archetypal dimension of consciousness [10].

A significant aspect of the problem of metacognitive and archetypal phenomena integrative application is the development of health-preserving competence of physical education teachers as a holistic and systemic professional-personal and intellectual-value phenomenon. In this anthropological model, the components of health-preserving competence (cognitive, activity-discursive, personal-existential, anthropocultural and inclusive-humanistic), which we define and set formally, are consolidated into "intellectual-activity-personal" integrity, into competence – at the level of neuropsychological processes. Accordingly, we emphasize the possibility of targeted influences at the level of baseline conditions in the development and formation of competence in order to optimally integrate the above components into a certain integrity in health competence. As factors of health competence components integration into a single integrity, we consider metacognitive (knowledge, strategies, goals) [10] and archetypal phenomena that can be represented in the format of strategies, algorithms, principles, narratives, professional and cultural myths, legends, mythologists, and stereotypes.

Metacognitive strategies are an important aspect of the health-preserving competence of a physical education teacher. They (metacognitive strategies) in our pedagogical system are part of the cognitive component of health-preserving competence of a physical education teacher [10]. Metacognitive strategies as a teacher's mental tool are aimed at maintaining health both at rest and during exercise. They are important for the development of anticipation (the ability to predict events) as an important component in the prevention of certain disorders that can be caused by exercise. In the scientific literature, the problem of improving the methodology and methods of developing metacognitive strategies of a physical education teacher in postgraduate education as a significant aspect of his health-preserving competence of a physical education teacher is insufficiently covered. This, together with the importance of metacognitive strategies of the physical education teacher for the preservation of life and health of students in the conditions of physical activity represents this problem as relevant.

*The purpose of the study*. Improving the methodology and techniques for the development of metacognitive strategies in postgraduate education as important aspects of health competence of physical education teachers.

## 2 Methods of the research

The study was conducted on the basis of a system of methods and approaches, the main of which were: metacognitive [2–9, 11–13], methodology of archetypal psychology of C. G. Jung [14], archetypal pedagogy [15], competence, axiological. Were used: narrative, holistic, philosophical, epistemological; transdisciplinary; preventive [1] approaches and analysis of scientific literature.

The following concepts were used to develop the metacognitive component "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to increase the health-preserving competence of a physical education teacher" [10]: intellectualization, professionalization, anthropologization, humanization, critical thinking, tolerance, knowledge transfer, existentialization.

*Use of own methodological developments.* To determine the system-organizing ideas, images, strategies, values and intentions associated with the archetypal level of consciousness and diagnosis of constitutive metacognitive knowledge, goals, strategies aimed at preserving the health of students, revealing their freedom, personal and creative potential, as well as understanding the role of a physical culture teacher in health preservation and actualization of his/her value-semantic sphere, the professional and personal growth 2 questionnaires were developed: № 1 "Analysis of simplifying health-preserving metacognitive strategies and interpretations", № 2 "Understanding health-preserving metacognitive strategies".

*Questionnaire № 1. "Analysis of reducing health-preserving metacognitive strategies and interpretations".*

1. The health-preserving activity of a physical education teacher mainly concerns the sphere of his/her professional activity, adaptation, efficiency and especially cannot affect his/her spiritual development and personal growth. (Yes / No / I don't know)

2. Mostly, health is seen as physical, mental and social. Other aspects of health are not significant in educational practices of its preservation. (Yes / No / I don't know)

3. Physical health is central to educational practices. Consideration of psychological and spiritual health in the context of historical memory actualization of ecological (Chernobyl and Fukushima disasters) and social (Holocaust, Holodomor, World War II, conflict in the East of Ukraine) catastrophes are not relevant issues in educational health-preserving practices. (Yes / No / I don't know)

4. If the health-preserving technology or technique is perfect and tested, it can be used in physical education classes without analyzing the health status and individual, age, sex, gender characteristics of children and students' reactions to these influences. (Yes / No / I don't know)

5. If the student's medical certificate states that he/she is healthy and admitted to physical education classes, this makes it practically impossible to develop acute cardiac diseases during exercise and, accordingly, eliminates the need to monitor such a student to prevent possible health problems. (Yes / No / I don't know)

6. Physical activity, proper nutrition and exercise, which are the basis of a healthy lifestyle, are the determining factors that ensure a person's health, so there is no need to take into account the prevention of possible disorders that may never occur. (Yes / No / I don't know)

7. Health is mainly formed by a person himself/herself through physical activity, hardening and proper nutrition. At the same time, the impact of culture and communication on health is insignificant, and it is almost absent. (Yes / No / I don't know)

8. To increase the effectiveness of physical education, there are minor health problems (such as runny nose, lethargy, low mood) which can be ignored. (Yes / No / I don't know)

9. Rapid and significant growth of the adolescent and, accordingly, the presence of the formed physical qualities (strength, endurance, etc.) almost always indicate good health. (Yes / No / I don't know)

10. The more a person moves, the better his/her health is. (Yes / No / I don't know)

11. If students are healthy, then for effective classes, in order not to waste time and effort during training, there is no need to analyze the dynamic state of their health to identify and prevent possible violations. (Yes / No / I don't know)

12. Significant concentration of the child in the physical sphere as a result of physical culture and sports only has a positive effect on the preservation and formation of health and the student's development. (Yes / No / I don't know)

13. Rapid and significant physical development and growth of the adolescent should correspond to physical activity, which should be increased in proportion and in relation to his/her development. (Yes / No / I don't know)

14. Motor activity and preservation of health are aimed at the development of the motor sphere of the individual, his/her physicality has no special and significant connection with the preservation of the Earth and the environment. (Yes / No / I don't know)

Questionnaire № 2 in the format of affirmative formulations presents strategies that are formed on the basis of humanistic, poliontological, democratic understanding of human nature and health.

*Questionnaire № 2. "Understanding health-preserving metacognitive strategies".*

1. Carrying out dynamic health observation during physical education classes is a necessary strategy of a teacher, which ensures the preservation of life and health of students. (Yes / No / I don't know)

2. Knowledge and understanding by a physical education teacher of the reasons and mechanisms of actual disturbances development which can be formed or shown during physical activity provides preservation of students' life and health. (Yes / No / I don't know)

3. Humane, understanding, tolerant and compassionate treatment of students is the basis of health competence. (Yes / No / I don't know)

4. Physical development and preservation of students' health in relation to the formation of their values aimed at caring for the Earth and its preservation is an important strategy of a physical education teacher. (Yes / No / I don't know)

5. The relative development of bodily arete – health, strength, beauty and spiritual arete – kindness, sophrosyne (moderation, harmony), reason, mercy is decisive in the harmonization between the physical and spiritual-intellectual spheres of students. (Yes / No / I don't know)

6. For his/her harmonious development, a person must be directed not only to the outside world, but also to himself/herself, that is, to be engaged in self-knowledge, which is an important aspect of modern child-centered practice of physical culture. (Yes / No / I don't know)

7. Understanding the primacy of being determines the phenomenon of existential health, which is revealed by means of physical culture as significant for the individual and his/her harmonious development. (Yes / No / I don't know)

*Statistical methods*. We need to prove the statistical significance of the study results. For this purpose we will use the Wilcoxon's T-test [16]. We consider the results of the study on one sample of data in two different experimental conditions.

We will prove the statistical significance of the difference in the results of testing Physical Education Teachers before and after the experiment. We put forward hypotheses:

$H_0$: The value of the test results of Physical Education Teachers after the experiment is lower than the value of the test results before the experiment at the level of significance $p < \alpha$.

$H_1$: The value of the test results of Physical Education Teachers after the experiment is exceeds than the value of the test results before the experiment at the level of significance $p < \alpha$.

We rank the results.

The change in the values of the test results in the direction of increasing the corresponding values after the experiment is considered "Typical".

Calculate the sum of the ranks of "atypical" shifts ($S_{atyp}$, formula (1)):

$$S_{atyp} = \sum_{i=1}^{n} R_i, \tag{1}$$

where:

$n$ – number of "atypical" shifts,

$R_i$ – ranks of "atypical" shifts ($i = 1, 2, \ldots, n$).

Using a statistical table taking into account the level of statistical significance $\alpha$ ($p < \alpha = 0{,}05$ or $p < \alpha = 0{,}01$) and the number of studied indicators $n$ we find $S_{typ}$.

Hypothesis $H_0$ is rejected, hypothesis $H_1$ is accepted in case of exceeding at the level of significance $p < \alpha$ "typical" shifts over "atypical" $S_{atyp} \leq S_{typ}$.

Hypothesis $H_1$ is rejected, hypothesis $H_0$ is accepted, in case of exceeding at the level of significance $p < \alpha$ "atypical" shifts over "typical" $S_{atyp} > S_{typ}$ at the level of significance $p < \alpha$.

## 3 Results and discussion

To develop and manifest the metacognitive abilities of the teacher, we present the concept of "Logos of health-preserving competence" as part of the cognitive component of this competence (figure 1 and figure 2) [10]. To actualize the personal-professional factor of the teacher's professional activity based on the interaction of the archetypal and partly emotional sphere, we developed the concept of the "Myth of health-preserving competence" as part of the personal-existential component of this competence. [10]. The Myth of the health-preserving competence of a Physical Education Teacher is presented as a professionally oriented aspect of consciousness in which both the deep irrational archetypal mental reality and the rational principle are manifested [10]. The Myth of health-preserving competence manifests the individual and collective unconscious and, to some extent, the existential dimension of the human (figure 1). Myth is associated with emotional origins, with anthropohistorical and cultural-historical stereotypes of decision-making, actions, perceptions, orientations to certain values and meanings, Mythos is closely related to the phenomenon of culture in general and, accordingly, is a specific holistic, emotional and figurative way of mastering reality. Mythos forms a certain psychological and emotional charge and background, which in turn contribute to the optimal functioning of the professionally oriented metacognitive sphere of the specialist – the logos. We consider the myth and logos of health-preserving competence as a whole and interconnectedly and interdependently (figure 1 and figure 2).

For the development of metacognitive strategies, we have developed and applied "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" [10]. In addition to the development of metacognitive strategies, this technique is aimed at actualizing the archetypal dimension [10] of consciousness (presented as a Myth of competence) which is energetically powerful and thus creates a certain psychological background for revealing the metacognitive nature of the specialist.

During the development of this technique, 4 components (blocks) were laid in its basis. This methodology is based on the integration of such components (figure 1) "Logos of health-preserving competence of physical education teachers", "Myth of health-preserving competence of physical education teachers", "Determining health-preserving strategies" and "Metacognitive-semantic context".

Actualization of metacognitive, cultural, personal, existential potentials of the teacher, which is realized in the process of each of the course topics consideration ("Development of health-preserving competencies of physical education teachers in postgraduate education") is represented as "Metacognitive-semantic context" (figure 1). This concept is an important component of this technique. Accordingly, it is decisive in scope and significance. This concept is a system of purposeful assistance to the teacher in understanding the strategies for saving the lives and health of students, which are updated and formed within each of the course topics. Health-preserving strategies, which are formed in the system of "Metacognitive-semantic context" in relation to "Determining health-preserving strategies", are metacognitive strategies of the II (second) order, technologically oriented, concretized (specified), i.e., aimed at solving specific problems. The metacognitive-semantic context is "penetrating" and present in all topics of the course. Accordingly, it is aimed at the formation of practice-oriented "Determining health strategies" and, to some extent, "Mythos" and "Logos" of health-preserving competence.

Due to the fact that the formation of physical education teachers' ability to apply meta-cognitive strategies in educational practices and technologies of health is cross-cutting and system-organizing in this pedagogical system (and in the relevant training course), so the control of results, in addition to questionnaires, is also car-

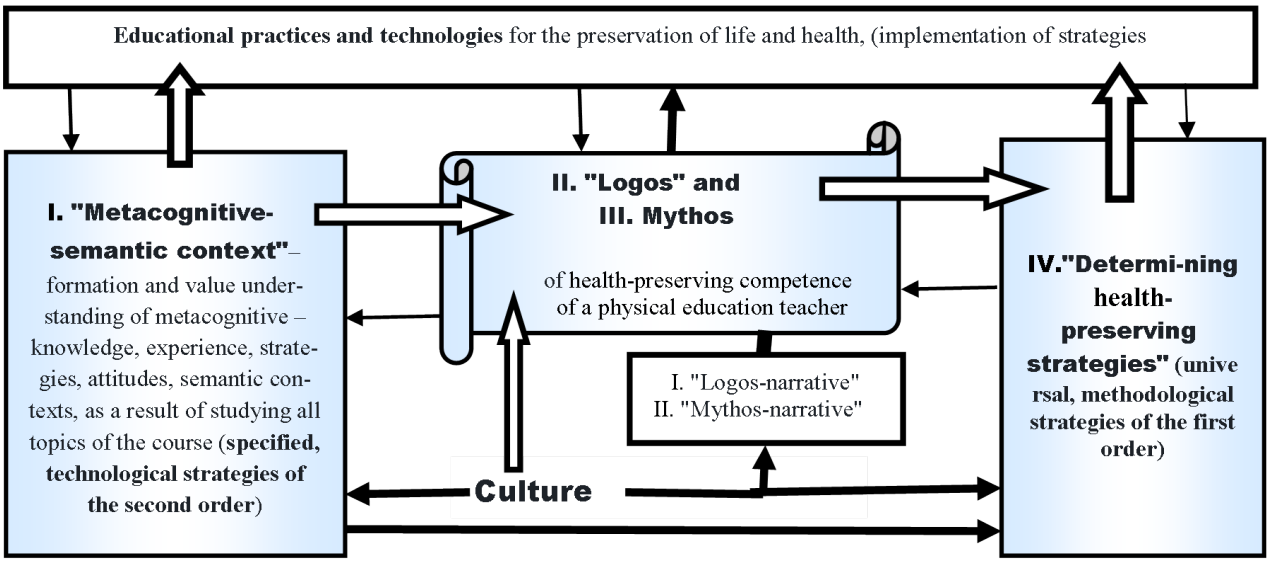


**Figure 1.** Conceptual and structural scheme of "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher".

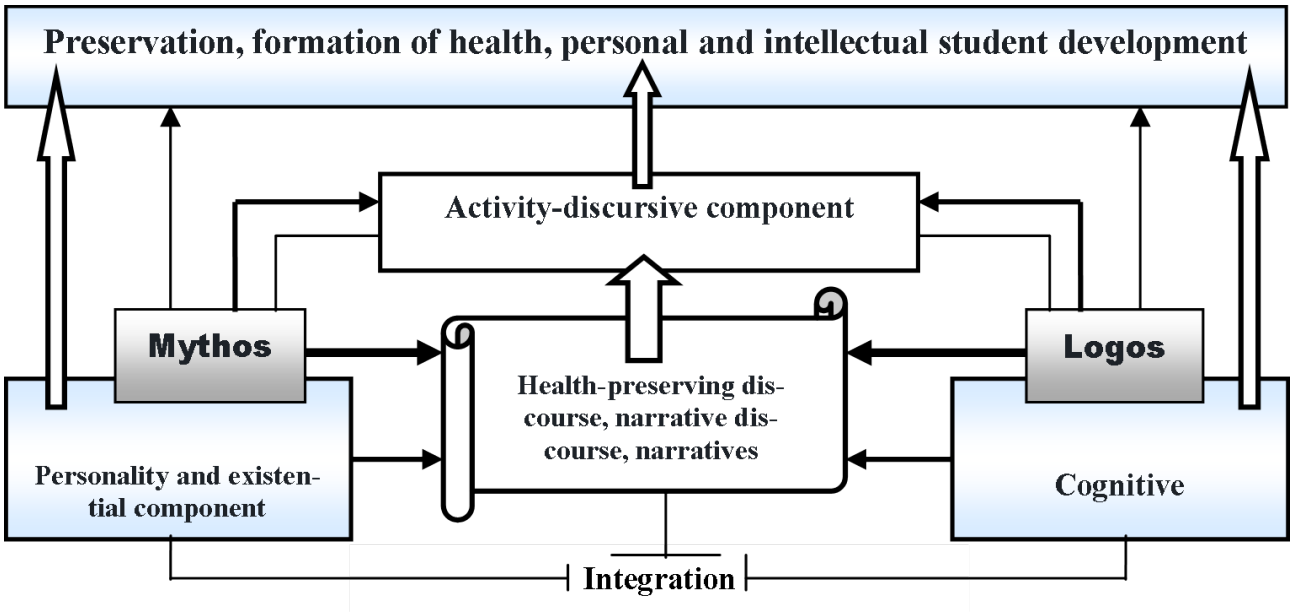


**Figure 2.** Conceptual and structural scheme of consolidation and implementation of health-preserving competence through the formation of health-preserving discourse and narratives of health through the integrative effects of "Mythos" and "Logos" of health-preserving competence of Physical Education Teachers.

ried out in the analysis of the level of formation of cognitive, personal-existential, activity-discursive components of health-preserving competence (in this study, we do not consider this aspect).

"Determining health strategies" (figure 1) are formed on the basis of technological and value understanding of the developed "Mythos" and "Logos" of health-preserving competence, analysis of educational practices and experiences of health within the "Metacognitive-semantic context", transfer of medical and hygienic, anthropological and psychological knowledge. The following "Determining health strategies" are used (this aspect is not considered in this paper): "Motor strategy", "Strategy of body and physical development", "Strategy – do no harm", "Prevention strategy based on knowledge of the causes of violations" ("Etiological strategy"), "Strategy of kindness, mercy and tolerance as the basis of psychological health", "Axiological strategy", "Harmonization strategy", "Earth care strategy", etc. These strategies are presented as methodologically-value-oriented, universal, conceptualizing, defining, value-semantic, system-organizing, i.e., metacognitive strategies of the first order.

*Logos* of health-preserving competence. Metacognitive strategies are especially important in the health-

preserving competencies activities of Physical Education Teachers. The problem of metacognition is revealed in many studies [2–9, 11–13]. Metacognitive strategies are not only practically significant but also necessary in the health-preserving and life-saving activities of a Physical Education Teacher. Metacognitive strategies are part of the cognitive component of health-preserving competence, which determines the impact on goal setting, reflection on their own intellectual abilities and practical skills, activities, experiences.

In developing the concept of "Logos" we used Bloom's taxonomy in the interpretation of Anderson et al. [17] and the taxonomy of Marzano and Kendall ("The New Taxonomy of Educational Objectives") [18]. The logos of health-preserving competence correspond to the 4th metacognitive level – D (dimension – "Cognitive processes"), Bloom's taxonomy and "Metacognition system" according to the Marzano taxonomy. At the same time, this concept of "Logos" is interpreted by us somewhat more broadly and is related to human teleology, its creative potential, existence and cultural dimension of existence.

The logos of a health-preserving competence Physical Education Teacher are a professionally oriented metacognitive ability. The Logos of health-preserving competence is formed on the basis of comprehension of the constitutive and constituent narrative – "Logos-narrative" aimed at actualization of metacognitive aspects of health-preserving thinking and reflection on one's professional, intellectual and life experience [10]. An important aspect of the development of the Logos of health-preserving competence of a Physical Education Teacher is the reception and internalization of metacognitive knowledge, strategies, values, value-semantic contexts, attitudes, algorithms, stereotypes of thinking. Logos of health-preserving competence of a physical education teacher is an important aspect of the cognitive (intellectual-value) component of this competence, of which it is a part.

Logos of health-preserving competence of a Physical Education Teacher is formally developed and formed as a component of the cognitive (intellectual-value) component of the specified competence (figure 1). Functionally, logos of health-preserving competence is aimed at: the constitution of this competence into one whole on the basis of actualization of the metacognitive sphere of personality, including goals, strategies, intentions, understanding of experiences; intellectually oriented solution of complex and typical health problems; formation of health-preserving thinking and intentionality; interest in the ideas of humanism, child-centeredness, anthropologization; practical implementation of health-preserving strategies; actualization of cultural, value, ethical, intellectual and personal potential of the individual.

Logos reveals and forms the professional and intellectual culture of a teacher, his/her reflexive and self-reflexive skills and abilities to comprehend his/her intellectual experience. The logos of health-preserving competence, as a metacognitive system integrates competence and in the format of certain strategies and algorithms, determines the cognitive, intentional, reflexive and target aspects of the formation and implementation of all components of this competence and, above all, the activity-discursive one. This is due to the fact that health-preserving activities are maximally and "externally" manifested in the activity-discursive component, are intellectualized and mostly discursive in nature. The teacher makes decisions by "manifesting" the logos – through metacognitive strategy and mainly implements it through the logos which in the cognitive aspect is knowledge, thought, attitude, and in the activity one is a word (in the sense of narrative and discourse). Thus this is the effect of the relationship and interaction in the systems "Logos – Praxis" (Praxis is used in the sense of activity, practice) "Logos – Praxis – verbalis (discursus)" (verbalis in the sense of verbal influence) (figure 2).

In connection with the COVID-19 pandemic, the problem of health in the modern world has acquired a qualitatively new value-ethical and life-giving understanding, as indicated in the study by Kamasz [19]. Accordingly, the role and importance of a teacher's ability to form a professional (in the sense of health-preserving) discourse in the educational process, including narrative discourse and narratives about health, which we consider as a relevant component of the activity-discursive component of health-preserving competence of physical education teachers and a significant aspect of a healthy lifestyle. Real communication in the educational process, which includes narratives and narrative discourse, which is considered a significant aspect of health care, is a factor in the actualization of the archetypal dimension of consciousness and the development of metacognitive strategies. The problem of professional communication online in the pandemic COVID-19 is revealed by Kim et al. [20], who notes its imperfection. At the same time, it can be pointed out that in the conditions of quarantine and online communication the role of narrative, narrative discourse as well as health discourse in general, which are essentially the defining competence "tools" of professional activity of physical education teachers grows significantly. Accordingly, it highlights the importance of developing these concepts of "Mythos" and "Logos" of health-preserving competence of a physical education teacher as narrative-discursive in their essence. Thus, metacognitive strategies and the archetypal dimension of consciousness are both actualized and manifested in professional activities through professional health-preserving discourse, the defining component of which is narrative (as a teacher's ability), narratives about health, which are revealed in narrative discourse.

Thus, we define two aspects of the Logos concept of health-preserving competence – competence, which is, as part of a competence – "Logos" (figure 1) and formally-constituent, which is presented in the format of a narrative – "Logos-narrative" (figure 1). The first (as a component or the aspect of competence) aspect was considered above. Let's consider the formal-institutional aspect of the health-preserving competence "Logos-narrative" (figure 1), which is purposefully formed and represents a "formal metacognitive and intellectually valuable basis of competence". Within the formal-constitutive aspect, the health-preserving competence logos-narrative is a purposefully formed narrative (see below a fragment

of the logos in the format of a narrative), concise, conceptual, generalized, value-oriented representation of the main defining and system-organizing ideas, ideals, conceptions, values, meanings, images (of a person, action, etc.), decision-making, algorithms, action strategies, knowledge, metaphors, directions. That is, the logos-narrative of competencies is a short concise story, which is structured by highlighting the main groups of ideas, values, problems and directions. The defining and main among them are the following – Person (child), Teacher, life, health, move (motor activity), prevention of violations, preservation of the Earth.

Functionally, the logos-narrative (figure 1) of health-preserving competence is aimed at:

1) formalized, systematic, generalized, value-oriented presentation and disclosure of basic ideas, visions, strategies, values, based on which both the competence and its cognitive component are developed;

2) constitution of competence into one system integrity on the basis of metacognitive phenomena actualization, narrative and intellectual-value potential of personality;

3) conceptualization of the competence main components and certain specific strategies;

4) selection and comprehension of knowledge, problems, strategies, values necessary for realization of competence;

5) identification and demarcation of the main systems of problems on the solutions to which the competence is directed;

6) representation of anthropological, humanistic and ecocentric values and meanings as a rational basis for health-preserving activities;

7) definition of basic values, meanings and direction of competence;

8) determining the role of a teacher as a subject of professional activity and the importance of its metacognitive potential in the implementation of health preservation;

9) anthropologically-value, child-centered and intellectually-oriented understanding of the child as a subject of educational interaction;

10) intellectually-oriented and humanistic, anthropologized, ecocentric and value disclosure of the health phenomenon.

To understand the methodological and constitutive meaning of the health-preserving competence logos-narrative, it (logos) can be metaphorically called a "constituent document" or a "constitution of competence". Thus, the logos of health-preserving competence (see below) plays a creative-founding, constitutive and integrating role in the construction and in the process of this competence formation.

Based on the methodological and technological-value understanding of the health-preserving competence logos and metacognitive strategies of professional activity, professional stereotypes, algorithms and intellectual traditions, professional discourse, values and meanings, two questionnaires № 1 and № 2 were developed (see "Methods of the research"). Questionnaire № 1 reveals the presence of simplifying and reducing ideas about the person (child) and his/her health. Questionnaire № 2 presents idealized system-creating and constitutive health-preserving competence of ideas, ideals, visions, values, and narrative preconditions of metacognitive strategies.

Let's present in an abbreviated format the logos of health-preserving competence of a physical education teacher.

*Logos-narrative of health-preserving competence of a physical education teacher (as a constitutive competence narrative) (6 points out of 12 are abbreviated).*

1. The logos of health-preserving competence of a physical education teacher is considered as a system of concise, holistic, interconnected, anthropologically-value-based and intellectually-oriented representation of basic ideas, ideals, visions, approaches, attitudes, values, meanings, intentions, directions, ethical and aesthetic guidelines on the basis of which competence is developed and formed and which are part of it in the format of the metacognitive aspect. At the personal-professional level, the Logos of health-preserving competence reflects and actualizes the spiritual-intellectual and intentional essence of a Physical Education Teacher as an intellectual and an intelligent person and his/her ability to professionally oriented conceptualization and strategic thinking. The logos of competence is presented as a "metacognitive" way of self-improvement and a "meta-intellectual" tool of the teacher aimed at maintaining the health and disclosing the creative and personal potential of students. The logos of competence is developed within this pedagogical system on the basis of: ideas of humanization, anthropologization, Europeanization, axiologization, freedom, cordocentrism, child-centeredness, tolerance, gender equality, paideia, harmony, knowledge transfer, ecologization, goals of sustainable development, and using inclusive, innovative, anthropological, culturological, existential, and psychological approaches.

2. The theory and practice of preserving and forming the health of children and preserving their lives are through the professionalization and axiologization of the Teacher of Physical Education, are also important for the development of his/her professional subjectivity, self-improvement, actualization and self-realization. According to professional positions, the development of special and specific knowledge, intellectual skills and understanding of normative and pathological anthropological phenomena both at rest and during exercise, as well

as the ability to interpret them, are necessary for effective health.

3. Person in his/her essence is holistic, polyontological, multidimensional, intentional (directed), ethical and creative. Person is understood as a spiritual, corporeal, social, dialogical, merciful, kind, intelligent, motor, temporal creature. This determines the understanding of the health and physical activity phenomenology in formats related to the above attributes. Accordingly, health is multidimensional and is seen as spiritual and physical, as a manifestation of well-being, harmony, charity, as a manifestation of movement, as an existence (existential health), etc.

4. The motor sphere and motor activity of a person is considered to be decisive in its existence, in its maintenance and formation: health, including psychological and spiritual; character and behavior; intelligence and creativity; adaptation and development; emotional sphere; as an ecophilic way of interacting with the Earth and preserving the environment. Homo Sapiens and Homo Educandus are represented as Homo Locomotorium and as Healthy Person.

5. Health is considered as an attributive feature of a person, as a personal, physical, mental, educational, anthropological, culturological, autopoetic, value, and ethical phenomena. Health is presented as a given and as a way of its formation and preservation; both the actual and real existing phenomenon and the potential for life, its manifestation and vitality. Life and health are optimal and harmonious interaction and integration of competitive strategies and phenomena. There are both harmonizing and competitive strategies between the physical, the intellectual and the spiritual. Excessive and prolonged concentration on the physical sphere due to excessive physical activity and sports can lead to the formation of a disharmonious personality. Measure in the effects on person and his/her body, is the path to health – "Servare modum, finemqu et enere naturam qu esequi" (Latin: "Keep the measure, adhere to limits, follow nature"). The basis of maintaining health is determined by a healthy way of life and a healthy lifestyle, the defining component of which is optimal and individualized physical activity. The system-organizing component of preserving and maintaining health is the prevention of diseases, problems and health risks during exercise in general, as well as the correction of certain pathologies with the use of physical culture.

6. A healthy lifestyle is considered on the basis of understanding: health as well-being, health, which is an individualized phenomenon; health as harmony with oneself, with the environment and with the Earth; health as homeostasis (balance); health as self-care and self-knowledge; health as existence and as a special subjective time.

*Experimental study.* Consider the results of a study conducted in 2017–2018. 816 Physical Education Teachers were invited to the study. The experimental group consisted of 411 people. The study was implemented in 9 institutions of higher education in Ukraine: Chernihiv Regional Postgraduate Institute of Postgraduate Pedagogical Education named after K. D. Ushinsky, Communal institution of the Lviv regional council "Lviv Regional Institute of Postgraduate Pedagogical Education", Communal institution "Sumy Regional Institute of Postgraduate Pedagogical Education", Communal institution "Zhytomyr Regional Institute of Postgraduate Pedagogical Education" of the Zhytomyr Regional Council, Communal Higher Educational Establishment "Kherson Academy of Continuing Education" of the Kherson Regional Council, Donetsk Regional Inservaise Teacher Training Institute, Drohobych Ivan Franko State Pedagogical University, Municipal Institution "Zaporizhzhia Regional Institute of Continuing Pedagogical Education" of Zaporizhzhia Regional Council, Nikolaev Regional Institute of Postgraduate Pedagogical Education.

Consider the results of testing Physical Education Teachers using Questionnaire № 1 "Analysis of reducing health-preserving metacognitive strategies and interpretations" before and after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" (table 1, table 2, and figure 3). The answer "No" to Questionnaire № 1 is a positive result. We prove that the excess of the values of the test results after the experiment over the values of the test results before the experiment is statistically significant.

As can be seen from table 1, table 2, and figure 3 there are no "atypical" shifts $S_{atyp}$ as a result of Physical Education Teacher testing using Questionnaire № 1 "Analysis of reducing health-preserving metacognitive strategies and interpretations" (table 1, table 2, and figure 3). Therefore, the sum of the ranks of "atypical" shifts according to the formula (1) $S_{atyp} = 0$ according to Wilcoxon's T-test [16].

Using the statistical table [16] we find the critical value of Wilcoxon's T-test for $n = 14$ and $p < 0{,}01$ $S_{typ} = 15$.

Therefore, at the significance level $p < 0{,}01$ $S_{atyp} = 0 < S_{typ} = 15$. Hypothesis $H_0$ is rejected, hypothesis $H_1$ is accepted, ie, at the level of significance $p < 0{,}01$ value of Physical Education Teacher test results using Questionnaire № 1 "Analysis of reducing health-preserving metacognitive strategies and interpretations" after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" significantly exceed the value of test results before the implementation of this methods.

Such a positive dynamics of the results of testing physical education teachers indicates the development of metacognitive strategies. In developing this Questionnaire № 1, typical cognitive and cognitive-value phenomena (errors, strategies and professional attitudes) that are present in the modern professional consciousness and culture of

**Table 1.** Values of testing indicators Physical Education Teachers using Questionnaire № 1 "Analysis of reducing health-preserving metacognitive strategies and interpretations" before and after (*b*/*a*) the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher".

| Question number, *n* | The number of "yes" answers before/after the experiment | The number of "no" answers before/after the experiment | The number of "undecided" answers before/after the experiment |
|---|---|---|---|
| 1 | 31/8 | 293/402 | 87/1 |
| 2 | 83/7 | 171/398 | 157/6 |
| 3 | 9/2 | 334/406 | 68/3 |
| 4 | 65/3 | 299/303 | 47/5 |
| 5 | 79/12 | 247/392 | 85/7 |
| 6 | 78/4 | 303/399 | 30/8 |
| 7 | 57/13 | 298/387 | 56/11 |
| 8 | 87/7 | 271/395 | 53/9 |
| 9 | 123/33 | 276/347 | 12/31 |
| 10 | 264/133 | 132/274 | 15/4 |
| 11 | 15/5 | 323/396 | 73/10 |
| 12 | 205/37 | 124/351 | 82/23 |
| 13 | 168/41 | 221/355 | 22/15 |
| 14 | 79/13 | 313/386 | 19/12 |

the teacher are purposefully used. Accordingly, in the course of the training we purposefully analyze them both at the level of "Metacognitive-semantic context", i. e. in the study of specific topics of the course and in the formation of "Determining health strategies" by updating the "Logos" and "Mythos" of health-preserving competence. The result of learning is the development of metacognitive strategies based on the teacher's critical assessment of typical reduction ideas about the child and his/her health.

A slight increase in learning outcomes is observed for question № 4 (see Questionnaire № 1). This is due to the fact that teachers traditionally understand the issue of health-preserving interpretation of the medical document content in which the student is recommended to attend physical education classes. Guided by a system of approaches and experiences, including medical, we update the thesis that according to the content of the medical document, the child can really be healthy. At the same time, the teacher must take into account the following two important aspects: 1) the state of the child's health in the medical document is recorded at the time of his/her examination by the doctor, which means that after his/her examination by the doctor and the child's condition may remain (that is he/she is healthy) or he/she will have certain problems or illnesses; 2) a completely healthy child under the influence of physical activity can develop acute illnesses that form against the background of complete health, such as injuries or acute cardiac disorders.

Let's check the results of testing according to Questionnaire № 2 "Understanding health-preserving metacognitive strategies" using Wilcoxon's T-test [16] (table 3, table 4, and figure 4). The answer "Yes" to Question-

**Table 2.** Values of "no" answers of testing indicators Physical Education Teachers using Questionnaire № 1 "Analysis of reducing health-preserving metacognitive strategies and interpretations" before and after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher".

| Question number, *n* | The number of "no" answers before the experiment, $b_1$, (%) | The number of "no" answers after the experiment, $a_1$, (%) | The value of the differences between $a_1$ and $b_1$, $a_1 - b_1$, (%) |
|---|---|---|---|
| 1 | 71 | 98 | 27 |
| 2 | 42 | 97 | 55 |
| 3 | 81 | 99 | 18 |
| 4 | 73 | 74 | 1 |
| 5 | 60 | 95 | 35 |
| 6 | 74 | 97 | 23 |
| 7 | 73 | 94 | 21 |
| 8 | 66 | 96 | 30 |
| 9 | 67 | 84 | 17 |
| 10 | 32 | 67 | 35 |
| 11 | 79 | 96 | 17 |
| 12 | 30 | 85 | 35 |
| 13 | 54 | 86 | 32 |
| 14 | 76 | 94 | 18 |

**Table 3.** Values of testing indicators Physical Education Teachers using Questionnaire № 2 "Understanding health-preserving metacognitive strategies" before and after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher".

| Question number, *n* | The number of "yes" answers before/after the experiment | The number of "no" answers before/after the experiment | The number of "undecided" answers before/after the experiment |
|---|---|---|---|
| 1 | 348/397 | 8/3 | 55/11 |
| 2 | 377/405 | 11/2 | 23/4 |
| 3 | 407/409 | 0/0 | 4/2 |
| 4 | 363/398 | 36/5 | 12/8 |
| 5 | 384/406 | 6/2 | 21/3 |
| 6 | 312/389 | 21/7 | 78/15 |
| 7 | 299/388 | 15/9 | 97/14 |

naire № 2 is a positive result. We prove that the excess of the values of the test results after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" over the values of the test results before the implementation of these methods is statistically significant.

According to the values of table 3 and table 4 there are no "atypical" shifts $S_{atyp}$ as a result of Physical Education Teachers testing using Questionnaire № 2 "Understand-

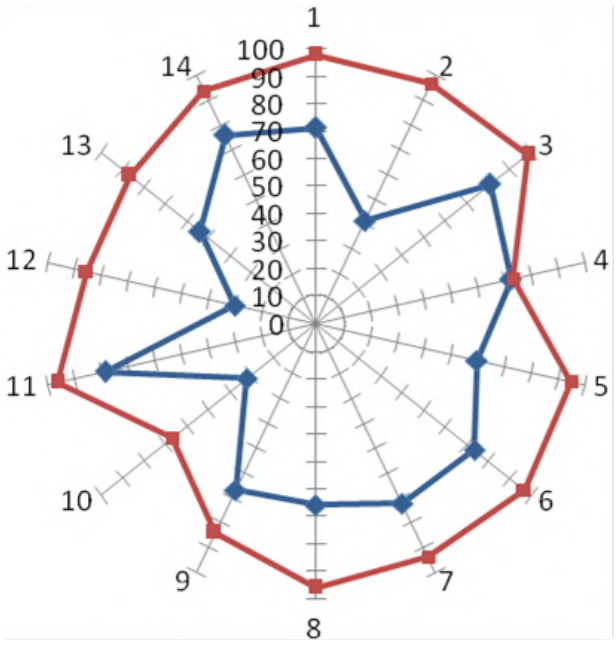


**Figure 3.** Graphical representation of test results Physical Education Teachers using Questionnaire № 1 "Analysis of reducing health-preserving metacognitive strategies and interpretations" before and after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" (Blue color on the graph indicates the results of the study before the implementation of this methods, red – after the implementation of this methods).

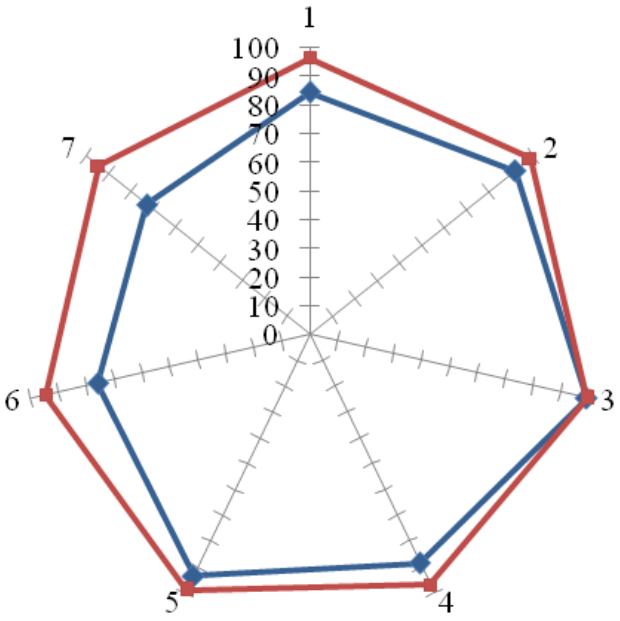


**Figure 4.** Graphical representation of test results Physical Education Teachers using Questionnaire № 2 "Understanding health-preserving metacognitive strategies" before and after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" (Blue color on the graph indicates the results of the study before the implementation of this methods, red – after the implementation of this methods).

**Table 4.** Values of "yes" answers of testing indicators Physical Education Teachers using Questionnaire № 2 "Understanding health-preserving metacognitive strategies" before and after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher".

| Question number, $n$ | The number of "yes" answers before the experiment, $b_2$, (%) | The number of "yes" answers after the experiment, $a_2$, (%) | The value of the differences between $a_2$ and $b_2$, $a_2 - b_2$, (%) |
|---|---|---|---|
| 1 | 85 | 97 | 12 |
| 2 | 92 | 99 | 7 |
| 3 | 99 | 100 | 1 |
| 4 | 88 | 97 | 9 |
| 5 | 93 | 99 | 5 |
| 6 | 76 | 95 | 19 |
| 7 | 73 | 94 | 21 |

ing health-preserving metacognitive strategies" (table 3, table 4, and figure 4). The sum of the ranks of "atypical" shifts according to the formula (1), $S_{atyp} = 0$ according to Wilcoxon's T-test [16].

Using the statistical table [16] we find the critical value of Wilcoxon's T-test for $n = 7$ and $p < 0{,}05$ $S_{typ} = 3$.

At the significance level $p < 0{,}05$ $S_{atyp} = 0 < S_{typ} = 3$. We reject hypothesis $H_0$, accept hypothesis $H_1$: at the level of significance $p < 0{,}05$ value of Physical Education Teachers test results using Questionnaire № 2 "Understanding health-preserving metacognitive strategies" after the implementation of the "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to improve the health-preserving competence of a physical education teacher" significantly exceed the value of test results before the implementation of this methods.

The decisive factor in the obtained results is that the questions of the Questionnaire № 2, purposefully reflect the traditional strategies for modern education formed within the framework of competence, child-centered and humanistic paradigms. All issues contain an axiological dimension and are doctrinal and institutional. Accordingly, the strategies, visions and values mentioned in the issues were purposefully considered as significant and strategic in the preparation process. The slight increase in the results of the questionnaire on question № 3 (Humane, understanding, tolerant and compassionate attitude towards students is the basis of health-preserving competence). Due to the fact that this question highlights the role of humanism and charity as defining phenomena, therefore, both at the beginning and after graduation, no one pointed to a negative attitude towards such an understanding.

## 4 Conclusion

We consider metacognitive strategies as an important aspect of health competence of a physical education teacher, which is a mental condition that provides effective goal setting, reflection on their cognitive and professional abilities, expression of intellectual feelings, actualization and comprehension of complex intellectualized experiences and practices. A methodology for improving the metacognitive strategies of a physical education teacher in postgraduate education has been developed. In pedagogical practice in the conditions of postgraduate education we apply the developed author's special course "Development of health-preserving competence of the teacher of physical culture". This special course includes the tried and tested "Methods of actualization of metacognitive abilities and archetypal measurement of consciousness to increase the health-preserving competence of a physical education teacher", which purposefully updates the meta-cognitive strategies of the teacher. Analyzing the specifics of professional activity and mental and activity features of health-preserving competence of physical education teachers, we form the concept of "Logos of health-preserving competence of physical education teachers". This concept, which reflects the rational, logical and metacognitive features of health activities and the corresponding competence of the teacher is represented in accordance with our concept "Myth of health competence of physical education teachers"

The logo of health-preserving competence of a physical education teacher is represented as a professionally oriented metacognitive sphere of a teacher. The purpose of the logo of health-preserving competence of a physical education teacher is to increase the effectiveness of maintaining the health of students by updating the purpose of the cognitive sphere and its focus on solving specific practical problems and developing self-reflective skills. It is important to reflect on professional intellectual experience and goal setting. The logo of the health-preserving competence of a physical education teacher includes the "Logos-narrative". This "Logos-narrative" represents formally selected and succinctly presented, basic, constitutive goals of cognitive strategies, ideas, concepts, values, algorithms of action, visions, interpretations, which underlie the health activities of physical education teachers and constitute this competence. "Logos-narrative" has a constitutive, motivating goal-setting function and is formed in the process of competence development and is used in its formation.

To study "Methods of integrative use of metacognitive and archetypal phenomena to improve the health competence of physical education teachers", two questionnaires were used to study the meta-cognitive strategies of physical education teachers. All issues had an axiological dimension and are doctrinal and institutional. The issues highlight the role of humanism and charity as determinants of the relevant modern Ukrainian Eurocentric trends in education reform. Wilcoxon's T-test was used to process the test results. The positive dynamics of learning outcomes aimed at updating the goals of cognitive strategies is determined.

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# Analysis of life plans and emigration intentions of pupils and students of border regions of the South of Ukraine (experience of empirical sociological research)

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**Abstract.** Educational emigration of young people is today one of the most pressing topics, taking into account the place and role of this socio-demographic group in the processes of economic and socio-cultural reproduction of society. In order to clarify the scale and nature of migration sentiments in the field of education, the life plans of young people, the authors of the article within the framework of the grant project "Common Language: public dialogue on the Law of Ukraine "On Education" in the Odessa region" conducted two empirical sociological research: 1) a formalized interview of students, students and their parents; 2) in-depth interviews with representatives of local authorities and self-government bodies, heads of schools and other educational institutions, school teachers, pupils, their parents, students, representatives of public organizations, ethnic communities, employers and representatives of local political parties. Despite the prevailing migration sentiments among some of the respondents, most of them associate their future with Ukraine. The mood for educational emigration is most pronounced among student youth, this is due to the fact that getting an education in foreign countries facilitates the possibility of their employment, including on the international labor market. The authors emphasize the importance of further scientific understanding of topical problems associated with the implementation of educational reform in Ukraine, which has hidden the development of transnational curricula.

## 1 Introduction

A person's choice in favor of one or another model of behavior, the construction of plans for the future depend on the characteristics of the functioning of his/her space of life activity. Adolescence is a sensitive period when personal self-determination occurs, the development of flexible life strategies associated with the readiness of representatives of the youth community to understand and accept their place in society through the prism of internal positions happens. In this sense, life plans associated with future professional choice and continuing education are an important prerequisite for the economic self-sufficiency and independence of young people as the basic components of the assertion of their social maturity and social subjectivity, accumulating the existing institutional imbalances in the education sphere and the labor market both on the level of a specific region and the country as a whole.

Educational emigration of graduates of Ukrainian schools to the countries of the European Union in recent years has become more widespread. There are no official statistics, but experts estimate the number of Ukrainians studying abroad in 2019–2020 was 60–70 thousand [1]. According to research conducted by the analytical center CEDOS, in recent years the number of students emigrating from Ukraine has increased at least threefold. Ukrainian citizens study at foreign universities on a full-time basis in 34 countries of the world [2].

The problem of educational emigration of young people is especially acute for the western border regions of Ukraine, such as the Zakarpatska, Lvivska, Volynska regions. In neighboring Poland, 55% of the total number of all foreign students come from Ukraine [3]. Today, Romania, Bulgaria and even Moldova, Transnistria have appeared on the list of recipient countries of educational migrants together with Poland, Germany, Hungary, Slovakia, Austria, Canada, USA, Australia, which undoubtedly keeps current the need to study the problem of educational emigration, characteristic of the inhabitants of the southern region of Ukraine.

The intensification of educational emigration processes has a number of both positive and negative consequences, however, under existing circumstances, there are significantly more latter ones. Since, in some cases, student mobility is transformed into emigration with no hope of a return, which certainly complicates both the demographic and social economic situation in Ukraine. And

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taking into account the scale and dynamics of educational emigration, as well as potential losses for the economy of both a specific region, and of the entire country as a whole, there is a need for a sociological study of the life plans and emigration intentions of pupils and students in order to develop and implement a number of measures that, at least, will allow even partially to minimize its negative consequences.

Realization of personal potential, achievement of life goals depend not only on the choice of a life path, but also on the organization of work aimed at its optimization. However, certain contradictions arise as for the formation of life plans, which are determined by the instability of social structures, nonlinearity and unpredictability of life circumstances, which significantly complicate the mechanisms of their formation and implementation. The need to find ways to overcome this kind of uncertainty contributes to the emergence of new forms of organization of social life and is reflected in new models of life strategies of the younger generation, which, in its turn, actualizes the need to study them in a close relationship between factors at the micro and macro levels. This is especially true for border areas, where the geography, ethnic structure, economic opportunities of the regions, which simultaneously perform barrier, filtering and contact functions, influence the formation of life plans and emigration intentions of young people along with other definite factors.

Thus, based on the widespread cases of departure of graduates of Ukrainian schools on educational programs outside Ukraine, it becomes necessary to study the causes and factors contributing to the spread of these trends, primarily to make changes to the state policy of regulating the processes of educational migration. The purpose of this article is to identify the relationship between the migration intentions of graduates of secondary educational institutions in the border regions and the possibility of their implementation, based on the systematization of the results of an empirical sociological study conducted in Odessa and the Odessa region.

The theoretical and methodological basis for the study of life plans and emigration intentions of pupils and students is the theory of the direction of the personality towards the formation of a promising future of G. W. Allport [4], faith in his/her own abilities of C. R. Rogers [5], developing a life strategy of the individual of A. V. Petrovsky [6], Ju. M. Reznik and E. A. Smirnov [7], G. A. Cherednichenko [8], the implementation of professional choice of E. P. Ilin [9], I. S. Kon [10]. Also the works of Y. P. Golovakha [11] are aimed at studying the ability of life strategies to perform the function of orientation in the future, to act as a social value, an individual meaning of life. No less significant are N. A. Shlapak's developments [12] on the essence of a young person's life plans, which is expressed in the relevance of reflecting objective reality, because they, having organizational potential, educational and social capital, act as an ideal mean of transforming opportunities into reality. In addition, it is worth paying attention to the scientific achievements of such Ukrainian scientists as E. Libanova [13], O. Malynovska [14], L. Kalashnikova [15], whose publications are devoted to the problems of human resource emigration, including academic mobility of student youth in the border regions.

The prerequisites for conducting an empirical sociological study in order to study the problems of the formation of life strategies and educational emigration intentions of pupils and students in the border areas of the Odessa region were the results of an international study carried out during 2018 in higher educational institutions of the Eastern region of Hungary, Slovakia, Romania, Serbia and Ukraine. The authors of which, guided by the obtained empirical data, showed that Ukrainian students have a predominantly economic motivation for educational emigration to European countries with no hope of a return, where the standard of living is significantly higher than in Ukraine. Among a number of favorable factors of these emigrations, the proximity of the location of the recipient countries, knowledge of the language, similarity of culture and traditions, family ties, etc. were highlighted [16].

## 2 Research methods

The design of the study was based on the use of a mixed method, that is, a combination of general scientific and special, quantitative and qualitative methods, the choice of which was determined by the purpose and objectives of this scientific work.

The work uses general scientific methods, in particular, traditional and critical analysis, synthesis to understand the essence of emigration of educational institutions of secondary education. To determine the causes and factors of the spread of migration intentions, special sociological methods were used, namely, a secondary analysis of statistical results and sociological studies conducted in Ukraine by leading research centers.

To determine the trends in the formation of life plans and emigration intentions characteristic of pupils and students living in the border regions of the South of Ukraine (in particular the Odessa region, which borders Moldova, Transnistria, Romania), the authors of the article – the members of the Southern Branch of the Sociological Association of Ukraine took part in implementation of the grant project "Common language: public dialogue on the law "On education" in the Odessa region" (No. RFR-43-2018 dated 02.05.2018). Within which during 02.05-30.11.2018 two empirical studies were carried out in Odessa, Bolgradsky (Bolgrad, Banivka village) and Izmail (Izmail, Broska village) districts of the Odessa region):

1) a formalized interview at the place of study and residence of the respondents (250 respondents took part, of which: 50 students, 100 pupils of senior classes of secondary educational institutions and 100 parents of schoolchildren);

2) in-depth interviews at the place of work and study of informants (80 respondents took part: 15 of them were representatives of local authorities and self-government bodies (various structural units – education, culture); 15 heads of schools and other educational institutions (vocational and technical educational institutions, institutions of higher education of

1-4 levels of accreditation); 15 school teachers (of the Ukrainian language and other subjects); 5 parents of pupils of schools with the language of education of ethnic minorities and with the Ukrainian language of education); 5 senior pupils of secondary schools with the language of education of minorities and with the Ukrainian language of education; 10 students; 5 representatives of public organizations, ethno-national communities; 5 employers; 5 representatives of local political parties.

The sample is quota, representative by sex, age, ethnicity, place of residence and sphere of professional activity of the respondents.

The empirical study was carried out using the instrumentarium developed within the framework of the "Reforms to the Regions" project, which was carried out by the Institute of Economic Research and Policy Consulting in cooperation with the editorial board of the newspaper "Evropeyska Pravda" (with financial support from the European Commission and the International Foundation "Vidrodzhennya") [17].

## 3 Research results and discussion

Determination of the place and role of education in the life plans of pupils and student youth in the Odessa region provided for the identification of motives for obtaining higher education, as well as ideas about their future life prospects. The analysis of the answers received allowed us to conclude that students strive to get higher education for personal development (72% of the total number of respondents). On the other hand, the pupils and their parents turned out to be more pragmatic in their thoughts about the mission of higher education in the life of young people, probably realizing the direct connection between obtaining it and the implementation of life plans. As most of them noted the need to obtain higher education for employment to a well-paid position (54% and 45% respectively) (table 1).

On the fact that the respondents have emigration intentions, we note that every sixth student, every third high school pupil and every third parent (16%, 27%, and 32% respectively) believe that obtaining a higher education allows a person to continue studies abroad in the future. Almost the same number of informants (every sixth student, every third pupil and every fifth parent (17%, 31%, and 19% respectively)) determines that higher education provides an opportunity for employment abroad.

As evidenced by the research data, the thoughts of high school pupils and their parents about the life plans of their children are inextricably linked to the possibility of continuing education after graduation. The majority of the surveyed students (74%) believe that for future successful self-realization in the profession, you need to have a higher education. Other respondents (11%) do not see a direct connection between their future profession and getting higher education, or they have certain difficulties regarding the wording of the answer to this question (10%) (table 2).

**Table 1.** Distribution of answers to the question "What, in your opinion, does a higher education give to a person?" (% of the total number of selected answer options in each social group) [17].

| Answer options | Students | Pupils | Parents |
|---|---|---|---|
| Personal development | 72 | 32 | 37 |
| Opportunity to get a well-paid profession | 52 | 54 | 45 |
| High level of professional training | 50 | 43 | 32 |
| Opportunity to work in better conditions | 42 | 35 | 44 |
| Opportunity to get an interesting profession | 38 | 43 | 37 |
| Useful practical skills needed in the labor market | 28 | 21 | 17 |
| Opportunity of employment abroad | 18 | 31 | 19 |
| Opportunity to study abroad | 16 | 27 | 32 |
| I think that it gives nothing | 4 | 12 | 13 |
| Other | 2 | 3 | 2 |

**Table 2.** Distribution of answers to the question "Do you need a higher education for your future profession?" (% of the total number of surveyed people) [17].

| Answer options | % |
|---|---|
| Yes, I need it | 74 |
| No, I don't need it | 11 |
| I find it difficult to answer | 15 |

With regard to plans to continue the study after graduating from school, almost three quarters of the surveyed pupils (77%) plan to enter higher educational institutions. The majority of their parents (71%) confirm these intentions by giving a positive answer to a similar question. The expectations of students are also optimistic – 60% of whom strive to continue their study in the future in the graduate studies, postgraduate studies. Only 14% of pupils and 17% of parents are oriented towards continuing the education in a vocational and technical institution after graduating from school (table 3).

In order to find out the reasons for the reluctance to continue education after graduation from school, the pupils and their parents were asked a clarifying question "If your child does not plan to continue education after graduation from school, please indicate the reasons?". Among the answers presented, most of both pupils and parents indicated the lack of material opportunities in the family to continue their education, as well as the lack of confidence that further education would allow successful employment in the future.

Every tenth student (10%) considers the possibility of studying abroad, which confirms the voluntariness of choosing a life strategy, as well as the presence of intentions to implement educational emigration. Studying abroad for their children is planned by 15% of parents, who identify Poland, Bulgaria, Germany, Russia, the

**Table 3.** Distribution of answers to the question "Do you (Does your child) plan to continue education (higher educational institution) after graduation from school?" (% of the total number of surveyed people in each social group) [17].

| Answer options | Students | Pupils | Parents |
|---|---|---|---|
| No, I do not plan (he/she doesn't plan) | 12 | 4 | 5 |
| Yes, I plan (he/she plans) to enter higher educational institution (university, institute) / graduate studies, postgraduate studies | 60 | 77 | 71 |
| Yes, I plan (he/she plans) to enter college (technical college) | – | 9 | 12 |
| Yes, I plan (he/she plans) to enter a vocational and institution educational institution | – | 5 | 5 |
| I find it difficult to answer | 27 | 5 | 7 |

Czech Republic, Slovakia, Canada among the recipient countries.

This position of the parents is absolutely understandable, because the reason is their personal experience. It is well known that there is virtually no production in most of Bessarabia, therefore economic factors of public discontent prevail. Despite the fact that the border regions (Bolgrad, Izmail) are known for fertile soils and high-quality agricultural products, in the absence of an appropriate level of investment, the economy is rapidly declining, as a result, the unemployment rate is growing. Residents of working-age have to migrate to neighboring countries of the European Union in search of at least temporary earnings [18]. And loving parents, as it is known, demand a better destiny for their children than their own one.

Therefore, perhaps precisely because of the lack of financial opportunities, the majority of pupils (72%) and their parents (61%) prefer Ukraine and plan to continue their studies in domestic institutions of higher education after graduating from school (table 4).

**Table 4.** Distribution of answers to the question "What option of education for you/your child in an educational institution is more acceptable?" (% of the total number of surveyed people in each social group) [17]

| Answer options | Pupils | Parents |
|---|---|---|
| I do not plan (he/she doesn't plan) to continue studies | 2 | 4 |
| In Ukraine | 72 | 61 |
| Abroad | 10 | 15 |
| I find it difficult to answer | 16 | 10 |

In general, the results, which are presented in table 4, indicate the presence of a relatively low potential for educational mobility. But attention is drawn to the fact that at the time of the study, 16% of pupils and 20% of their parents did not answer this question. In its turn, this may indicate that they have not yet finally decided on the choice of the country where they intend to continue their studies after graduating from a secondary educational institution.

Regarding the life plans and educational emigration intentions of students, we note that 22% of the respondents are considering options for continuing their studies abroad, 12% have no such plans. Students intending to continue their studies abroad, among the desired countries, named Germany, Bulgaria, Poland, France and the Czech Republic.

Almost every tenth pupil and almost every tenth student consider the opportunity in the coming years to continue their studies or find a job abroad, choosing countries both neighboring to Ukraine (10% and 8% respectively) and other more distant foreign countries (9% and 14% respectively). It is very encouraging that 48% of students and 52% of pupils intend to associate their future with Ukraine (table 5).

**Table 5.** Distribution of answers to the question "Where do you plan to study or work in a few years?" (% of the total number of surveyed people in each social group) [17]

| Answer options | Students | Pupils |
|---|---|---|
| In Ukraine | 48 | 52 |
| In the neighboring countries to Ukraine | 8 | 10 |
| In other foreign countries | 14 | 9 |
| I find it difficult to answer | 30 | 29 |

Thus, the analysis of the data obtained allows us to conclude that, despite the established emigration intentions of a certain part of the respondents, the majority of the respondents associate their future with Ukraine. Intentions for educational emigration are more characteristic of student youth, this is due to the fact that the education received in foreign countries will facilitate their employment in the international labor market.

The results of the survey of students, pupils and their parents, obtained during the formalized interview, coincide with the data of the in-depth interview. Here are some examples from interview transcripts.

So, answering the question about the desire to study at an institution of higher education abroad, some students gave solid, detailed answers:

- "I was going to study in Bulgaria, even entered the Faculty of Economics at the University in Varna, but it is clear that this is very far away and I decided to stay in Ukraine, I entered the Odessa Polytechnic University. In Bulgaria, education is at a higher level, there is no corruption, you study yourself, pass yourself, attend classes freely".
- "I didn't want to leave my native country, my Motherland. I know that the level of education in our country is quite high. This is confirmed by the fact that a large number of foreign students from other countries come to our Odessa National Polytechnic University to study, and they find here the knowledge that they cannot receive in their country. I would not want to leave the country and I want other students and children to understand that it is good to study in our country".

Discussing the intentions of looking for work abroad, three out of ten surveyed students agreed to temporarily leave Ukraine for successful employment:

- "If there is a well-paid job abroad, I will go there, but I will definitely return to Ukraine".
- "So, if there is a need for it, if the circumstances will be of a kind – life, political. Since there has been a conflict situation on the territory of Ukraine in recent years. Although I don't want to leave".
- "If there is such an opportunity and there is no language barrier, then of course "yes"".

Two out of five surveyed pupils, answering the question "Where do you see your future – in Ukraine or abroad?", gave reasons for their intentions regarding a possible departure to Bulgaria in the future to receive education, upon condition of returning to Ukraine after receiving it:

- "I want to get an education in Bulgaria in order to get a European-style diploma and have more opportunities to live in another European country in the future. I have not yet chosen a specialty, a profession finally, but I am thinking about it. However, after completing higher education in Bulgaria, I may return to Ukraine and work here".
- "I am more inclined to stay in Bulgaria, I like their cities, perhaps because it's just something new, interesting. Remembering all the problems that exist in Ukraine today, I do not think that something will make me go back after graduating from a university in Bulgaria".

Separately, it is worth drawing attention to determining the place and significance of the language in the possibility of realizing the life plans of pupils and youth, since for the border regions the issue of the language barrier when moving to study to a neighboring recipient country is less relevant. Considering, first of all, the high level of adaptability of representatives of the youth community, which was repeatedly emphasized by the research participants:

- "It would be easier for children to adapt if there would be more Ukrainian language in schools, if they immediately started communicating in Ukrainian there. And then in general there would be no adaptation process"(representative of the national-cultural society).
- "They adapt normally. I don't see any particular problem in this. For example, our children who graduated from school here, then went to study in Odessa, and they have no problems. They have basic knowledge of the Ukrainian language, so this is enough, and then they learn to communicate with each other, live in a dormitory with Ivano-Frankivsk residents and automatically speak Ukrainian even at home. I studied at a Bulgarian school, we studied a completely different Ukrainian language, because Western speech is real Ukrainian, which was spoken by Taras Shevchenko" (representative of the national-cultural society).
- "It takes 1-2 years to adapt and the children adjust, they "absorb like sponges"" (representative of a local political party).

However, teachers are not so optimistic in their reasoning and have certain doubts about this:

- "If you studied for 10–11 years in one language, and then you come to a university where, all the textbooks, definitions are in a different language, of course it is very difficult, I can't even imagine how children adapt".
- "If in technical universities, then I think without problems, but if in philological universities, then the person knew what exactly he/she chose. I have not analyzed the situation to talk about the emergence of a trend".
- "If in Ukrainian higher educational institutions, it is difficult. I have an example from my student life, when a girl from Zakarpattia, who studied at a Hungarian school, who studied with me, did not speak Ukrainian and did not even understand it at the everyday level. However, after five years of study, she made an effort and received an honors degree. That is, everything depends on the particular child".
- "I think that there are certain problems at the beginning, but if you want to learn you can adapt, children aged 17–18 actively communicate with their peers and quickly adapt".

The results of the study showed the fact that among the pupils of secondary schools, their parents, students there is a growing awareness of the need to properly study the state language and the influence of the level of proficiency in it on improving the life chances of future applicants. First of all, given the fact that most of the respondents show their desire to continue their studies and find a job in the future in Ukraine.

The majority of respondents believe that teaching in Ukrainian in national schools increases the chances of entering higher educational institutions in Ukraine and improves the life chances of graduates of national schools. The research participants do not deny the importance of knowing Ukrainian as the state language, as well as other languages for the implementation of life plans.

The second position is clearly confirmed in the answers of the respondents received during in-depth interviews with representatives of national-cultural societies, politicians, employers:

- "If we talk about the Odessa region, then "no", since our overwhelming majority of people are Russian-speaking. However, in Ukraine as a whole, perhaps even "yes". The more languages a person knows, the more opportunities he/she has".
- "In our case – "yes", we work with customers on the territory of Ukraine, therefore, preference is given to people with knowledge of the Ukrainian language. There are many vacancies in the labor market today for persons with fluent English. Of course it is easier for them to find work".
- "It certainly increases the chances a lot. Today, a university graduate who strives to enter the civil service, must take a test for knowledge of the Ukrainian language, this is an indispensable prerequisite".

According to the participants of the in-depth interview, there is no direct connection between the level of proficiency in the Ukrainian language and the increase in the chances of graduates of secondary schools to enter domestic higher educational institutions and further employment. According to the respondents, the non-competitiveness of young people, associated primarily with the shortcomings of the functioning of the modern domestic education system:

- "Non-competitiveness has nothing to do with the language of education, the reasons for this are the shortcomings of modern domestic higher education, which is not able to keep up with the times" (representative of the national-cultural society).
- "No, I don't think that anything depends on the language of education. I was recently in Zakarpattia to study the experience of forming united territorial communities, there are a number of Hungarian schools, lyceums, colleges where Ukrainians go to study. Unfortunately, they simply do not see prospects in Ukraine, but see them there in Hungary. After graduating from Hungarian educational institutions, they enter Hungarian universities, and then go to Hungary to find a job. Our Bulgarians in the south of the Odessa region have the opportunity to travel to Bulgaria, but our situation cannot in any way be compared with the situation in Zakarpattia" (representative of a local political party).
- "Regarding life chances ... it does not depend on the language ... but as for entering educational institutions, despite the fact that the external independent assessment is carried out in the Ukrainian language, of course the in-depth study of the Ukrainian language helped" (student).

In the context of discussing the problems of the relationship between the level of proficiency in the Ukrainian language and improving the life chances of graduates of secondary schools, the subjects of education emphasized that the insufficient level of proficiency in the Ukrainian language by graduates leads to the fact that they cannot pass an external independent assessment in the Ukrainian language and lose the opportunity to enter state higher educational institutions in Ukraine: "Every academic year we come across the situation, when the external independent assessment points in the Ukrainian language and literature are not enough for individual graduates to enter higher educational institutions. There are not so many of them – up to 100 people, they successfully pass physics, chemistry, however, due to the fact that they belong to representatives of ethnic minorities, they pass the Ukrainian language much worse and thereby lose the opportunity to enter state higher educational institutions in Ukraine" (teacher).

Among the determinants of the quality of teaching the Ukrainian language and other languages, the level of language proficiency by secondary school pupils there are the factor of residence, the level of qualifications of teachers and motivation of students to learn languages.

The issue of financial incentives for obtaining higher education in the country, the creation of decent working conditions and new jobs is also relevant. Thus, proposals and practical recommendations for improving the situation associated with the identified problems that exist in the region today were partially formulated in their statements by employers, answering the question "Today, part of the youth is focused on employment abroad. What steps can you suggest to overcome this trend?":

- "Besides the knowledge of the Ukrainian language, it is necessary to develop oneself in other sciences, to love to work. Today, young people in most cases do not want to work, they only want to receive high wages, while doing nothing".
- "Children have to see the perspective in our country, in addition, to understand not only the advantages, but also the disadvantages of employment abroad".
- "Everything is elementary simple – to give such a salary as is given abroad".
- "It would be effective to offer jobs with decent wages after graduation from higher educational institutions, so that they do not seek a better life in Europe or the United States. The money factor is very significant".
- "The first step and the most important one is to improve the social standard of living of the population. A simple mechanical increase in wages will entail inflation, so we should talk not only about improving material well-being, but about systematic activities to improve the economic situation in the country".

## 4 Conclusions and recommendations

The analysis of the research results helped to reveal that the life plans of high school pupils are related to the continuation of their studies after graduating from school, because 3/4 of them are focused on obtaining higher education. 14% of pupils in secondary education institutions are focused on studying at a college (technical college) after graduation from school. According to the informants, the most important arguments in favor of obtaining a higher education were such as the opportunity of personal development, obtaining a well-paid profession and a high level of professional training, continuing education and employment abroad.

Emigration intentions were found in both students and pupils. For the first ones the desire to implement educational and labor emigration is characteristic, while for the others – mainly educational. Speaking about the possibility to continue education after graduating from school, most of the surveyed pupils give their preferences to domestic higher educational institutions. Every tenth pupil and every fourth student have intentions to continue their studies abroad. The trajectory of their emigration intentions is directed towards external emigration, because among the desired countries to study, students named Germany, Bulgaria, Poland, France and the Czech Republic. The interviewed parents for their children also choose such countries as Poland, Bulgaria, Germany, Russia, the Czech Republic, Slovakia, Canada. These trends can be

explained by the existence of a high level of economic development of these countries, close cooperation, which has been established between Ukrainian higher educational institutions and universities of these countries, the availability of exchange programs for pupils, students and teachers.

According to the majority of the participants in the in-depth interview, there is no direct linear connection between the level of proficiency in the Ukrainian language and the growth of the chances of school graduates to enter higher educational institutions, as well as the chances of successful employment.

It is virtually impossible to stop the phenomenon of educational and labor emigration of the younger generation in the border regions by administrative measures, but it is first of all necessary to try to minimize their negative consequences. State policy should, first of all, be aimed at supporting the positive component of educational mobility. In particular, due to the activation of temporary residence programs at the border of Ukraine, for example, within the framework of the Erasmus+ program, there is the deployment of opportunities for the issuance of double diplomas by universities.

It is equally important to conduct information work among students about the opportunities and consequences of international educational emigration for both recipient countries and donor countries. As well as the coordination of intergovernmental agreements in the framework of the implementation of cross-border cooperation, in particular, regulatory documents governing the rules for admission to the graduate study, postgraduate study of domestic higher educational institutions after completing bachelor's programs at foreign universities.

Summing up, the following advantages of the growth of cross-border educational mobility of young people in Ukraine should be highlighted, such as: gaining experience in intercultural communications, their use and popularization in Ukraine; the formation of new social capital thanks to student youth, who acquire cross-border education and can further use it to create and implement international social and business projects; use of international experience in developing strategies for the development of university education in Ukraine. Despite the obvious advantages, one should point out the challenges posed to the country by the cross-border educational mobility of youth. This is the loss of a part of social capital and financial capital as a result of the import of educational services by institutions of secondary and higher education from other countries, a decrease in domestic demand in the educational services market, and a reduction in jobs for scientific and pedagogical workers in the institutions of higher education of Ukraine.

So, for Ukraine, a particularly urgent task is to use the potential of cross-border regions not only for integration into the European educational space, but also to use the experience of the European Union countries in increasing the competitiveness of national and regional educational systems by the modernization of national higher education.

It is obvious that the implementation of some of these steps will improve the state of affairs in educational emigration not only in the border regions, but also in the country as a whole. Bessarabia, in this sense, like part of Zakarpattia, has its own specific regional peculiarities in terms of the settlement structure, social and economic situation, and requires special attention from the governmental authorities, which must remember the main thing – Ukrainians, wherever they live, constitute the basis of the resource potential of Ukraine.

Investigating the place and role of education in the life plans of Ukrainian youth, the motives for obtaining higher education, emigration intentions for educational and labor mobility, the role of the Ukrainian language in achieving the life plans of pupils and students were analyzed. However, these issues do not complete the entire depth of the problem, both at the state, regional levels, and at the level of a specific personality, and require further research, analysis to develop recommendations and technologies as for the possibility of saving a labor resource, attracting young people to develop their own country.

The primary task in resolving the issue of educational emigration from Ukraine should be the development of state policy. It is impossible and unnecessary to influence these processes by administrative measures in a market economy, since they have their positive side – obtaining foreign learning experience, knowledge and connections for students returning from foreign studies.

At the same time, it is necessary to develop a system of measures that will promote effective educational mobility with positive effects for the Ukrainian economy. It is not necessary that our high school graduates go to study abroad at the age of 17 and stay there after graduation. The same foreign learning experience can be obtained through semester exchange programs, academic mobility under the Erasmus+ program, and double degree programs. But do future students know about it? We need to do educational work. Inform applicants about international academic mobility programs available at Ukrainian universities. And also inform them about the positive and negative aspects of going abroad to study. Special attention should be paid to double degree programs that allow you to combine studies in the EU and Ukraine. They allow you to study simultaneously in Ukraine and abroad. This is an ideal solution to the problem, but there are very few such really functioning undergraduate programs. Most of them are designed for master students. It is obvious that clear intergovernmental agreements are needed with the relevant authorities of the countries in order to solve the problem of educational emigration. It is also important to create financial incentives for applicants to stay in Ukraine, in addition to the opportunity to enroll in a state-funded form of education. The essence of this system of motivation requires further discussion.

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