relevant results and theoretical developments
of science and research

12
2022
issue 2, special XXX.

AD ALTA

Journal of Interdisciplinary Research

AD ALTA: Journal of Interdisciplinary Research
Double-Blind Peer-Reviewed
Volume 12, Issue 2, Special Issue XXX., 2022
Number of regular issues per year: 2

MAGNANIMITAS Assn.

Usachevsky, O. Luening, discovered insufficient development of clear criteria for evaluating phenomena associated with the tradition of experimentation. The researcher focuses on the fact that an important factor in the holistic analysis of experimental and innovative examples of composer creativity is the use of literature from various fields of knowledge: mathematics and computer technology, information theory and cybernetics, phenomenology, linguistics and semiotics, semantics, philosophy of music, meditative practice and Oriental studies [8]. Studying samples of experimental music created with the use of technical means, almost for the first time, Ukrainian scientists faced the question of the impossibility or ineffectiveness of musicological analysis in the traditional sense. The main problem was that each work is unique from the point of view of the dialectic of music and computer technology. Therefore, further research by scientists was directed into the field of the experimental analysis of the technology of the creative process, which is sometimes impossible without the composer's comment.

The study of the role of musical computer technologies and the peculiarities of their use in the creative process is related to the issues of I. Haydenko's dissertation "The role of musical computer technologies in modern compositional practice" [6]. The author focuses on the peculiarities of the use of information technologies in composers' creativity and considers computer technologies as a basis for a new type of creative thinking on the examples of the works of representatives of modern foreign and Ukrainian musical culture. The researcher emphasizes the structural and functional similarities between compositional techniques and music computer technologies: they are both ways of creating music by a person, and the difference lies only in their nature. While compositional techniques do not go beyond the boundaries of human activity, musical computer technologies are their reflection in human consciousness, embodied in software and hardware. Musical computer technologies first accumulated the properties of compositional techniques and then began to influence musical composition themselves.

Investigating computer technologies and new creative musical possibilities on the example of the activities of IRCAM (Paris, France), I. Haydenko singles out the main directions of development of the field of music computer technologies that are directly related to composer practice, including the research direction on sound synthesis, creating music, developing computer equipment and specialized computer programs, etc.

The development of analytical methods for the study of electroacoustic compositions remains an urgent issue for Ukrainian musicologists. Researchers repeatedly addressed this topic [2, 9, 16, 17, 20], but each time the author's idea of electroacoustic and electronic music was adjusted according to the ideas of the researcher himself. This tendency is maintained due to terminological desynchronization between different schools of musicology. The author of the term *electronic music*, V. Meyer-Eppler, used it to define compositions created using electromechanical or purely electronic sounds. In the USA, for example, under the term *electronic music*, as noted by V. Kamins'kyj, "< ...> all derivatives and directions close to it, such as concrete music, *Music for Tape* and others, have been united, without causing terminological confusion and ambiguity <...>" [9, p.35]. In our opinion, the term *electronic music* only indicates the technology and does not establish stylistic restrictions, as well as genre restrictions. Such an opinion coincides with the reasoning of such an authoritative researcher of electronic music as L. Hiller. He noted that there is no difference in approaches to the process of creating music, but there is a difference in the means that the composer chooses for this. When creating symphonic music, he must work with orchestral means; instead, for a piece of music to be electronic, its author must provide for electronic sound generation, processing with effects, etc.[2] In agreement with L. Hiller, S. Shyp (Ukraine) calls electronic music the one "the material basis of which is electronically produced, prepared, and synthesized sounds" [17, p. 146]. Such a definition, in our opinion, should be taken into account by scientists, as it is quite clear, comprehensive and does not create other meanings.

The term *electroacoustic music* has a broader meaning than the term *electronic music*. Emerging in France in the late 1950s as a result of a combination of compositional techniques and a concrete and electronic approach to sound, electroacoustic music today is entirely related to the use of computer software. Historically, it so happened that in some European countries the term *electroacoustic music* encompasses concrete, electronic music, psychoacoustics, acousmatics. Electroacoustic music also includes computer music and its branches - interactive, algorithmic, stochastic, and experimental music [22].

The dissertation research of I. Rakunova "New compositional technologies (on the example of the work of Alla Zahajkevych)" [16] is devoted to the issue of the use of electronic technologies in the process of creating electroacoustic compositions.

The musicologist examines the history of the development of electronic technologies, the history and theory of algorithmic composition, researches sound synthesis technologies, etc. The technology of sound processing in real time is investigated by I. Rakunova using the example of A. Zahajkevych's work "Pagodas". At the same time, another work of the composer – "Air Mechanics" - became the subject of studying the features of algorithmic composition. The work is analyzed with an emphasis on its connection with the "Computer Assisted Composition" technology (compositions using a computer[3]).

Among the types of synthesis used by A. Zahajkevych in the electroacoustic work "Heroneia", wave-table synthesis and granular synthesis are distinguished. In addition, it was found that the author widely implements the effects of instrument sample processing - reverberation, various filters, skillfully using the functionality of computer programs, including Super Collider Sound Hack and others.

The basis of Rakunova's multifaceted research is an attempt to find the correct application of modern computer technologies, to determine their place in the creative process, as well as in its analysis. So, among the most important problems facing the musicologists of the world today, the researcher includes such as the development of a unified analytical terminology, the development of effective methods and tools for the analysis of electronic works, and the study of the processes of musical creativity with the help of mathematical models. Studying the electroacoustic works of Zahajkevych, Rakunova proves that the main question of musicological analysis is that each work is unique from the point of view of the dialectic of music and computer technology. Therefore, it seems possible to identify certain common features and relationships only from the standpoint of using certain technologies or computer programs. Everything else is the sphere of experimental analysis of the creative process technology.

4 Discussion

The problem of the existence of the limits of the computer' creative possibilities, which was touched on in the works of D. Oppenheim, I. Pyaskovs'kyj, the questions about the measure and ways of identifying the individual author in the compositions created with the help of a computer, raised in the works of I. Haydenko and I. Rakunova, the relationship between the personal-composer' and the machine' were continued in the research of Ukrainian musicologists in the early XXI century. Tuchynska's dissertation study "Understanding a musical text: theoretical and informational aspect" is devoted to algorithmic composition, its essence and software implementation [20]. The researcher studied the problem of formalization of the process of understanding the musical text and the frame approach to modeling the composer's style using the example of the work of

[2] Hiller, L.A. (n.d.). *Electronic music. An Encyclopaedia Britanica Company*. https://www.britannica.com/art/electronic-music

[3] The technical solution is implemented on the basis of the PatchWork program

teacher in the digital age are formed as an integral structure. It represents an integral structure of such competencies, the totality of which is necessary to create pedagogical conditions for the implementation of the professional activities of a teacher [12, 19]. As it is known, the main areas of work of a higher education teacher include educational, methodological, research, and managerial functions.

With this in mind, the methodological basis of the study was as follows:

- The provisions of the system-activity approach (L.S. Vygotsky, A.N. Leontiev, S.L. Rubinshtein, etc.), according to which knowledge acquires value only when it is included in educational activities;
- The provisions of the personal approach, suggesting the development of the personality through the organization of its activities;
- The provisions of the integrative approach, which determine the systemic and holistic education, the integrative essence of the professional activity of the future teacher.

The theoretical basis of the study was made up of studies in the field of the competence-based approach, studies of the features of the organization of the information and educational environment of an educational organization.

3 Results and Discussion

The competencies of a teacher are directly related to the criteria for effective performance, so it remains an open question how those university teachers who provide the best educational results differ from their colleagues, being considered the best from the point of view of students, or having expert potential. The EAQUALS competency matrix, which sets standards in language education, identifies a cohort of expert teachers who have the following characteristics [3, 10]. First, they act as mentor to less experienced colleagues, guiding them in the selection and development of training materials, learning management, error correction, and professional development. Secondly, such professionals influence not only the activities of their colleagues and students, but also the educational organization; they play the role of a leader: they participate in the decision-making process, constructively evaluate the effectiveness of the educational process, develop new systems and processes, coordinate administrative and educational tasks, performed by others. Thirdly, their skills differ in breadth and depth; for this reason, such teachers use a wide range of approaches and techniques to develop different skills, manage groups of students with different cultural contexts, different ages, with different needs, at different levels, respond to special needs. Moreover, expert-level educators demonstrate critical thinking skills and flexibility by analyzing the effectiveness of assessment tools and feedback methods, critically evaluating tools and resources for professional development, developing alternative approaches, adapting to the context, adequately responding to unforeseen circumstances, improvising according to the needs of students.

Special mention should be given to the student-centered (personally oriented) education they carry out, which is manifested in the creation of a constructive atmosphere, the involvement and motivation of students, the support of discipline, the support of students at the group and individual levels, the development of educational autonomy of students. Much of the above comes with practice: routine actions are automated, so experts can be more flexible, make decisions faster and perform more complex tasks.

However, the digital age has added a new component to the aforementioned teacher competency framework: digital competency. The government of the European Union has for several years expressed concern about the slow introduction of digitalization processes in training and education. In order to study the state of the current level of implementation of e-learning in educational institutions of the EU countries, the European Commission conducted a survey of citizens' opinions and published it as part of the Eurobarometer. According to it, the most important aspects of education and learning, as EU citizens believe, are related, in particular, to the teacher's ability to attract and motivate students. This area is considered the most in need of improvement (51%). Other areas that require special attention are the learning environment to stimulate creativity and curiosity (41%), as well as practical work experience in a company or organization (37%). The vast majority of EU citizens (95%) believe that the necessary competencies and skills can be obtained outside of formal education, in particular, foreign language skills, as well as practical skills that are in demand in different segments of the economy [6]. EU initiatives to digitize education have focused on formal educational institutions, from kindergartens to universities, but non-formal adult learning remains a key idea, as lifelong learning is one of the areas where, according to the study, the European Union is still not achieved the desired result. Therefore, in 2018, the so-called action plan was published, considered as a priority in the field of digital education.

In the last decade, a unique situation of dialectical contradiction has been created: a generation is growing that knows how to handle various gadgets from an early age, and this generation is taught by those who grew up in a system of classical linear education without constant access to the Internet and without social networks. The Eurobarometer data confirms these positions - only 20-25% of students in European universities are taught by teachers who are confident users of new technological achievements, 43% of Europeans do not have basic digital skills, and 71 million students in European countries have insufficient skills for the digital society. Given the need to take decisive action in the field of education, the European Commission adopted the main provisions of the Current Plan for Digital Education in Brussels on January 17, 2018, calculated up to 2022 [11].

Decisions to introduce innovations in education and training were made dynamically and consistently. In the Declaration, adopted in Rome in March 2017, the European Education Commission emphasized the EU's commitment to providing the population with better education and training. In October 2017, the Council of Europe called on the education and training system to be at the level of the digital age. In November 2017, at the Gottenberg Summit, the European Parliament, the European Council, and the European Commission on Education adopted the European Human Rights Framework, which emphasized the human right to quality and inclusive education and lifelong learning [21].

The communiqué “Strengthening European identity through education and culture”, adopted at the Gottenberg Summit, presented a perspective vision for the European educational space, an important part of which was the Digital Education Action Plan. The first European Education Summit was held in Brussels on January 25, 2018 under the title: “Fundamentals of a European Educational Space for Innovative, Inclusive and Value-Based Education” [5].

The summit highlighted the lack of progress in the following areas: the basic skills of young people in Europe, the need to address inequalities in education systems, and greater investment in education. During the summit meeting, the issue of how to use the most modern scientific knowledge and methodological techniques to implement a value-based approach to learning was considered. Education must become part of civil society in order to achieve high-level political consensus to address the problems of inequalities in education and the development of social cohesion.

Key competencies were revised in terms of lifelong learning, listing the knowledge, skills and abilities necessary for lifelong learning, including digital competencies.

The action plan clearly outlines how education and training systems can make better use of innovation and digital technologies and support the development of relevant digital

competencies needed to live and work in an era of rapid digital change.

According to the plan, Europe's digital transformation is expected to accelerate due to the rapid development of new technologies such as artificial intelligence, robotics, cloud computing and blockchain. Like previous major technological advances, digitalization processes have a significant impact on all areas: everyday life, human interaction, education, and work. Foresight generalizations express expectations about the professions of the future - some jobs will disappear, others will need to be replaced, new jobs will be created, and new activities will emerge [9]. All these processes convince that the development of digital skills throughout life is a priority.

While digital transformation offers many opportunities, the biggest risk today is that society is not sufficiently prepared for such changes. Therefore, an extremely important role in such conditions is given to education. Namely education that should be the basis for the growth and integration of the individual, while the key task is to prepare citizens to make the most of the available opportunities and respond to the challenges of a rapidly changing, globalized, and structurally interconnected world.

Pan-European cooperation realized through the exchange of best practices, peer learning and exchange of evidence, is a proven way to support education systems in the states of the European Union. Common frameworks help define effective solutions, while common tools like eTwinning increase efficiency and expand the sphere of digital reach. Innovative practices in education, in particular digital ones, are widespread in the EU. They take various forms and include public, private, and non-governmental actors. However, innovation in education systems is not an end in itself, but a way to improve the quality and inclusiveness of education systems.

Research data from the European Institute of Innovation and Technology have shown that already now, without waiting for changes in legislation, stakeholders are actively using digital opportunities to improve teaching and learning [16, 18]. There is a need to share, discuss, promote, and scale up innovative practices. Concepts, tools, methods, processes, systems thinking and design thinking need to be more accessible to educators who for now tend to be under-informed about innovations in the education system.

Stakeholders in education and training are key players in the innovation process. Public consultations highlighted the need for more focused EU action to support the introduction of innovative approaches and digital technologies in education, as well as the development of digital competencies, including digital media literacy and digital security and well-being [8]. The focus is on the implementation and the need to stimulate, support, and expand the targeted use of digital and innovative educational practices. The plan is expected to be drawn based on a wide range of education and training stakeholders, including the business community, research, NGOs, and non-formal education where appropriate.

At the same time, innovations in the field of education and training largely depend on the competence of teachers in universities. The implementation of these innovations is possible only with an innovative approach that combines teacher training, curricula adjustments, and teaching materials to implement digital learning models. This organization-wide approach to digitalization of teaching and learning is reflected in the SELFIE self-assessment tool [14]. SELFIE is one of the 13 initiatives announced in the Digital Education Action Plan (2021-2027) of the European Commission. SELFIE for Teachers is a self-assessment tool based on the European Digital Competence Framework for Educators (DigCompEdu), which was developed to support teachers in developing digital competencies and in using digital technologies for effective teaching and learning. Users of the tool need to first fill out a questionnaire to identify their strengths and weaknesses in relation to digital competencies. The following step is personalized feedback pointing out areas for further development, and a customized study plan that can be completed on own schedule. Moreover, the tool connects users of all levels of digital expertise to share knowledge, challenges, and best practices. The tool has been tested by 3299 teachers from 5 European countries. Five of these teachers from Portugal, Italy, Ireland, Lithuania and Estonia were invited to the event, where they were able to share their stories about the use of SELFIE for teachers and put forward suggestions for improving the tool [2]. SELFIE for teachers is currently only applicable to primary and upper secondary education. However, the European Commission is considering extending the use of SELFIE to teachers of higher education. The platform was perceived as user-friendly and useful for sharing experiences between teachers.

The digital competencies of teachers are the basis for the transformation of universities. At the same time, the structure of the competence model of a teacher of higher education can be considered as a tool that allows employers and society as a whole to demonstrate what competencies the university strives to provide for graduates and what relevant requirements the university imposes on its teaching staff.

The digitalization of higher education is accompanied by the incorporation of digital competencies into the structure of academic capital - the skills of teaching and research activities in the digital environment. They acquire an independent value, and also form the methodological basis for a set of professional competencies of a teacher.

Based on the framework model of digital competencies proposed by the Joint Research Center of the European Commission, variants of digital competency grids for various empirical objects are being developed. In particular, the grid for university teachers proposed by German scientists includes eight dimensions: IT literacy, the ability to search and work with digital information, communication and collaboration in a digital format, digital learning, digital identity and career planning, digital scientific activity, digital production of media products, analysis and comprehension [3]. Another version of the grid can be created on the principle of embedding a digital component into the basic competencies of a university teacher: scientific-subject, psychological-pedagogical, communicative, managerial and creative digital competence [1].

The empirical study of various aspects of digital competencies is gaining momentum: promoting digital literacy in the culture of education; measuring the level of formation of digital competencies; readiness of teachers to teach digital skills and barriers to this; differences in the profiles of digital competencies of students and university teachers, as well as in the development trajectory of social network communicative literacy, etc. [11].

Competency models are generated in response to the needs of the environment and social institutions. Rapid sociotechnical transformations make modeled competency grids a special case, not always relevant to current tasks and the current state of social systems, which actualizes the need to develop a more universal approach to studying the results and possible scenarios of academic development. In the empirical study of academic capital, it is important to take into account that its structure is determined by factors of different genesis - institutional, organizational-environmental, personal. In particular, t the institutional level, a frame of academic normativity and competence is being formed, correlated with the mission of the university and the functions of higher education in specific social conditions. The environment of the organization produces incentives for building competencies that affect the system of professional dispositions. The personal factor is the internal motivation of the teacher, his orientation towards professional development.

In our study, we attempted to identify and analyze the competence of the best teachers from the perspective of students studying at universities of two types: a classical university (Charles University in Prague) and a research university (Czech Technical University in Prague). The study was conducted in

several stages: 1) preparatory - development and testing of the questionnaire and checking its validity; 2) research - data collection; 3) analytical - analysis of respondents' answers and summing up the results of the study.

In the first stage, 40 second and third year students of the Czech Technical University (aged 19–20) were asked to answer two open-ended questions in writing. The questions concerned the qualities and activities of those teachers whom they consider the best. Each of the 40 students who took part in the survey suggested two to five qualities and performance indicators. Respondents were selected by the continuous sampling method. Based on the results of cluster analysis and processing of qualitative data, a second survey was compiled, which included the most popular answers from the first stage. In two closed questions, students were asked to choose from the proposed list the three most important, from their point of view, characteristics of the activity and the three personal and professional characteristics of a university teacher. In two open-ended questions, students were asked to briefly describe which teacher is competent for them, and which one is interesting, because these definitions were often found in the answers of the first stage of the study (during the testing of the questionnaire), but required clarification.

The electronic survey was sent to 1st-4th year students of the Czech Technical University and Charles University (aged 18-22). Participation was voluntary, 250 students of the Czech Technical University and 228 representatives of Charles University took part in the survey. Descriptive statistics were used to analyze closed responses; open responses were analyzed thematically.

The qualities of the best teachers identified at the first stage of the study (57 in total, some qualities were repeated) were grouped into clusters, as a result of which the most significant category included qualities that describe the positive emotional attitude of the teacher towards students (patient, understanding, friendly, responsive, etc.), the second most important category describes the professionalism of the teacher, it also included the most common answer “competent” (10 answers). The students who took part in the survey see the best teachers as responsible (5), professionals (5), who love their work (2), and who are interested in their work (3). Thus, at this stage, it turned out that students value exactingness, but at the same time objectivity and impartiality, and they want the teacher to be interesting to them.

Open answers to the question about the activities of the best teachers give a more complete picture of students' preferences, reveal similar trends in the respondents' answers and understand the meanings of the qualities identified at the previous stage. Five categories were identified here: organization of the learning process based on digital technologies (12 answers), attitude towards work (10), attitude towards students (13), personality-centered / student-centered learning (11), diversity and interest due to the widespread use of digital technologies, an emotionally positive reaction to digital transformations and a tendency to find opportunities in them (13). As in the previous part of the study, in the answers there is a need to establish interpersonal relationships at the student-teacher level, which is expressed in support, tolerant attitude, taking into account the opinions of students when communicating using digital technologies. From their point of view, the best teachers are interested in each of their students, see each individual’ best side. Also, students most positively note teachers-innovators – ‘agents of change’, producers of new educational practices.

Professionalism and competence are revealed as a comprehensive and transparent organization of the learning process, clear requirements and a transparent assessment system. This is manifested in the fact that the teacher evaluates only objectively, regardless of his mood, meets deadlines, explains the material intelligibly and controls its perception, gives knowledge that will be useful in life. For students, passion for the profession and a responsible attitude to their duties in a teacher are important: such teachers prepare for the lesson even more carefully than the students themselves, identify themselves, as persons, with their profession, are constantly looking for new approaches to solving professional problems.

It is possible to highlight the emphasis on student-centered learning, which is manifested in taking into account the needs of students, personalization of approaches simultaneously with an objective attitude towards them. For this reason, the best teachers track the individual progress of each student, choose the best teaching method for each student / group of students, try to adjust the program to the needs and abilities of the students. There is a need for students in a variety of content and methods of presenting information to increase interest in the subject: a teacher “ignites” with love for their subject, provides not only textbook material, but also additional information, knows how to present any material so that it is remembered, and, with the help of information technology makes each lesson interesting and different from the others.

At the second stage, from the options offered, reflecting the opinions of the participants in the first stage, the respondents - representatives of a classical university and a research university - chose the three most important characteristics of activity and the three qualities of the best teachers. Both groups of respondents consider subject knowledge and the ability to teach their subject as the most important characteristic, inextricably linked with digital competence (more than 80% of respondents). Also, important ones are the skills to interest students and motivate them to study (about 60% of respondents), to fairly evaluate the results of work, to create and maintain a comfortable learning atmosphere (about 50% of respondents). There is no significant statistical difference between the opinions of students of classical and research universities.

Speaking about personal and professional characteristics, it should be noted that the distribution of preferences in this case is more even than in the case of activity characteristics. Approximately at the same level students value competent, polite, fair teachers with a broad outlook (these qualities were chosen by 40 to 60% of students). Comparing the opinions of the students of the two groups, it can be noted that the students of the research university attach more importance to the competence of the teacher and his/her communication skills.

Open responses made it possible to understand what students mean by the concept of ‘competent teacher’. As expected, a significant proportion of students' open responses were categorized as “subject knowledge” (47% of responses in both cohorts) and “teaching skills” (16% for classical university students, 14% for research university students). It is noteworthy that a significant percentage of open responses from students of a classical university were classified as “student-centered learning” (15% versus 4% of a research university) and relate to the practice of taking into account the needs and opinions of students in teaching practice.

We also managed to reveal what characteristics make teachers look interesting in the eyes of students. In this case, several almost equivalent categories were identified. First, judging by the students' open responses, the presentation of educational material (19% of the responses of classical university students, 20% of research university students) arouses their interest if it is based on the active involvement of digital technologies, provided with real life examples, is diverse, and motivates students to independent work. Diversity and interest were also noted regarding the use of practice tasks, games, virtual and augmented reality and educational presentations (14% and 17%, respectively). Experience, including work outside the university, as well as a broad outlook that allows the teacher not only to ensure the involvement of students, but also to develop their worldview, were highlighted in 21% of the open responses of students of the research university and 13% of the responses of students of the classical university. The percentages in the answers related to the categories “attitude towards students” (16% of the answers of students of a classical university, 9% - in a research university) and “interest in one’s subject / business” (14 and 17%, respectively) also differ slightly. As a result, the results for groups of students from two different learning

contexts are similar. The following characteristics are emphasized in the responses of both cohorts of respondents:

- Knowledge of the subject and the ability to teach it;
- Excellent knowledge of digital technologies and their active use in the learning process
- Fair and objective evaluation;
- Motivation and involvement of students through a variety of materials and tasks, going beyond the classroom experience, using humor;
- Positive relations with students, orientation to their needs;
- The ability to maintain a comfortable atmosphere in the classroom.

Many of the identified characteristics are related to each other. A sense of humor and references to experience or other areas of knowledge help diversify classes and engage the audience. Developed teaching skills provide a fascinating presentation of the material, and an understanding of the needs and characteristics of students determines the relationship with them and the approach to teaching. In general, the results of this study are in line with what studies show in other contexts. Obviously, the best teachers not only know and teach their subject well, but also motivate students to comprehend it, including "infecting" them with enthusiasm for their discipline. A teacher with high professional motivation represents the most significant 'factor' in stimulating the motivation of students.

Consciously or unconsciously, the best teachers follow the theory of motivation: they create a working, but at the same time friendly atmosphere in which students can reveal their potential, they themselves are a model of a caring professional. Interest and motivation arising from it are important for students of both research and classical universities.

Developing M. McLuhan's idea that information and communication technologies are "a kind of extension of the human nervous system", teachers are faced with the task of comprehending the diverse aspects of this process and creating practices aimed at developing the personality of a human in the information society [15]. One of the main characteristics of the formation of a knowledge society is its openness, interpreted in pedagogical, political, and technological aspects. The strategic goal of the current stage is to conduct empirical research aimed at developing a wide range of forms of e-learning and creating a theoretical base for the pedagogy of the information society.

Total digitalization creates a need for new models of organizing the educational process, providing students with fundamentally new development trajectories, which, in turn, leads to the complication of pedagogical activity and the transition to learning in a branched digital ecosystem that helps the teacher successfully solve new problems. An analysis of the studied approaches to assessing the digital competencies of teachers shows the need to create a comprehensive teacher support system that includes various elements of a competency-based model and is focused on accompanying the teacher in the process of solving problems of professional and personal growth.

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Primary Paper Section: A

Secondary Paper Section: AM

FOOD POLICY OF THE SOVIET GOVERNMENT IN UKRAINE THROUGHOUT 1917-1923 (BASED ON MATERIALS FROM CHERNIHIV REGION)

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Abstract: The article examines the problem of the food policy of the Soviet government, which was carried out in Chernihiv region in 1917-1923. Based on the use of a wide range of archival sources and periodical literature of those times, the author considers the main goals of this policy, the methods of its application and analyzed results. Special attention was paid to the state authorities responsible for the implementation of this policy in practice. The author considered their structure, equipment, changes that occurred in the structure of the apparatus during its reformation. The period 1917-1920 was characterized by considerable anarchy in the conduct of food policy, which was an objective result of the time, because a civil war was raging in Ukraine. The campaign of 1921-1922 was still ongoing under military communism, but with the transition to the New Economic Policy. It was characterized by the active use of various non-economic measures by the Bolshevik authorities, aimed at draining food resources from the peasants. The campaign of 1922-1923, when the surplus appropriation was replaced by a food tax, which was collected in money and only partially in kind, gave the Bolshevik government more positive results. At the same time, the author states that due to a number of objective and subjective reasons, the new government did not manage to fully form a strong apparatus of food policy bodies, which inevitably affected the results of the policy as a whole. The author came to the conclusion that the entire food policy of the Bolshevik government was oriented to the needs of maintaining the Red Army and the administrative apparatus of the province, while the needs of ordinary peasants were considered secondary.

Keywords: Food policy, Food distribution, Food tax, Bolsheviks, Soviet government, Chernihiv province.

1 Introduction

At the current stage of the development of independent Ukraine, in the conditions of economic and political reform of the state, the interest of researchers in studying the history of the Ukrainian village of the national liberation revolution era and the establishment of Bolshevik power in the country has revived. The history of the Ukrainian peasantry of the beginning of the 20th century, for a number of reasons, has always attracted the attention of researchers. First, the peasantry made up the bulk of the population of the Ukrainian lands at that time. Secondly, the Bolsheviks, who seized power in Ukraine, immediately began to implement a harsh repressive policy related to the eradication of private property in the countryside, the pumping out of food, the suppression of religion and the radical restructuring of traditional peasant culture and lifestyle. Attempts to build socialism in the Ukrainian countryside at a rapid pace met with rejection and active opposition from the peasantry. That is why, during a small period of time, the Soviet government was forced to radically change its policy several times. The transition from the uncontrolled actions of the era of the civil war was changed to the policy of “military communism”, which after some time was replaced by new economic policy (NEP). These changes affected the goals and methods of implementing food policy and the activities of the Bolshevik food authorities operating in Ukraine.

2 Method

The methodological basis of the study is the dialectical method of cognition, which involves the consideration of a historical phenomenon in development and interconnection with other phenomena. From among the general scientific methods, cognition, analysis, synthesis, comparison, and others were used, from among the specific ones - comparative historical, concrete historical (considering certain measures of the Soviet food policy), problem chronological (identifying the reasons for the transformation of food policy, the development of its forms in time), statistical (determining the results of food policy, the impact on agricultural production, and so on). In carrying out this study, reliance was placed on the basic principles of historical knowledge - historicism, scientific character, objectivity. Such an approach to the analysis of phenomena and events, to a certain extent, makes it possible to understand the real situation in those conditions, the positions of various political forces, to understand the policy of the Bolsheviks, their own assessments of the food situation and to explain what guided the Soviet government in making decisions to overcome the food crisis.

3 Results and Discussion

Chernihiv province, as one of the regions that was quickly captured by the Bolshevik armies and where Soviet power was established, is of great interest with regard to the problematic under consideration. The study of the food policy of the Bolsheviks in Chernihiv region (*oblast*) during the specified period enables researchers not only to establish and trace the common features of the Bolshevik course on providing the new government with agricultural products, which were common to all Ukrainian provinces, but also to isolate and analyze its regional features, to identify changes that occurred in food politics and determine their causes, analyze the forms, methods of its implementation and results, find out the complex of problems faced by the Soviet food bodies and characterize the measures aimed at overcoming them.

The historiography of this issue includes a significant number of monographic studies and scientific articles in periodicals. Already in the 20s of the 20th century, the first articles covering the first steps of the Soviet government in agricultural policy in Ukraine began to appear [1, 4, 8, 15]. The works of Soviet historians of the mid-1950s and mid-1980s, despite the introduction of a significant array of archival sources and new statistical data into scientific circulation, were marked by the influence of ideological dogmas in the coverage of historical events and the bias of conclusions [2, 3, 7, 10, 12]. A new wave of research interest in this topic was brought by Ukrainian historians after the declaration of Ukraine's independence. The works of V.F. Verstyuk, O.I. Hanzha, G. Heorhizov allowed looking at this problem in a different way [5, 6, 17]. The conclusions reached by domestic Ukrainian historians were completely opposite to those announced in Soviet times. From praising the policy of the Soviet government, they moved to sharp criticism and condemnation of the activities of the Bolsheviks in the Ukrainian countryside. Today, this problem requires more detailed study and analysis, along with unbiased conclusions. At the same time, the history of the pro-Bolshevik politics and the activities of their food bodies in Chernihiv region was not the object of a separate study by researchers and does not have its own historiography.

Immediately after the Bolshevik seizure of power in October 1917, the RSFSR government turned its attention to Ukraine's food reserves and raw material potential. The capture of the territory of the Ukrainian People's Republic by Soviet troops at the beginning of 1918 allowed representatives of the new government to launch activities to extract resources from Ukrainian territories. However, this policy was short-lived, because the advance of the armies of the Quadruple Alliance forced the Bolsheviks to quickly retreat. During the next Ukrainian-Bolshevik war, units of the Red Army managed to return the territories of Ukraine under the control of the Soviet authorities. The Soviet food policy and special bodies responsible for its implementation began to be formed immediately after the transition of the Chernihiv province to the power of the Bolsheviks. Speaking in March 1919 before the delegates of the 3rd Congress of the Communist Party of Ukraine in Kharkiv, the head of the All-Russian Central Executive Committee of the Communist Party of Ukraine Ya.M. Sverdlov stated: “The resque of the entire revolution, not only the Russian one, but also the international one, is in the hands of Ukraine. You must realize that the Russian Revolution is now going through a very critical period because of the breakdown of

transport on the one hand and the breakdown of food on the other. Food and fuel are here in Ukraine, and both can be obtained from Ukraine only if strong state institutions are created. And they will be created when strong party organizations are created" [20, sheet 8]. However, on the ground, representatives of the Soviet authorities began to act much earlier. At the end of January 1919, the Provisional Workers' and Peasants' Government of Ukraine issued and publicized the decree "On the organization of food affairs in Ukraine", according to which a state monopoly on the procurement of food products was introduced and fixed prices were established for the purchase and distribution of food products. As one of the contemporaries of the events wrote, "The revolutionary proletariat started a new war for the possession of bread, against the landowners, village kulaks, and other servants of capital" [11, p. 4].

Before the First World War, there were no food organizations as special institutions in the Russian Empire. Supply issues were introduced and governed by the laws of the free market. But during the war, when complications began to appear in providing the armies and the population with foodstuffs, the tsarist government tried to regulate the food issue by partially restricting private initiative in the field of using grain surpluses. However, the tsarist government did not manage to solve the food problem until the end. The food crisis was constantly deepening, which eventually became one of the reasons for the overthrow of the autocracy.

Four main periods can be clearly distinguished in the work of the food bodies that operated in the territory of the province in 1917-1923.

The first period lasted from the beginning of 1917 to the February Revolution. At that time, the food affairs were in the hands of the Commissioner for Affairs of the Ministry of Agriculture for the purchase of bread for the army.

The second period lasted from the February Revolution to the occupation of Chernihiv region by German and Austro-Hungarian troops. During this period, the law of March 25, 1917 on the establishment of a grain monopoly was adopted.

The third period started from the time of the capture of Ukraine by German troops at the beginning of 1918. The Food Boards were liquidated, and the State Bread Bureau was organized in their place. In this way, the food affairs was centralized, which was necessary for Hetman P. Skoropadsky, but primarily for his German allies, to collect and export food from Ukraine.

After the seizure of power by the UNR Directorate, the previous Food Administrations were restored. However, it is not possible to touch on history in detail and evaluate the work of the Commissioner for Affairs of the Ministry of Agriculture and the State Bread Bureau, due to the fact that practically all documents were destroyed in the period of 1919 during the evacuation of the food authorities of the province to the city of Bryansk, which is also confirmed by the Bolsheviks themselves [13, p. 2]. As for Food Administrations (ProdUpravs), they were monopoly state bodies for the procurement of products to provide for the army, state industry and the city population, and their branches - city food committees - provided for the city population exclusively through the card system.

Only from the beginning of 1919, as the Soviet power began to be restored in Chernihiv Oblast, 'food cells' began to be formed in individual settlements, whose primary task was to provide food for the units of the Red Army, which continued its offensive against the armies of the Directorate of the Ukrainian People's Republic. The importance of the Chernihiv province in the matter of food supply was noted in the report by the provincial representative of the Ukrainian People's Committee of Ukraine Chaikovsky. On January 22, 1919, he reported: "Chernihiv Oblast is a significant part of our territory freed from bourgeois power, 11 counties were completely recaptured by our troops from the Petlyurites. Strongly developed industry - cloth, hemp and spinning, sugar, forest, paper, leather, matchmaking, bread-rich southern districts - all this, with the presence of significant reserves of raw materials and finished products, makes it possible to obtain from this province a significant amount of goods for exchange with Russia and Belarus, providing the Red Army with bread and other products, and finally - to meet the needs of other provinces of our Republic" [17, sheet 55].

The provincial food commissariat was organized back in January 1919 in the city of Klintsy. It was subordinate to the local revolutionary commissariat (*Revkom*), and in February it moved to Chernihiv. As Chernihiv region was captured by Bolshevik forces, district food agencies began to be organized in the form of district food commissariats.

The winter-autumn period of 1919 was one of the most difficult in the implementation of food policy and the work of provincial food authorities. The new government immediately faced a number of problems that it could not solve. Firstly, there was not enough food. Thus, in the minutes of the Krolevetsk County Congress of representatives of the county VRCs, it was reported: "Klyshov Volost - all food was pumped out of the Volost through frequent requisitions. The population demands the introduction of free trade; Altynivska volost - the food issue is acute; Ponornytsia Volost - Soviet money is poorly accepted" [20, sheet 51]. At that time, it was reported from Glukhiv County: "There is no food in the county. Red Army soldiers do not receive food, uniforms, and salaries. Disturbances on this ground among the Red Army resulted in uprisings and arbitrary "requisitions". We are in a hopeless situation. Get the troops out of here immediately or give them food immediately. We are waiting for your help" [18, sheet 135]. Food prices can serve as a characteristic indicator of the situation on the food market at this time. Thus, the newspaper "Nezhinsky Vedomosti", which was published during the Denikin regime, reported: "In the last days of the Bolshevik regime, in the city, the following was extremely expensive: a pound of bread - 120 kr., a pound of meat - 75-100 kr., a pound of lard - 500 karbovans (krb.), butter - 500 krb., a glass of milk - 15-20 krb. With the entry into the city of Dobramia, the prices decreased: a pound of bread - 25 krb., meat - 30-40 krb., butter - 200 krb., lard - 140 krb., salt - 20 krb. The food issue in the county is very acute. The retreating Bolsheviks took all the food from the peasants, leaving nothing even for sowing. All the fodder was also taken away" [16, p. 3]. After the retreat of the White Guards and the occupation of Chernihiv Oblast by Bolshevik troops, the newspaper "Znamya Sovetov", which was the printed organ of the Chernihiv Provincial Revolutionary Committee and the Provincial Committee of the RCP /b/, reported on December 14, 1919: "Life in Nizhyn has returned to normal. The food crisis is completely over. All products are available in large quantities and are relatively cheap. A pound of bread - 20 krb., white - 35 krb., lard - 75 krb., a pound of meat - 20 krb., herring - 20 kr., a full lunch - 50 krb. ... Life in Borzno is very cheap. Bread costs 30 krb. per pound. In the Horodnyanskiy district, a pound of bread costs 75 krb. at the market. According to local wage rates, this is too high price for workers" [14, p. 3].

Secondly, the Bolsheviks did not manage to quickly build a strong apparatus not only in the localities, but also in the center. Thus, in the report on the inspection of the commission of the Provincial Committee of the Provincial Committee, it was emphasized: "The commission is a completely sad sight... Hopeless discord, two warring camps, lack of stewardship, irresponsibility, drunken appearance at meetings, hostile attitude towards new people... the staff does not meet its purpose and is parasitic" [17, sheet. 62].

An attempt to solve the food issue by organizing agricultural communes also did not yield a positive result. By mid-May 1919, 46 communes had been organized in Chernihiv region, although M. Skrypnyk calls the number 55 collective farms (in terms of the number of registered communes, Chernihiv Oblast was ahead of the rest of the provinces of Soviet Ukraine). The communes, which had extensive state support (land, equipment, money), could not compete with agricultural artels and

cooperatives. Characterizing the situation in the province at the end of the summer of 1919, the local Bolsheviks were forced to state that "A poor man or an outsider goes to the commune, and a middle peasant willingly goes to the artel, it is they who need to be "neutralized" politically and economically" [9, p. 65]. Therefore, after the expulsion of Denikin, the Bolsheviks abandoned the practice of the ill-conceived and forced organization of communes, which discredits "the Soviet government and repels the peasant masses from the very idea of communism". By mid-August 1920, only 34 collective farms remained in Chernihiv region [9, p.67].

Local Bolsheviks saw the way to solve the problem and fulfill the norms set by the center in the implementation of a number of measures. The leadership of the province made the following proposal: "The first step in solving the food issue should be a request to the Rev. Council of the 12th Army (its spare parts were quartered on the territory of the province - O.L.) for the immediate release of the poviats from any orders, since the further pumping of bread is unthinkable, there can be no question of excess products, pumping out products will lead to the most negative complications. However, removing of orders alone is not enough. It is necessary to demand permission from the All-Ukrainian production bodies for workers and public organizations to purchase products in the agricultural regions of the provinces of Ukraine, deviating as a last resort from the policy of fixed prices. The latter circumstance contradicts the basic principles of our party's food policy, although it should be noted that in Ukraine, some distortions have been allowed in the food policy of the Central Committee" [19, sheet. 62]. After that, the central government did everything not so much to ease the food situation in the province but rather to stop such frank criticism from the seats. Available documents show that in the following years, representatives of local state and party institutions no longer allowed themselves to express seditious opinions and criticize the central government.

The Chernihiv Provincial Food Commissariat (Gubprodkommissariat) worked until October 1919, and after the occupation of the territory of the province by Denikin troops, it was evacuated to the city of Bryansk. But already in November, after the expulsion of the Denikinites, the Provincial Committee for Food and Agriculture was reorganized by the Food and Agriculture Committee of the XII Army in the form of the Special Military and Food Commission (*Oprdkomgub*). Its structure was as follows: the Regional Development Committee was headed by a commission headed by the chairman, which was subordinated to seven departments (statistical and economic, legal, department of reception and procurement points, information and publishing). The latter published the weekly newspaper "Food Bulletin". For comparison, in 1920-1921, the Odesa District Commissariat published the newspapers "Plow and Hammer" ("*Pluh y molot*"), "Food Questions" (Voprosy prodovolstvyia), "Food Month" (Prodovolstvennyi mesiats) and two magazines – "New Food Policy" ("*Novaia prodovolstvennaia polytyka*") and "Bulletin of the Regional Commissariat" ("*Biulleten Oprodkomhuba*") [23, p. 57].

However, the conditions under which the Chernihiv District Commissar worked were extremely difficult. There was a great deal of confusion in the relations between the People's Committee and the higher authorities. The Regional Commissariat was subordinated simultaneously to the XII People's Committee of People's Commissariat, the People's Commissariat of the South-Western Front, the People's Commissariat of the USSR and the People's Commissariat of the RSFSR. Of course, this led to contradictory orders, which complicated the work of the Committee and its local bodies. This was confirmed in the report by the above-mentioned provincial commissioner Chaikovsky: "...attempts to interfere on the part of the People's Commodity Committee of the RSFSR, the so-called Central Procurement, all kinds of Head Offices (*Glavks*) and Centers bring disorganization into the work of provincial and district institutions, against which the most decisive measures have to be taken" [17, sheet 55].

On the other hand, the political situation in the province was not favorable for the establishment of productive food work (peasant uprisings covered entire counties, gang activity, lack of local forces to fight them, constant misunderstandings with local administrative authorities). City and county executive committees considered food bodies their departments, interfered in their work, removed and appointed commissioners at their discretion. This is vividly illustrated by one of the episodes that took place in Nizhyn. After the liberation of the city from Denikinites, the city council was formed in the city, and departments began to operate under it, including the city Food Committee. I.M. Chepela was appointed its head of it. The only criterion for his appointment to this position was that he was a communist. In addition, the city Food Committee demanded significant personnel reinforcement. The Municipal Revolution Committee (*Miskrevkom*) reported that 10 more communists are needed for its normal functioning [22, sheet 6]. However, a member of the Province Revolution Committee (*Gubrev Committee*) Podolskyi, who was on an inspection trip to the city to settle the food issue, as well as to take army food orders from the territory of the province, by his order "removed the appointed head of the Region Food Committee (Oprodcom) T. Chepello (correctly Chepela - O.L.), who does not know at all of the food affairs, and appointed Mr. Fradko. Revolution Committee (*Revkom*) did not agree with this and stood up for Chepela". Later, in his report at the joint meeting of the *Gubrevkom* and the *Oprodkom* on December 24, 1919, Podolsky raised the question of the need to settle issues between the Province Revolution Commettee and the *Oprodkom*. The meeting made a decision to prevent the intervention of the regional committees in the technical work of the food bodies, establishing strict control over them by the provincial authorities [22, sheet 8].

At that time, the basis of the food policy of the Bolsheviks remained food distribution, which was carried out by forcibly seizing bread and other products from the peasants at the established rate of products and state prices. One of the leaders of the local Bolsheviks, E. Mazanko, proclaimed at the time: "Soviet power has moved from the sentimental monopoly of Kerensky's time to the state structure and declared a merciless war of speculation on food stocks and seized grain surpluses" [11, p. 4]. As a basis for the breakdown of the agricultural population, the Regional Development Committee set the tithe rate of taxation for all farms that had at least 3 deciets of arable land, while the tithe rate of taxation gradually increased in accordance with the total amount of land in the farm. At the end of 1919, the above-mentioned Podolskyi noted in his report: "As for the views for food, in the near future we should expect up to 10,000 poods of sugar, up to 1,000 poods of soap, and up to 300 poods of shag. From bread products for January-April 1920, a distribution was made: wheat - 100,000 poods, buckwheat and millet - 65,000 poods, beans and peas - 80,000 poods, oats and barley - 100,000 poods" [22, sheet 8].

In May 1920, in connection with the offensive of Polish troops and the army of the Directorate of the UNR, Special provincial food commission (*Oprodkomgub*) was evacuated to the city of Novgorod-Siversky, from where it soon returned. At the same time, a procurement department was organized under it to establish systematic work and eliminate "distortions" on the ground. However, without clear tasks and instructions from the center, the food bodies were provided with income from various food expeditions and surplus appropriation carried out by the food agencies and food detachments on the ground.

Since the transfer of all sub-departments of the Procurement Department to independent institutions, they have been given the task of systematic and planned receipt of products at the disposal of the provincial food body. The first orders were insignificant, so the order for livestock was issued for only 215 heads within the entire province [13, p. 2]. Meager revenues forced the Regional Food Committee to enter into contractual relations with cooperative organizations for the procurement of poultry, canned meat, salting of vegetables, and the supply of onions. The strengthening of the power of the Bolsheviks in Chernihiv

Oblast, after the retreat of the Denikinites, gave the provincial food authorities the task of intensifying their work. The detachment of the departments from each other did not contribute to this, so the Congress of Provincial Commissars of Production in August 1920 decided to reorganize the procurement apparatus of the province and unify it. Decision-making on the reorganization of the apparatus coincided with the receipt from the center of surplus appropriation layouts for all products, which were several times larger than the ones that the Regional Food Committee outlined in its program and for the implementation of which all the preparatory work was carried out in the center and on the ground. The main reason for these changes was the attack of Soviet troops on Warsaw and the increased need for food and fodder to support the Red Army. The combination of operational and organizational work immediately had a negative impact on the procurement campaign' results. The Special Provincial Food Committee was informed that during current food year, Chernihiv Oblast will have to feed itself exclusively on its own bread. The outfits sent from the center exceeded the "most daring expectations" of the People's Commissariat of Province. The order for potatoes in the amount of 1,000,000 poods exceeded one third of the entire total Ukrainian distribution, for vegetables - in the amount of 3,000,000 poods – it was not at all possible [13, p. 2]. If to add to this the conditions in which the procurement campaign was conducted (complete absence of specialists and experienced temporary workers, managers, even people with initiative, as well as lack of management instructions of the center, inertia, and at the same time a "peculiar" understanding of the tasks set, insufficient help from party committees and of the provincial trade union councils (the mobilization of party and trade union forces during the 'food month' gave only 11 people), the lack of clarity in relations with cooperative institutions, which were reinforced by a wide wave of banditry, terrorizing the population and the physical destruction of food workers, looting of warehouses, depots and transport), then it becomes clear why it was not performed [15, p. 2]

Table 1: Implementation of the food distribution for February 1, 1921

Products	Planned (poods)	Harvested (poods)	% of completion
Grain-bread	1362200	566103	41
Oat	590100	267065	45
Bird	10650	3999	38
Horned cattle	262644	170694	65
Pigs (live weight)	239550	26234	11
Sheep (live weight)	931559	52558	16
Potato	10000000	872994	9
Hay	5000000	946340	19
Oilseeds	1000000	391138	4

From April 1921, the *Oprodkomgub* began to organize the apparatus and at the same time started to prepare for a new campaign. The 1921/1922 campaign took place under more favorable conditions. At that time, the structure of the Food Committee of Province was as follows: 5 departments, and the district food apparatus consisted of Poviets Food Committees (*Povitprodkoms*) and District Food Committees (*Rayprodkoms*). Povitprodkoms also had departments, as well as Oprodkomgub; in addition, all reception points located on their territory were under the leadership of povitprodkoms. The apparatus that carried out work in the provinces consisted of former sales agents and persons seconded by the party and trade union bodies, and partly of persons recruited from outside. The administrative apparatus participated in the campaign in the form of village and province tax commissions. But at the end of 1922, sales tax revenues were drastically reduced. In compliance with the order of the People's Commissariat of the Republic of Ukraine, Oprodkomgub was forced to resort to extreme measures in order to "raise the embankments". A food month was declared in the province, but it gave insignificant results, increasing indicators only for pulses and oilseeds. The results of the activities of the provincial food authorities are clearly demonstrated in Table 2.

Table 2: Implementation of the food tax for the end of 1921 - beginning of 1922

Products	October 1921	November 1921	December 1921	January 1922
Grain-bread	705506	108857	53048	39903
Grain-forage	488952	54269	18393	17686
Beans	197554	32405	1607	10687
Oilseeds	67682	9028	2535	4095
Forage	1056606	691499	406163	256507
Potato	1328238	841911	9979	7120

That is why the Bolsheviks were resorting to tried-and-tested tactics of repression. Already in December, the Food Revolutionary Tribunal (*Prodrevtribunal*) and people's courts have been actively operating. As a result, sentences for non-payers increase from 194 (November) to 1473 (December) [13, p.2]. Forced measures were taken to combat the concealment of products. In January, 25,997 tithes of untaxed land were discovered, on which the peasants did not pay the tax, and for the entire campaign before that, this figure was only 29,019 tithes. A total of 283,212 tithes of untaxed land were found in the province [13, p. 3]. In February-March, the "February-March pressure" was carried out in Ukraine, which brought additional results - 33,088 tithes of tax-free land. In March, in order to force the peasants to abandon the concealment of untaxed land, a collective settlement was introduced. "Pressure" continued until April and brought the following results: bread grain - 2460819 poods (100%), feed grain - 1140150 poods (85%), grain - 606691 poods (80%), legumes - 533772 poods (218%), oilseeds – 150,243 poods (94%), potatoes – 3,500,948 poods (56%), hay – 1,754,432 poods (50%), straw – 1,145,267 poods (149%). The food tax was expressed in rye units: 6,672,402 poods were planned, 6,064,910 poods (91%) were 'executed' [15, p. 3]. As the local Bolsheviks themselves pointed out, although the end of the campaign gave the authorities almost 100% results, it caused significant damage in terms of morale, causing dissatisfaction among the peasants with the food tax and food workers, and the slogan "connecting the city and the countryside" was not fully implemented. Here is the assessment of the campaign of 1921/1922 given by the local Bolshevik E. Mazanko, who was a direct participant in those events: "The tax of 1921-1922, although it did not cause significant comments, but the variety of products collected under the tax, when the peasant was forced to look for parsley that is missing from his farms on the side or to get horns to contribute the raw material part of the tax, made up the most negative part of the tax. Later, it was eliminated, but many other taxes were added to the food tax" [11, p. 4].

The negative results of 1920-1922 forced the Bolsheviks to resort to another reform of their industrial policy in Ukraine and the system of food bodies operating there.

The new campaign of 1922/1923 was already underway after the issuance of the decree on the single tax in kind, which could not but affect the tasks and methods of its implementation. It, like the following ones, was held under the slogan of rebuilding peasant farms and easing the tax burden for the peasantry. The military and food apparatus of the Province Food Committee was demobilized and renamed to *Gubprodkom*. Numerous cadres of food army men, food militia, barricade posts, food revolutionary tribunals were disbanded and members of trade unions from the food front were demobilized. The reform of the food apparatus separated tax and fiscal functions from economic ones. District tax bureaus were formed instead of the District Product Committees that existed in 1921/1922. Volost food committees were given exclusive tax functions. The economic apparatus of the province, organized into procurement offices, was directly subordinated to the Provincial Committee of Food (*Gubprodkom*). The former procurement department of the Gubprodkom was divided into two separate, completely

independent departments - tax and economic and procurement, whose work was coordinated by the deputy of the Gubprodkom and the planning commission. Tax inspectorates, village councils, and political executive committees became the primary tax authorities, to which the functions of village and volost tax commissions were transferred. This was done to achieve two goals - the distribution of tax and economic functions and the transfer of the main burden of work to village councils and Volost executive committees. While the first goal was achieved relatively quickly, the second, throughout the entire campaign, was not fully achieved. The fact is that, unlike the campaign of 1921/1922, which took place under the banner of maximum attention to the sales tax on the part of party and trade union bodies, the campaign of 1922/1923 began in the conditions of liquidation mood, which covered all levels of power. In addition, the representatives of the food apparatus tried to carry out the work on their own and, therefore, did not turn to the Gubpromkom for help in time. At the same time, for village councils and volost executive committees, this work turned out to be new, imposed by the center, and, therefore, they were not prepared for it. Only at the moment of the direct collection of sales tax, when a real threat of disruption of the campaign became apparent, due to the weak participation of the administrative and party apparatus, the issue of active "involvement" of village councils and volost executive committees was brought under the control of the central provincial authorities. Thanks to a number of organizational measures (organization of provincial and volost food triads, mobilization of about 200 party workers), as well as measures of administrative coercion, the volost apparatus gradually began to be involved in work [13, p. 3].

The campaign of 1922/1923 took place in the conditions of insufficient campaigning training of the population, weak participation of village councils, and throughout the campaign the tax was collected by means of "incessant pressure" on the payers, village councils and volost executive committees. But compared to 1921/1922, in the campaign of 1922/1923, the Bolsheviks had a clear tax law, a stronger grassroots apparatus, the repressive measures applied against non-payers were exclusively legal in nature, and were not the result of the arbitrariness of the workers. Strict administrative measures were applied to non-payers, which brought greater legality to the punitive policy of food bodies. Of course, there were local excesses and exceptions (in the Nizhynsky povit, Ichna and Nosivka), but they were isolated ones, and their organizers and executors were severely punished. The system of tax payers' complaints was streamlined, a system of benefits was introduced for poor farms, as well as for farms specializing in the cultivation of special technical crops. Despite the fact that the government did not manage to eliminate all the troubles, the results of the campaign turned out to be positive for it. On January 1, 1923, the tax in Chernihiv Oblast was paid in full, while it was not collected even in March from the campaign in 1921/1922. The 6th Province Council of Volost Food Commissars and Chief Tax Officers, which took place on February 2-4, 1923 in Chernihiv, confirmed 100% implementation of the food tax.

Table 3: Execution of food tax in Chernihiv province in 1922/1923

Products	Planned (poods)	Harvested (poods)	% of completion
Grain-bread	5191290	4827900	93
Grain-forage	1587083	1351900	85
Cereals	858828	112060	131
Beans	281870	24920	88
Total bread	6496722	7558600	177
Oilseeds	117611	51800	52
Feed volume	921587	580600	63
Potato	7285500	64580	88
Horned cattle	119000	232357	194
Sheep	20300	7076	94
pigs	21000	4444	21
Salo	57710	8358	14

At that time, an attestation commission was organized to control the food bodies themselves, and measures were taken to strengthen the fight against bribery. The result of these measures was the dismissal of 30% (!) employees of the food bodies of the province [13, p. 3].

During the period of the tax company, the Gubprodkom had at its disposal granaries with a total volume of 235,148 poods with a total tax amount of 1,2126,561 poods. This was completely enough for the provincial authorities, because only 40% of the tax was collected in kind, while the rest - in money. Statistical data for the province in the campaign of 1922/1923 are as follows: 348670 households, 1781514 eaters, taxed land - 182098532 tithes, and livestock - 680634 heads. Compared to the previous campaign, the results were greater by 4,199 farms, 7,549 eaters, and 87,566 acres of land. As a result of the fight against land tax evasion, 2,108,070 acres, 129 farms, 466 eaters, and 1,864 heads of livestock were discovered in the province [13, p. 3].

In the campaign of 1922/1923, the authorities set a clear deadline for paying the tax. Thus, the tax was paid in kind until November 1 (60%) and January 1 (40%). Cash tax was also paid in installments - on January 1 (35%), March 1 (35%), April 1 (15%), and May 1 (15%). The money tax was calculated by the Chief Tax Office of District Product Committees and the control commission. The main obstacle in calculating the tax was the low payment of peasants' labor (1 krb. 50 kopecks in Soviet money ("*radznaks*") from the farm) and the lack of qualified personnel. These two circumstances made it impossible to complete the work on time [13, p. 4].

The Department of Bread Inspection was created under the Provincial Committee of Food, and the territory of the province was divided into tax districts. But despite the clear schedule for the start of tax collection for September, only 33.5% was collected (819,028 pouds, 570,167 krb. 92 kopecks, and bread loan bonds – 284,127 pouds). For October – 295,382 poods, bonds – 378,820, money – 2,681,822 krb., or a total of 68%. In November: in kind - 400,243 poods, in bonds - 605,023, and in money - 2,871,252 krb. or 37% of the provincial tax [13, p. 4]. At the same time, the financial cash registers that collected the tax were not sufficiently staffed by staff, which led to the fact that payers waited in lines for several days (!). This led not only to inconvenience for people trying to pay tax, but also to their financial losses. Inflation daily "ate" the financial savings of the peasants. Taxes were paid in Soviet marks in terms of the gold red coin (*chervonetz*) put into circulation in 1922. Thus, on November 1, 1923, the exchange rate of the red coin was equal to 7,000 krb. by "radznaks", on November 2 - already 7,100 krb., on November 3 - 7,250 krb., on November 4-5 - 7,500 krb., and on the 6th of that month the rate rose to the mark of 7,650 krb. [13, p. 3].

Another question that acutely arose during the food tax campaign and to which the Bolsheviks themselves were unable to answer was the cost of the campaigns themselves for the new government. The cost of the campaign of 1920/1921 cannot even be approximated, because only the number of personnel workers participating in it was several thousand. If to add to this the cost of preparatory work and other expenses, in the absence of any control and reporting, the sums spent become sky-high. Gubprodkom acted in this campaign as a "generous cashier who distributed money and bread at the first request" [13, p.4]. Thus, the campaign did not pay for itself. The organization and conduct of the 1922/1923 campaign, according to "rough calculations", cost 17.3% of the collected tax. As early as 1922, the highness of the cost of the apparatus and overhead costs became clear to the Provincial Committee. Therefore, in September 1923, the temporary staff of food bodies was dissolved, the staff of the Gubprodkom was reduced by half, as well as the staff of procurement offices, 7 of which were turned into bulk stations.

Summing up, it should be emphasized that the food policy of the Bolsheviks, which was carried out in 1917-1923 in Chernihiv region (Oblast), was primarily aimed at ensuring the political,

military, and economic needs of the new government, while the interests of the local population always remained in the background. In the period 1918-1920, Chernihiv province turned into a raw material and food base that provided the needs of the active Red Army and its substitute divisions. Any resistance of the population was brutally suppressed, and attempts of local Bolsheviks to revise the regulations of the layout remained unanswered. Only with the transition to the New Economic Policy, the situation in the province began to gradually change for the better.

To carry out food policy on the ground, the Soviet regime created a cumbersome and, as it turned out, ineffective apparatus of new authorities. The bodies that were supposed to implement the food policy, as a rule, used non-economic and repressive measures in their work. This was caused primarily by the content of the food policy of the Soviet government, in which commodity-money relations were given a secondary place, and private ownership of land should be eliminated in general. That is why, not finding understanding in the peasant environment, the representatives of the new government, at the initial stage of their activities, actively used in their work food troops, food militia, food tribunals, all kinds of "food months" and "food raids". The lack of quick and positive results forced the Bolshevik leadership to resort to reforming the food apparatus and its work methods. At the same time, repressive methods in work were not completely abandoned, but only partially softened. The tax company of 1922-1923, which took place under the conditions of the NEP, was better organized and positively perceived by the peasantry, that immediately reflected on its results. The Bolshevik leadership stated that the food tax was perceived by the main mass of the population much better than the food surplus appropriation, the distribution of the tax by individual districts and groups of payers corresponded to the capabilities of peasant households, was controlled and redistributed by local authorities according to benefits ('social facilities'). The "purge" of local food authorities, which was carried out in 1922-1923 and constant control from the center, led to a decrease in abuses in the field, but did not completely eradicate them. Among the problems that required an immediate solution, the local authorities raised the question of the ratio of the in-kind and monetary part of the food tax. Local food bodies did not have time to quickly rebuild and demanded from the center that the tax be collected in kind, as it was during the civil war. The central authorities demanded a quick transfer of the tax into a monetary equivalent, and the local apparatus of the financial institutions turned out to be unprepared (there were not enough specialists).

4 Conclusion

Evaluating the food policy of the Bolsheviks as a whole, it should be noted that despite significant miscalculations in the methods of its implementation, it brought the new government significant profits, which were later used during the implementation of Stalin's industrialization policy. At the same time, it is worth noting that these profits were received from the pockets of ordinary peasants, which in no way contributed to their enrichment. Thus, the food policy of the Bolsheviks in 1917-1923 once again proved that totalitarian regimes put the interests of the state above the needs of ordinary citizens.

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Primary Paper Section: A

Secondary Paper Section: AB

THE IMPACT OF INCLUSIVE PRACTICES ON ACADEMIC PERFORMANCE IN PRIMARY SCHOOL

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Abstract: The article discusses important parameters of the quality of inclusive education, among which the main place is occupied by high and stable academic performance in inclusive classes, both among children with special educational needs and among children without such needs. Also, special attention is paid to the rationale for the need and opportunities for the formation of social skills and self-esteem among students in inclusive classes. Based on the conceptual provisions of humanistic pedagogy, as well as considering the best practices of both Europe and North American inclusive schools, within the framework of the case study methodology, an outlining of promising areas for the development of inclusive pedagogical technologies was carried out to ensure high academic performance of all categories of students participating in the inclusive educational process .

Keywords: Inclusive education, Academic performance, Self-esteem, Diversity.

1 Introduction

Inclusion, thanks to the processes of adaptation of the educational environment, today has the opportunity to provide students with special educational needs with an adequate form of education. Significant changes have taken place not only in the legal status of this category of students, but a radical restructuring is taking place in the value orientations of education and upbringing of "special" children.

At present, we are witnessing the improvement of various national education systems in terms of convergence of special and general education systems, in "schools for all children", due to the official adoption of the idea of inclusive education by the Salamanca Declaration (1994), in the "inclusive school" as an educational institution, whose activities are aimed at introducing children with disabilities into the process of joint learning with healthy children in order to effectively socialize and rehabilitate them [18].

The relevance of the implementation of inclusive education in the development of the modern educational system is beyond doubt. Inclusive practice can be defined as a set of approaches and methods that provide all students with access to basic education [13]. Successful inclusion of children with special needs requires working together to ensure that all students feel welcome and valued and receive the right support to help them develop their talents and achieve their goals. When education is truly inclusive, it actually brings real benefits to all students, not just students with disabilities or special needs. But, t the same time, it should be noted that many difficulties are associated with the process of including children with developmental disabilities in mass educational institutions. One of the most significant and still unresolved problems is the problem of creating educational and methodological complexes for the successful inclusive education of all categories of children in general education preschool and school institutions. Linked elements regarding the same problem is the challenge of ensuring a consistently high level of academic achievement in inclusive classrooms.

In the research of scientists and social review project of regulators in EU, it has been established that, first of all, parents are interested in the development of inclusive education: 70% of parents of 'ordinary' children (those who do not have any special educational needs) do not object to joint (inclusive) education, because this will allow their children to become more tolerant, learn to help each other; however, they are convinced that teachers need to make special efforts for this. Also, 76% of parents of children with disabilities agree with the advantage of inclusive education, but understand that for this it is necessary to overcome a number of structural, social, regulatory, educational, and methodological barriers [14, 17].

At the same time, as broad practice 'in the places' show, there are contradictions in the modern educational practice of teaching children with disabilities and special needs in general education schools:

- The contradiction between the increase in the number of children with disabilities in general education schools and the lack of an integrative educational environment that ensures their joint education with healthy children, built on the principles of "unity in diversity" [7];
- The contradiction between the obsolete system of identifying and placing this category of children in educational institutions and the lack of the necessary psychological, medical, and pedagogical diagnostics for this, which would make it possible to implement in education an individual approach to a child with disabilities or special needs;
- The contradiction between the request of the parent community for the introduction of an inclusive approach to education and insufficient development of the conditions for its implementation;
- The contradiction between the need for special training of teachers to work with children with disabilities or special needs in a general education institution and the insufficient number of professional retraining and advanced training programs for teachers in this area.

These contradictions actualize the problem of studying the impact of inclusive practices on academic performance in elementary school.

2 Method

The theoretical basis of the study covers the conceptual provisions of humanistic pedagogy on the social value of the individual, on the need to include every child with disabilities in the educational space. Research methods involve the study of philosophical, sociological, psychological, pedagogical, and educational literature, logical and historical analysis of the problem under study, comparative analysis of approaches to teaching children with special educational needs, study and generalization of existing experience in the field of inclusive education. Some elements of the case study are used.

3 Results

Judging by studies carried out in the 1960s and 1970s in the United States, social and family circumstances have the greatest influence on the results of schooling there, which subsequently determines the level of income of a person. The effectiveness of the educational process is affected by the social background of students, which determines "the inequality in which children are placed by their home, their neighborhood, their environment" [2]. These studies gave rise to a discussion about the need for the inclusive education of children from different groups and social strata, including the disabled.

Inclusive education suggests that the diversity of needs of students with special needs and disabilities should be matched by a continuum of services, including an educational environment that is most favorable for them. This principle means the following: all children should be included from the very beginning in the educational and social life of the school in the area in which they live; the task of an inclusive school is to build a system that meets the needs of everyone; in inclusive schools, all children, not only those with disabilities, are provided with support that allows them to achieve success, feel safe, value being together in a team. Inclusive schools aim for many educational achievements different than those most often recognized as mainstream education. The goal of such a school is to give all students the opportunity for the most fulfilling

social life, the most active participation in the team, the local community, thereby ensuring the most complete interaction, helping each other as members of the community [8]. This value imperative obviously shows that all members of the school community and society are interconnected and that students not only interact with each other in the learning process, but also develop when they make joint decisions about managing processes in the classroom [9].

In this context, it is advisable to digress a little from the topic and turn to the experience of the United States in the field of combating the low academic performance of African American school students. Throughout America, their academic performance, on average, is significantly lower than that of their white peers. According to psychologists, the poor academic performance of African-American schoolchildren is largely due to their low self-esteem, imposed on them by the stereotypical attitude of others. Experiments have shown that even a small intervention aimed at increasing self-esteem can improve the performance of black children, reducing the achievement gap between black and white students by 40% [5]. In this regard, a stereotype of racial mental differences between white and black Americans has formed. This stereotype negatively affects students' self-esteem. In addition, deliberately low expectations give rise to fear of a possible fiasco, which, of course, increases the likelihood of failure. As a result, the number of losers among African Americans is growing like a snowball: it is a self-sustaining system. Likewise, overweight children are not expected to achieve serious sporting success, and, following the stereotypical attitude, an obese child does not expect much from himself and does not try to succeed.

Experiments conducted in provincial schools in the American Northeast have shown that a vicious circle can be broken. The work of psychologists was as follows. Teachers of one of the subjects were asked to distribute personalized envelopes with a questionnaire to the students at the lesson. Seventh grade students were randomly divided into control (119 people) and experimental (124 participants) groups. The questionnaire of the students of the experimental group was supposed to increase their self-esteem, while the questionnaire of the control group was not. In the questionnaires of the experimental group, it was necessary to tick off the highest value for the student (a list of values was offered, such as “relationships with friends”, “success in art”, etc.), and write why this choice was made. In the questionnaires of the control group, it was necessary to mark the lowest value and write why it might be important to someone else. A second experiment was carried out a year later with another group of seventh graders. In the second experiment, it was proposed to choose not one, but several highest (for the experimental group) and lowest (for control) values [5]. The questionnaire of the experimental group was a standard method for improving self-esteem. Surprisingly, this seemingly minimal intervention led to visible results. Almost all African-American students improved their academic performance.

This example, seemingly unrelated to inclusive education, contains an important experience: improving self-esteem and overcoming stereotypes leads to better academic performance. For those students of the inclusive class who do not have special educational needs, this is also important, since in a diverse environment they can more clearly see their talents and abilities, which will also have a positive effect on academic performance.

Thus, inclusion is a shared responsibility. Therefore, the creation of an inclusive environment should be the responsibility of all stakeholders. Schools that are on the path to introducing inclusion share responsibilities between general education teachers, special education teachers, consultants, foreign language teachers. True inclusion engages all adults in the school community, from parents of children with SEN and teachers to support staff (counselors, therapists, assistants, psychologists and social workers). At the same time, all participants in the educational process receive a number of advantages [4, 5, 11, 15, 21]:

- Students gain invaluable communication and interaction skills. Inclusive practices in schools make learning and academic achievement more accessible to all.
- Inclusive education allows students with SEN to fully express the full range of their educational opportunities, including learning and practicing important social skills. In addition, inclusion promotes a variety of friendships and communication, thereby enriching the lives of all students.
- According to statistics, students in inclusive schools miss less classes, have fewer behavioral problems and have higher self-esteem. When all students feel included and important members of the school community and society as a whole, they are more interested in their own education.

It seems necessary to build the educational process in the inclusive school, mandatory starting from the primary school, on the basis of the principle of pedagogical optimism. The principle of pedagogical optimism is associated with a high level of scientific and practical knowledge about the potential of persons with special educational needs; modern pedagogical opportunities for habilitation and rehabilitation of children and adults with developmental disabilities, the right of every person, regardless of his/her characteristics and organizational capabilities of life, to be included in the educational process [12]. Children with special educational needs tend to learn more slowly, but they can learn and achieve high results. This principle is based on the idea of L.S. Vygotsky about the zone of proximal development (ZPD) and rejects the “ceiling” theory [20]. Modern special pedagogy claims that there are no unteachable children. A person with special educational needs in accordance with this principle is a successfully developing and socially valuable person, if society wants it or if it can provide the necessary conditions for this [20]. Thus, inclusive education is not only justified, but also useful for providing diversity, which is now considered among the most important means for self-realization, development, and continuous learning.

In one of the most innovative inclusive schools in Germany, a comprehensive project of experimental work was implemented. The following pedagogical conditions for teaching children by means of inclusive education have been implemented: adaptive educational environment, psychological, medical and pedagogical support for a child with disabilities, dynamic changes in organizational forms and methods of teaching children with disabilities, based on continuous feedback, scientific and methodological (educational) support for teachers based on training cycles according to Kolb's method.

The timely implemented psychological and pedagogical correction of learning difficulties has improved the qualitative performance of students in inclusive classes in mathematics by 4% and in English classes - by 6%. In children with disabilities, the performance in English improved by 4%, in literature by 5%, in mathematics - by 1%. Indicators of physical development, neuropsychic and somatic health of school students improved: the number of schoolchildren with high and above average physical development has increased; the number of students registered with the dispensary decreased from 301 to 67 children [3]. The attitude of participants in the educational process towards inclusion has changed. The number of children who agreed with the statement “Friends help me learn” increased from 62% to 77%. After the project completion, there are 2 times more teachers who believe that the teaching staff works in cooperation mode. The number of parents who agree with the statement that teachers try to make the lessons understandable to everyone increased from 18% to 71% [3].

Also, a regional project to strengthen social connections and improve emotional intelligence in the inclusive classroom was implemented in the Canadian province of Alberta. An analysis of personalized quantitative assessments of the achievement of the planned results (standard) of healthy children and students with disabilities did not reveal any significant changes in their academic performance during the period of participation in the regional project. The subject results of students with disabilities in the main academic disciplines appeared to be at a satisfactory

level. Teachers noted that in some cases, a temporary decrease in the progress of students (both healthy children and students with disabilities) is associated with traditional reasons (absences due to illness, family circumstances, lack of a sense of responsibility, etc.), and not due to the introduction of inclusive education [10]. Describing the dynamics of individual educational achievements, 99% of teachers indicated that "children with disabilities improve basic school skills and abilities"; 58% of the teachers surveyed noted that in the context of inclusive practice, children with disabilities learn the material better than with individual learning, and, very importantly, 21% of school teachers testify that after a year and a half of participation in the regional project to introduce inclusive education, "normally developing students have become learn better" [10]. The authors of the project pay special attention to the competence of teachers and note that teachers who have generally accepted the ideas of educational inclusion have a chance to become such, provided they master adequate pedagogical tools, which should not only correspond to the spirit (values, principles) of inclusive education, but also allow them to successfully solve specific problems of joint (inclusive) education of children with complicated development and healthy children. Only in this case, it will be possible not only to reveal the absence of negative effects of this innovative educational practice (children did not begin to study worse), but also, as evidenced by the findings of researchers, to note positive effects in the behavior of children, in the level of their educational motivation, and in progress, and in the development of the personality of students [8, 18].

Obviously, to ensure the sustainability of the positive results obtained, constant monitoring is necessary based on specially developed KPIs, which involves monitoring the effectiveness of the educational process in the context of inclusive practice in terms of some parameters of the processes studied in it:

- The learning process (dynamics of academic performance of all groups of children),
- The process of socialization of students (social well-being, psychological comfort and safety in the classroom and the educational environment as a whole),
- Attitudes towards the practice of inclusive education on the part of teachers, administration, parents, and children themselves.

The task of inclusive education is the creation of appropriate pedagogical conditions for children with disabilities and special needs, which requires reliable approaches and criteria that allow for the correct assessment of learning outcomes, taking into account an individual approach. Many variants of pathologies in children and a significant variation in the level of educational abilities put forward the requirement for a differentiated assessment, the methodology of which has a different essence, which does not fully resemble the marking of healthy children and the rules of a mass school.

With regard to the problem of academic results in children with disabilities, the theoretical provisions of the above mentioned famous pedagogical scientists L.S. Vygotsky about absolute and relative success in learning are rational. Absolute success as a traditional assessment of school results is built on the basis of the knowledge gained by the child at a particular moment (for example, after studying a particular topic or the entire course). Absolute success allows ranking students of the same class (or parallel) and to determine a more or less high position for each student, depending on his knowledge of the school curriculum. Relative success shows the individual progress of each child in comparison with his previous results, but not with the results of classmates. When comparing the absolute and relative success in one child (healthy or with psychophysical disabilities), a paradoxical situation is possible: children with high academic performance may demonstrate low relative success, and poorly performing children - high relative results. This fact was also studied and described by Vygotsky. He wrote that a well-performing and successful child in school may make little progress in further mental development and not exceed his previous educational achievements. Other students who are poorly performing and do not show high academic results (an unsatisfactory picture of absolute success) can demonstrate good relative success: reading speed has increased, the number of errors in dictation has decreased, more correctly solved tasks in mathematics, etc. [16]. When discussing the issue of the quality of inclusive education, it is possible to extrapolate the views of L.S. Vygotsky on modern theory and practice of inclusive education and learning. Information about the special educational needs of students and the use of the pedagogical category "relative success" allow drawing reliable conclusions about the actual educational results of children with disabilities (not necessarily in comparison with the results of other, healthy children) and give a reliable assessment of the quality of inclusion at school in the areas of organization and didactics of education.

Based on all the criteria mentioned in the article, that make up a high-quality inclusive education, one can point out the multidimensionality and systemic nature of this pedagogical phenomenon. Inclusive education is a specially organized interaction of teachers with ordinary (healthy) children and children with disabilities in the space of a general education institution, which allows, firstly, to overcome contradictions in the educational practice of teaching children with disabilities, and secondly, to implement the basic principle of inclusive education as a principle of joint education of ordinary children and children with disabilities, thirdly, to ensure the use of special organizational and pedagogical conditions for the education of children with disabilities or SEN. Inclusive education, unlike integrative education, adapts the educational environment to the individual characteristics of the child, and not vice versa. Moreover, it implies the availability of education for all categories of children with disabilities, uses the educational resource of adult-children and children's joint activities in heterogeneous groups, for which the teacher builds special actions and not just allowing a child with a disability/SEN to be with healthy children in classroom premises.

The system of inclusive education itself is an effective mechanism for the development of an inclusive society, i.e., by developing an inclusive education system, we contribute to the development of an inclusive society - a society for all / a society for everyone. This is the key value of inclusive education.

In conclusion, it should be emphasized that the assessment of the success of inclusive education should be based not only on the analysis of the individual components of this process, but also on its final result, the high quality of which is possible only if inclusive education is seen as a continuous process in which, starting from the very first stage of life of a person with disabilities /SEN - infancy and early childhood - and throughout the life vertical, each new life and educational stage is built on a solid educational foundation of the previous stage.

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Primary Paper Section: A

Secondary Paper Section: AM

THE SPECIFICS OF THE PRESERVATION AND DEVELOPMENT OF STAGE AND CHOREOGRAPHIC FORMS IN THE ENVIRONMENT OF THE UKRAINIAN DIASPORA IN CANADA IN THE LATE 20TH AND EARLY 21ST CENTURIES

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Abstract: The article examines the specifics of the preservation and development of stage and choreographic forms in the environment of the Ukrainian diaspora in Canada in the late 20th and early 21st centuries. The creativity of the well-known Ukrainian choreographic group of Canada "Barvinok", led by ballet master Fedor Danylyak, the organization of rehearsal processes, the peculiarities of the choreographic school, and touring activities are analyzed. The works of Andrii Nagachevskyi, who is engaged in the study of Ukrainian dance in Canada at the modern stage, are highlighted. Using the example of the creative activity of the Canadian Ukrainian Drama Theater "Zagrava", led by J. Terletsky, we analyze the repertoire poster and the traditions of the productions of literary and dramatic works, which are characteristic of the numerous productions of amateur theater groups of the diaspora. Avant-garde Ukrainian Theater (AUT) of M.-R. Stekh (1980s of 20th century) is viewed as a singularly radical attempt to gain a foothold in the Ukrainian diaspora by means of stage adaptations of new original texts, music, drama, and poetry.

Keywords: Diaspora, National traditions, Avant-garde art, Stage art, Ukrainian dance, Choreography, Choreographic composition.

1 Introduction

The Ukrainian diaspora of the late 20th and early 21st centuries helped preserve the ethnic identity of Ukrainians abroad. Today, the art of the diaspora is a component of Ukrainian national culture, covering almost all fields of art.

Ukrainians living outside the country continue to support, preserve, and develop their own cultural self-awareness. Especially in the field of artistic activity, the creativity of our compatriots proves that the talented and devoted Ukrainian people are not only competitive under other conditions, but also have a place in the international community. Therefore, there is an urgent need to return unknown and forgotten names of artists who established Ukrainian culture in a foreign environment. Among them, there are world-famous ballet masters, art theorists, actors, and directors.

In a certain historical period, in particular, after the Second World War, the forced emigration of the Ukrainian intelligentsia, accompanied by the Soviet totalitarian regime, led to the relocation of numerous figures of culture, art, and literature to other continents, where they not only became residents of other countries, but also preserved customs and traditions of their ancestors and passed it all on to their next generations.

After 1992, when Ukraine became an independent state, the Ukrainian diaspora began to invite artists to their centers in order to preserve and support Ukrainian culture.
In the second half of the 20th century, Ukrainian folk dance and Ukrainian theater developed, which were characterized by a high level of performance skills, particularly in the area of choreography, as well as in new paradigms of folk dance and stage art. The synthesis of traditional forms of dance and stage art of ethnographic regions helps to create masterpieces of the production, allowing choreographers and theatergoers to delve deeply into their historical ancestral roots and find interesting ideas for their own creativity. "During the 20th century, Ukrainian culture developed in difficult conditions, its progress was mostly contradictory. Despite this, the achievements of Ukrainian artists are significant and original" [19, p. 462].

2 Method

To study the specifics of the preservation and development of stage and choreographic forms in the environment of the Ukrainian diaspora in Canada at the end of the 20th and the beginning of the 21st centuries, weighty works of art critics and theoreticians-practitioners, which help the world learn about the value of Ukrainian art, were employed.

In her works, art critic Olha Kvetsko explores the choreographic culture of the Boiks of Prykarpattia. Famous ballet masters of the Carpathian region, who began to develop Ukrainian dance in Ukraine, migrated to Canada and began to actively develop dance art abroad. Among them, there is the famous choreographer Fedir Danylyak, who is currently the artistic director of the School of Ukrainian Dance "Barvinok" (Canada) [4, p. 112-115].

In her dissertation study "Choreographic culture of Boyki in Prykarpattia at the end of the 20th - beginning of the 21st centuries", art critic Olga Kvetsko points out that choreographer Fedir Danylyak is the director of the Boyki dance "Lyubaska", which today is a model of Ukrainian folk choreography [5, p. 102–105].

Art critic Nadiia Kukuruza works on the development of stage art abroad, actively researching the stages of formation of theater art of the diaspora, highlighting the work of famous artists and the development of stage forms in the environment of the Ukrainian diaspora in Canada [6, 7, 8, 9].

The works of art critic Andrii Nagachevsky today are the only property of the Ukrainian diaspora, which reveal the history and development of all Ukrainian dance abroad. So in the monograph "Household dances of Canadian Ukrainians", based on the description and analysis of family dances, the author explores the cultural origins of Ukrainians in Canada, intertwined with their ties to their ancestral homeland and new environment. The book is of interest to students, scientists, and anyone interested in culture and cultural relations, ethnology, and dance [11].

In his monograph "Ukrainian dance from the village to the stage", A. Nagachevsky indicates that Ukrainian dance is very popular in Canada. Today, all choreographic groups mostly work on stage, but folk dance, which is the source of today's stage forms, originated at a performance in a Ukrainian village many years ago. The main purpose of the book is to highlight the traditional dances of the Ukrainian village [12].

The monograph "Ukrainian dance: a cross-cultural approach" by A. Nagachevsky describes that the popularity of Ukrainian dance is very stable and is performed in many cultural contexts. Most Ukrainian live dances are performed by peasants in traditional rural settings for entertainment and ceremonies. Light Ukrainian dances are performed more consciously, as part of the living heritage. In this book, the author introduces readers to subgroups that include folk dance, entertainment, educational, and stage dance [13].

Yosyf Terletskyi's article "Pains of our theater history" describes the last 20 years of work of the "Zagrava" theater. His reflections "contain an assessment of dramatic moments that often arise in theater groups at the breaks in their history, when there is a change of generations" [13, p. 15].
The study of the specifics of the preservation and development of stage-choreographic forms in the environment of the Ukrainian diaspora in Canada at the end of the 20th - beginning of the 21st centuries made it possible to expand the horizons of dance and stage art and add new personalities who continue to preserve, revive, and develop the stage-choreography art today.

3 Results

In the context of the development of Ukrainian choreography in Canada, we can claim new directions of development,

achievements, and successes, characterizing them at the current stage as Canadian-Ukrainian, because the language of dance is international and this, in a certain way, is a much easier way to adapt choreographic creativity in any corner of the world On the other hand, the importance of the Word in theatrical art, in particular Ukrainian, cannot have a wide range of connoisseurs and is in demand only for the Ukrainian diaspora.

Therefore, the need to understand the specifics of the preservation and development of stage and choreographic forms in the environment of the Ukrainian diaspora of Canada in the late 20th and early 21st centuries, the practical use, preservation and transmission of the national heritage to solve the current cultural issues of the modern Ukrainian diaspora, on the one hand, and insufficient coverage of the problem on the other hand, determine the choice of this topic.

Artistic director of AUT M.-R. Stekh, who successfully continued further activities in the field of literary studies, as well as his predecessors who sought to create a Ukrainian theater in the diaspora (such as, for example, Y. Hirnyak and O. Dobrovolska, V. Blavatsky after arriving on the American continent) after decades, again states that in the modern conditions of the emigrant community, even a half-fledged theater has no real chances.

Analysis and systematization of the periods of development of Ukrainian stage/theatrical art on the territory of the American continent in the 2nd half of the 20th century, in particular among the artists and writers of the Canadian diaspora, the period of the end of the 20th - beginning of the 21st century deserves attention; in it, we will single out the work of the collectives “Zagrava” and AUT - the theater of tradition and the theater of radical views, different in existence and in time, and the attitude towards the preservation or rejection of creative assets characteristic of traditional theaters of the diaspora, the polarity of one's own views on the role and purpose of theatrical art in general.

It should be noted that both Yosyp Terletskyi (“Zagrava”) and Robert-Marko Stech (AUT) - ethnic Ukrainians from Poland - moved to Canada almost at the same time (1982).

Yosyp Terletskyi (born in 1955) was born in Mlynary (East Prussia), a certified “director of drama group”. A meeting in 1983 with the administrator and head of the Ukrainian Drama Ensemble “Zagrava” Volodymyr Dovhanyuk (an actor in Galician theater companies before World War II, the founder of the theater) determined the further creative path of the artist, where he went through the path of an actor, a director, a member of the theater board and, finally, today heads the team.

As an actor, Terletsky skillfully masters the art of the entertainer, which involves mastering improvisation, performing roles in sketches on the subject of the life of Ukrainians in the diaspora. His repertoire includes roles in iconic plays by classical Ukrainian playwrights and contemporary Ukrainian playwrights. As a team leader, he managed to establish creative ties with Ukrainian theater artists: People's Artist of Ukraine Fedir Strygun became the artistic director of A. Krym's play “Illegal”. Even at the dawn of Ukraine's independence, “Zagrava” toured Ukraine with the performances “Dance of Freedom” by B. Budny and “Sins of Youth”, and its director was awarded the honorary title of “Honored Worker of Culture of Ukraine”.

Forming the collective's repertoire poster in the direction of entertainment genres, the collective immediately responded to the events of Russian aggression by staging the poetic and musical performance “Hetman Mazepa” based on the poem by H. Zaporozhchenko, which is performed for charity in support of the Armed Forces of Ukraine.

A significant contribution of Y. Terletskyi to scientific documentary theater studies is the publication of a universal book on the history of the formation and activity of “Zagrava” together with the art critic V. Haydabur [1]. The book included carefully collected materials about the theater from the first day of its foundation.

In the context of the study of avant-garde theatrical experimentation, the scientific work of the cultural expert, theorist of criticism S. Matvienko deserves attention, in which she notes that “the art of the avant-garde is ideological, because it pursues certain goals (changes of art, society, consciousness”). Defining the generalized concept of avant-garde in more detail, she considers the avant-garde as a “gesture of protest within the limits of modernism”, and at the same time - the most characteristic gesture...” [10].

Analyzing the short-term attempts to develop Ukrainian modern/avant-garde stage art among the Ukrainian diaspora on the American continent at the end of the 20th century, we can single out several iconic figures, including the writer and poet Bohdan Boychuk (New York Poets Group, 1958–1999). As an active researcher and connoisseur of modern world theatrical processes, he was interested in realizing his own drama on stage and thus opening the Ukrainian theater for experimental creativity [9, pp. 37–42], as well as a well-known Ukrainian Canadian literary critic, writer, theater researcher, manager of scientific and encyclopedic projects, author and presenter of the series “With the Eyes of Culture” Marko-Robert Stech.

He started his creative activity as a playwright and director in the 2nd grade. In the 1980s, founded the Avant-Garde Ukrainian Theater (AUT) group, which he led for almost five years.

Stech was associated with this theater not only as a director, but also as a playwright. His first literary attempt is the play “Duel”. In the theater, he staged his own compositions (dramas, staging-montages), as well as plays based on the works of Becket, Mrožek, Kostecky.

M. Stech positions the attempt to create AUT as an attempt to “declare self in these new circumstances, which I did not always perceive at the time without conflicts and feelings of inferiority. It was a form of protest and, more importantly, an attempt to integrate into a new community for me. And so it happened, because after the first performance, in which only emigrants from Poland, such as myself, took part, the group was immediately joined by several young Ukrainians from Toronto, who became the main core of the future AUT and with whom I later tried to publish as well magazine: four issues of the magazine “Terminus” [17].

Ukrainian literary critic L. Zaleska-Onyshkevych expressed her opinion about youth independent formation as “an interesting and joyful phenomenon in the diaspora... manifested in literature, journalism, theater, music and radio broadcasting, and art” [16].

Subsequently, Marko-Robert Stech successfully continued further activities in the field of literary studies, but he also, like his predecessors, who sought to create a Ukrainian theater in the diaspora (such as, for example, J. Hirniak and O. Dobrovolska after arriving on the American continent), after decades later states, that “there are no real opportunities for even a half-full existence of the theater in the modern conditions of the diaspora community” [16].

This is confirmed by Y. Nazyrevych's post about the creative individuality of AUT, where he not only tries to analyze one of the productions, but also describes the conditions in which the newly formed team had to work.

Young enthusiasts did not have premises for rehearsals, instead they worked in private residences, they tried to subordinate the team to organizations with better funding, they convinced them to turn towards the traditional repertoire to which the average Ukrainian audience in the diaspora is accustomed, to abandon incomprehensible innovation. The Institute of St. Volodymyr in Toronto became a signpost for AUT.

The first performance-montage of the AUTU “Evening in Prison” received favorable reviews, but was also criticized. The most common among the critical comments (according to the author's research, this is a problem of numerous Ukrainian-language productions in the diaspora) is the speaking stage culture: the performers “possessed insufficient mastery of the Ukrainian language...” and that “people are not used to such events, which in many cases became incomprehensible to them” [15].

Congratulating the creativity of M. Stech's theater, the author emphasized that the theater should make attempts to get out of ethnographic and everyday provincialism, teach the audience to “think and develop the intellect”, and that classical drama should appear in new forms [15].

The repertoire of the theater also included the performances “Duel” by M. Stech, which the team represented, in particular, at Harvard University, the musical and theater production “On the death of the poet. In memory of Vasyl Stus”, “In the middle of the sea” by Mrozek, “Catastrophe” (dedicated to the Shot Renaissance and the artists destroyed by the Soviet totalitarian system; was represented in New York at the celebration of the 100th anniversary of the birth of Les Kurbas), “Waiting for Godot. Krapp's last tape” by Beckett, “Nativity scene - torn wings” (edited by M. Bily). Mrozhek's play “Emigrants” (director Yuriy Onukh) was dedicated to the centenary of the resettlement of Ukrainians to Canada.

The dramaturgy was translated by R. Vashchuk, I. Stech, Yu. Tarnavskyi. The core of the group consisted of up to 30 participants, among whom there were A. Ivakhiv, R. Gurko, H. Gula, I. Naberezhny, S. Berezovska, T. Chorna, B. Vuytsyk, O. Ganushevska, and others.

The writer, pedagogue, public figure S. Gurko left a memory of the performance dedicated to V. Stus, thanks to which we can discover the means of stage embodiment. The textual basis and direction (“deeply thought out” stage pantomime) was embodied by Marko Stech on the basis of the musical composition (two out of three parts were performed) by A. Ivakhov “Requiem - for the death of the Poet”, which was based on Stus's poetry “And the house floated, floated by the river...” A small student orchestra and a girls' choir were involved in the performance [3].

The avant-garde direction of Mark-Robert Stech's theater became, first of all, a radical “gesture of protest” as a direction in the development of modern Ukrainian art, although its participants pursued a different goal.

It was one of the first attempts to unite creative youth to make a statement on the American continent by means of performing arts, as it combines all aspects of art in general: writers, musicians, artists, etc. (let us note that among the main associates of AUT, there were no professional theater artists, they performed rather advisory functions).

Many members of the team chose their own creative path, not related to stage/theatre art. For example, the musical group “Limestone under the bare sky” in 1986 first announced itself at a creative evening (organized by A. Ivakhiv and M. Stech) dedicated to V. Stus, V. Havel, and I. Yirous, and later the group became a participant in the festival “Chervona Ruta-91”, performed with members of the band “Hadyukin Brothers” on the stage of the Lviv Youth Theater.

In contrast to stage art, Ukrainian dance is widely known abroad. With the diasporas in all corners of the world, centers are created that are engaged in the popularization of Ukrainian dance. Since the late 1940s, the steady growth of participation in Ukrainian folk and stage dances in Canada has led to the organization of numerous dance schools and ensembles, some of which have reached a high technical and artistic level of performance. Most of the collectives took Ukrainian folk dance, its stage arrangements and original choreography as the basis for its existence and development. The results were mostly positive, but numerous problems arose due to limited knowledge and understanding of the form of dance art in general and the specifics of Ukrainian folk dance in particular, confusion regarding the nomenclature of the dance step, the correct and appropriate costuming and melodic accompaniment. Regional identity and characteristics of dance are among the most obvious problem areas.

Among the famous ballet masters working in Canada, there is Fedir Danylyak, who was born on September 2, 1955 in the village of Pukiv, Rohatyn district, Ivano-Frankivsk region. In 1972, he graduated from Pukiv secondary school. He became interested in choreographic art since childhood, but he began to professionally study a profession related to dance at the Kalush School of Culture (today the Vocational College of Culture and Arts (Kalush)) in 1972-1976.

After graduating from school, Fedir Danylyak worked in the Hutsul Song and Dance Ensemble at the Ivano-Frankivsk Regional Philharmonic (today the Ivano-Frankivsk National Academic Hutsul Song and Dance Ensemble “Hutsuliya”). From 1978 to 1982, he studied at the Kyiv Institute of Culture named after O. Korniychuk (now the Kyiv National University of Culture and Arts). After graduating from the institute, the young specialist was sent to work at the Kalush School of Culture, where he worked from 1982 to 1995.

During the time of Ukraine's independence, the subject “Ukrainian dance” was introduced into the curricula of cultural and educational institutions. This became an impetus for the development of Ukrainian folk dance in Prykarpattia, since there was a lot of folklore material and it was used only in dance groups.

Fedir Danylyak began fruitful work on the study of the discipline “Ukrainian dance”, the study of dances of the ethnographic groups of the Carpathians, later as a separate part of the discipline's curriculum. Therefore, the repertoire of the folk dance ensemble “Merezhivo”, of which he was the director at that time, is complemented by interesting choreographic works: “Prykarpatsky styvatkovy”, Boykiv dance “Lyubaska”, choreographic suite “Wreath of Unity”, etc.

In 1996, Fedor Danylyak was invited to the position of choreographer at the “Arkan” Dance Academy in Toronto, Canada. He was fond of Ukrainian dance art and created many interesting dance works. The decisive thing was that his art was highly appreciated. In 1997, he headed the school of Ukrainian dance “Barvinok” at the Church of the Assumption in Mississauga (Ontario, Canada).

The Ukrainian dance school “Barvinok” was founded in 1969. It began its work in the basement of the Ukrainian Marian Church in Mississauga. Every year, the number of participants increases, as does the professional skill of the dancers. During 20 years of work, Fedir Danylyak created more than 200 works. These are ethno-patriotic dance performances, folk dances of different ethnic regions of Ukraine. In his dances, the choreographer preserves Ukrainian traditions, transfers his knowledge to Ukrainian students abroad who are proud and love Ukraine. This plays an important role in the further development of Ukrainian dance culture abroad, helps to preserve customs and traditions, and to remember one's origins.

His team consists of 18 assistants, whom he trained himself. One of them is his son Taras Danylyak. Today, the Ukrainian dance school “Barvinok” has more than 400 students aged from 5 to 30 years. The school is dedicated to teaching Ukrainian dance. The curriculum of the school points to the great works of choreographers, especially Fedor Danylyak, who devoted his life to Ukrainian choreography. The school's repertoire includes choreographic productions that demonstrate the character and manner of performance of different regions of Ukraine: “Prayer for Ukraine”, Ukrainian dance “Hopak”, “Carpathian Mosaic”, Boykiv dance “Lyubaska”, “Polish Polka”, Transcarpathian dance “Tropotyanka”, “Opil Polka”, “Volynyanka”, and many others [5, pp. 104-105].

Among the famous ethnographers and theoreticians of the study of Ukrainian dance abroad, one can mention Andriy Nagachevskyi, who is the director of the Peter and Doris Kulyv Center of Ukrainian and Canadian Folklore at the University of Alberta, Doctor of Science.

A. Nagachevsky works as a professor at the Department of Modern Languages and Cultural Studies at the University of Alberta (Edmonton, Canada). He also holds the position of the Department of Ukrainian Culture and Ethnography named after Hutsuliakiv and heads the newly created Canadian Center of Ukrainian Culture and Ethnography. He actively participated in Ukrainian dance ensembles "Cheremosh" and "Shumka" (Edmonton), "Festival Ensemble" (Toronto), "Yevshan" (Saskatoon).

Nagachevsky defended his thesis "Dance culture of Ukrainians of Alberta and Saskatchewan, Canada" in Canada (Edmonton, Alberta) in 1997. This dissertation collects a large amount of monographic literature on folk dances by choreographers of Ukraine, Canada, and Western Europe. There are many photos of Ukrainians in Canada during the National Holiday.

Nagachevsky, in the process of writing a dissertation, received a rare opportunity to work in the best libraries abroad and in Ukraine. A famous Ukrainian choreographer-balletmaster, Ukrainian and Canadian musicologists and linguists came to his aid. During the 20th century, he got acquainted with numerous scientific and special documents that appeared in Ukrainian and foreign book collections. But he was primarily interested in the past and present dances of Bukovyna and Halychyna, where the first immigrants from Ukraine migrated. The most difficult thing for young researchers is to develop a scientific term.

Andrii Nagachevskyi visited Ukraine in 1980, 1992, and 1995 to study Ukrainian dance. This study is described in the master's thesis "Family dances among Canadian Ukrainians", and the scientific leader is Dr. Bohdan Medvidsky from the University of Alberta (Canada) [9].

Based on the description and analysis of family dances, Andrii Nagachevskyi explores the cultural origins of Ukrainians in Canada and their connection with their ancestral homeland and new environment. A book is for students, scholars and anyone interested in culture and cultural relations, ethnology and dance. "Family Dances of Ukrainians of Canada" was started in 2001 by the Ministry of Culture and Ethnography of Ukraine by Hutsuliakov from the University of Alberta (Edmonton, Canada), the Institute of Ethnology of the National Academy of Sciences of Ukraine (Lviv) and the RODOVID publishing house (Kyiv). This is the first book of the "Ukrainian Ethnography and Culture" series.

In 2008, with the support of the Hutsuliak Department of Ukrainian Culture and Ethnography at the Kule Center for Ukrainian and Canadian Folklore at the University of Alberta, Andrii Nagachevsky's work "Ukrainian Dance from Village to Stage" was published. Namely this work describes the fact that Ukrainian dance is extremely popular in Canada. Folk stage dances today take spectacular forms on stage, but Ukrainian dances take their roots from the life of Ukrainian villages since the past. The purpose of this book is to investigate traditional dance in a Ukrainian village [10].

The monograph "Ukrainian Dance: A Cross-Cultural Approach" was published in 2012 (Jefferson, N.C.: McFarland & Co.) [11]. The popularity of Ukrainian dance is very stable and it is performed in many cultural contexts. This work explores the complex world of this folk dance, paying particular attention to the difference between live dance (which requires full focus on the present) and reflex dance (dance which is clearly connected to the past). Most Ukrainian live dances are performed by peasants in traditional rural settings for entertainment and ceremonies. Light Ukrainian dances are performed more consciously as part of living heritage. The monograph describes Ukrainian dance by subgroups, including folk national dance, recreational and educational dance, as well as stage dance.

4 Conclusion

So, in the history of the development of Ukrainian stage art on the territory of Canada, one can single out two iconic collectives: the "Zagrava" theater and the AUT, which are completely opposite in terms of artistic direction and ideology.

Thanks to the organizational talents and dedication of the director of the Ukrainian Drama Theater "Zagrava" Yosyp Terletskyi to the theatrical business, the theater, albeit with interruptions, continues its long-standing history to this day, despite permanent difficulties (lack of premises, living conditions of team members, financing of productions, etc.), as it happened with the collectives of professional theater artists Y. Hirnyak, V. Blavatsky, and others after the 2nd World War, due to which their collectives, like many others, stopped their short-lived activities. Analyzing the last of the productions ("Hetman Mazepa") of the "Zagrava" theater, we can say that the collective works on the basis of amateurism.

We should also note that the attempts of radical changes in the theatrical art of the diaspora were tried to be embodied not so much by theater artists but rather by representatives of related creative professions - writers, musicians, choreographers, artists, for whom the theater as a syncretic art became a unifying factor for declaration of own views, opinions and beliefs regarding the prospects for the development of art and literature in general on the stage. But the most important thing is that they embodied their own creative assets on stage.

Therefore, in the history of the Ukrainian stage/theatrical art of the diaspora, we regard the Avant-Garde Ukrainian Theater under Mark-Robert Stekh as another of the short-lived attempts to initiate radical changes in Ukrainian literature and art.

Most of the migrant artists chose the path to the restoration and development of Ukrainian choreographic art abroad, which is highly appreciated by the diaspora in all corners of the world. The well-known productions of Fedor Danylyak are a symbol of love for Ukraine, which instills patriotism and high values in each subsequent generation of Ukrainians in Canada, and shapes Ukrainian identity.

The works of Andrii Nagachevsky form a scientific basis for the study of Ukrainian dance abroad, help to expand one's horizons and find the primary source for stage forms of choreographic art.

Centers of the Ukrainian diaspora around the world restore not only the customs and traditions of Ukrainian people, but also leave to the next generations a part of their past that is closely connected with history, everyday life, culture, and art. Ukrainian dance is danced by choreographic groups in different parts of the world. Namely the Ukrainian diaspora plays an important role in the development, preservation, and popularization of national choreographic art abroad.

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Primary Paper Section: A

Secondary Paper Section: AB, AL

FORMATION OF THE SOFT SKILLS AMONG STUDENTS OF HIGHER EDUCATION

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Abstract: The article examines the modern specifics of the formation of soft skills among students of higher education, taking into account the transformation of approaches to the training of future specialists and the objective changes in the social and economic environment that occur under the influence of globalization and impose new requirements on professional activity. It was determined that soft skills do not have a universal interpretation due to their significant differentiation depending on the field of professional training. A system of soft skills for higher education graduates has been formed, which is the most in-demand in the modern labour market for higher education graduates. It is proposed to consider soft skills as critical competencies of future specialists in the process of their professional training.

Keywords: Soft skills, Professional competence, Professional training of specialists, Higher education.

1 Introduction

In modern conditions, characterized by transformational processes in the general dynamics of the development of society and the globalization of the system of socio-economic relations, new requirements appear for the personality of the student of higher education. Today, to meet all the requirements posed by technological progress, a modern qualified specialist needs the skills and abilities necessary for effective work in new realities, which include perfect mastery of digital technologies, as well as modern technologies of virtual communications, etc. Thus, the qualified specialist needs something that allows him to function in the conditions of dynamic changes in the external environment and constructively solve the problems of professional activity. Therefore, for modern employee to meet the challenges of contemporary society and the technological complications of professional activity, it is necessary to have a high level of stress resistance to ensure the effective performance of all functions entrusted to them.

As practice shows, the key resource of professional stress resistance in such conditions for modern professionals is soft skills, that is, a system of "soft skills" in managing people and implementing professional competencies. At the same time, soft skills help to successfully interact and communicate with other employees, and they are also necessary for effective professional activity and career growth. Such skills include: communicative aspects; teamwork skills; the ability to effectively apply time management; flexibility; adaptability and ability to change; leadership qualities; personal qualities, etc. In the context of the activities of modern specialists, this list can be supplemented with such necessary qualities as self-organization skills, the ability to effectively work with information, the ability to solve complex professional tasks, flexibility, etc. Therefore, it can be argued that there is no permanent list and perfect classification of soft skills in practice, since different types of skills will be prioritized for different types of professional activities. That is why the study of the principles of the formation of soft skills among future specialists at the stage of obtaining higher education, when they are acquiring basic professional skills and knowledge, is of particular relevance at present.

2 Literature Review

The issue of studying the mechanism and principles of soft skills formation in future specialists at the stage of obtaining higher education is not new to modern scientific research. It is worth noting the thorough studies in this direction, which are presented in the works of such scientists as J. Heckman [7], P. Kyllonen [11], T. Mishustina [12], O. Pavelko [15], S. Vasanthakumari [21], S. Voloshyna [22], and others.

In addition, it is worth noting a number of studies on the professional training of specialists based on the formation of the soft skills system in higher education graduates in the process of practical implementation of professional educational programs by higher education institutions based on the application of modern information and digital technologies as the basic foundation of future professional activity. In particular, an important theoretical substantiation of the soft skills formation system based on the application of the competence approach was carried out in the studies of J. Andrews [1], T. Beridze [3], O. Hlazunova [8], K. Moore [13], N. Semenyshena [16], K. Tang [18], I. Tkachuk [19], I. Yakoviyk [26], A. Zhang [28], and others.

It is also necessary to note the significant practical contribution to the study of the principles of soft skills formation in institutions of higher education, which was revealed in the works of I. Balaniuk [2], Y. Chaliuk [5], O. Ermakov [6], K. Kostetska [10], S. Nakhod [14], A. Tiurina [20], O. Vorobyova [23], L. Zelenska [27], and others.

At the same time, it should be noted that in the conditions of digital transformations of the system of socio-economic relations, there is an objective need to expand research on the specifics of the formation of soft skills among students of higher education in the educational process precisely in the conditions of intensive use of information technologies in the learning process.

3 Materials and Methods

Researching the problems of professional identity as a central link to professional realization, it should be noted that its structure is made up of three key components:

- Individual (professional self-identification, or self-concept);
- Instrumental (professional knowledge, skills, abilities);
- Social (conformity to the social order).

The coincidence of these components is defined as professional identity, and the discrepancy is defined as a kind of professional marginalism. Thus, the realization of a professional must be considered not only as self-realization that occurs within the subject and in the interests of the subject, the degree of which is assessed by the subject himself from the position of how suitable this profession is for him, but also as realization directed from the outside, carried out in the form of social professional actions, through which society already assesses how suitable this professional is for it, to what extent he meets its interests and requests [19].

Modern methods of research into the essence of definitions of the term "soft skills" show that currently there is no single and unified concept, but in one way or another, the terms are interconnected with each other. All these definitions are united by a set of activity and communicative approaches in the implementation of communicative and personal competencies related to non-professional skills that increase the effectiveness of the activities of future specialists. Taking into account the processes of integration and the possibilities of soft skills, they can be divided into four typical groups:

1. Basic communication skills. This group includes the ability to persuade, argue, work in a team, negotiate, conduct business correspondence, make presentations, etc.
2. Self-management: to be able to manage emotions, know how to behave in stressful situations, to be able to plan, to be able to use one's time effectively, to control one's emotional state.

3. A group of intellectual thinking skills: it is important to search and analyze information, to think creatively and logically, that is not in purely formal nature, to have design skills, and to make competent decisions.
4. Foresight-management: the specialist possesses such stable skills as task setting, project management, motivation, control, and easy access to feedback [19].

However, the methodology of the Future of Jobs by World Economic Forum is currently considered the most complete, according to which it was possible to compile a list of typical soft skills and divide them into three categories: abilities, basic skills, and cross-functional skills. At the same time, each category has an internal classification:

1. Abilities:

- cognitive;
- physical.

2. Basic skills:

- content skills;
- process skills.

3. Cross-functional skills:

- social skills;
- problem-solving skills;
- system skills;
- resource management skills;
- technical skills [25].

4 Results and Discussion

As practice shows, the main task of a modern higher education is to create a professional personality, ready to quickly adapt to a new social environment and capable of self-realization and career development in conditions of intensive introduction of information and digital technologies into the economic and social system of society. Therefore, the role and responsibility of the higher education institution in matters of the development of general and professional competencies of modern specialists are growing. Accordingly, in the context of the intensification of the introduction of information technologies into social production, the main competitive advantage is the availability of soft skills among employees.

At the same time, it is meant that regardless of professional qualifications, modern specialists should be distinguished by a high coefficient of soft skills, which should ensure career success. In general, the concept of “soft skills” has now become an integral part of the world labour market in the most diverse spheres of economy and society in the conditions of globalization. In addition, in many contexts, soft skills are equated with such terms as “employability skills”, “people skills”, “non-professional skills”, “key skills”, “skills for social progress”, “life skills”, etc. It is appropriate to state that in practice soft skills represent a complex combination of all the listed concepts.

The conclusions of the latest labour market research, which reflect a noticeable trend of employers` significant interest in “soft skills” among potential employees, are of particular interest. Most employers consider them equally important in comparison with professional knowledge and skills [24]. However, educational programs are overloaded with academic disciplines that develop students` “hard skills”, i.e., “firm” skills related to knowledge of fundamental and special disciplines, acquisition of practical training, etc. It is hard skills that are easy to measure, they are quite objective. This group includes professional knowledge, skills, and abilities. Soft skills are difficult to measure, and, therefore, their assessment is subjective (honesty, initiative, diligence, learning ability, creative abilities, etc.) [9].

It should be noted that the practical construction of the “knowledge society”, the introduction of the paradigm of continuous education, and the quality assurance of higher education lead to the fact that learning and acquiring new competencies have become an integral part of the life of members of society. Therefore, soft skills acquire special importance in the personal development and professional activity of graduates of higher education institutions, namely: sociability, communication skills, cognitive flexibility, adaptability, the ability to work in a team, leadership, the ability to resolve conflicts, creativity, critical thinking, general literacy, organization, initiative, responsibility, perseverance, the ability to take responsibility, the ability to make decisions, the ability to work in critical conditions, stress resistance, self-learning and self-development, self-management, emotional intelligence and emotion management, etc.

So, it can be argued that soft skills are necessary for any type of professional activity; therefore, they need to be actively formed in students at the stage of education in general secondary schools, and intensively developed in institutions of professional pre-higher and higher education. At the same time, institutions of higher education should have their own policy regarding the development of these skills in their students and teachers through a system of professional development and advanced training, which also determines cooperation with employers and graduates, and affects the reputational capital of higher education institutions. Positive practice is the formation of soft skills when studying specific disciplines, but it is not limited to this, because it can also take place within general and specialized disciplines [17].

In this aspect, it should be noted that, given the significant relevance of the development of student`s professional and personal competencies, in order to achieve competitiveness in the labour market, it is important to find out whether the developed system of the educational process allows students to form soft skills, increase competitiveness, and especially to achieve high rates of graduate employment. In this context, the opinion of the students themselves, graduates, as well as employers regarding the effectiveness of the acquired competencies in the context of the formed soft skills become important.

In addition, taking into account the objective difficulties with adaptation to the first workplace for graduates, it is necessary to develop recommendations for professional growth, where a special place should be given to the further development of soft skills, which depend on professional and personal success, and the content of educational programs should be updated through separate educational components regarding the formation of relevant professional and life competencies [14].

In order to determine the system of key soft skills for future specialists and build a classification, it is not enough to focus only on today`s requirements of the labour market. It is necessary to take into account the experience of developed countries and focus on the needs of the future. For this, the researchers studied the world experience of developing 21st-century skills in educational programs. A number of studies aimed at finding out which competencies the professional community is focused on were considered. This study was conducted by the Centre for Education at the Brookings Institution, which aims to support countries in improving the assessment, teaching, and learning of soft skills by increasing the level of assessment literacy among regional and national stakeholders in the field of education [4]. According to this study, the documents on education standards often refer to such competencies as creativity, communication, critical thinking, and problem-solving (Fig. 1).

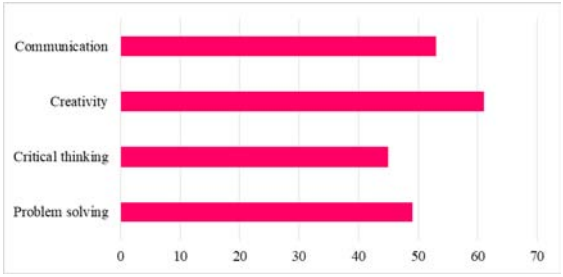

Figure 1. Competencies of the 21st century, which are most in demand according to a study by the Brookings Institute (November 2018)
Source: [4]

As one can see, these competencies are based on imagination, generating ideas, building arguments, establishing a lack of information and the ability to search for it, formulating one`s own ideas and developing the ideas of others, evaluating one`s own proposals and judgments, accepting the group`s goal and evaluating the overall results. Thus, it can be argued that the most important soft skills for future specialists in modern conditions are the following: critical thinking and the ability to make decisions, creativity, sociability, and the ability to work in a team.

Namely these skills allow solving complex professional tasks. They are classified as higher-order competencies. Undoubtedly, these are groups of skills, the structure of which includes a set of other smaller skills. Accordingly, the development of the second group of soft skills among students of higher education institutions should be aimed at ensuring the adaptability of future specialists to any changes in the environment in which they will have to work.

So, we come to the conclusion that the issue of competence formation and, accordingly, the transformation of education systems are considered at the current stage in almost all countries, therefore, in this sense, we can say that this aspect can play the role of a unifying trend of building a single educational space. From that, the level of economic development of countries, including the global economic space, which is directly related to the development of human capital, will depend on how the issue of competence formation will be resolved, and how it will be related to the modernization of production.

Thus, it is possible to form a system of key soft skills, which are currently of particular relevance in the process of training future specialists during their professional education while studying in higher education institutions (Table 1).

Table 1: Soft skills system of students in higher education

Help to solve complex tasks	**Help to adapt to a changing environment**
Critical and structured thinking	Adaptability
Ability to solve problems	Curiosity
Creativity	Initiativeness
Sociability	Purposefulness
Ability to work in a team	Emotional intelligence
	Leadership
	Motivation
	Positive thinking
	Self-management
	Ability to learn
	Stress resistance
	Responsibility
	Conflict management
	Social and cultural awareness

Source: developed by the author based on [13].

Thus, it can be argued that, in the modern sense, soft skills for students in higher education represent a set of social skills of an individual, which can be classified into interpersonal (such as the interaction of leadership qualities), organizational skills, and communication skills, which in general affect the successful performance of professional duties of specialists in any field of activity.

5 Conclusion

So, we conclude that the main soft skills, which, along with professional competencies, determine the professional self-realization of students of higher education are: the ability to work in a team, leadership qualities, creativity, organizational skills, communication, emotional intelligence, work with information, system thinking, motivation Achieving the goal of forming such skills among students is possible through an adequate construction of the educational process in institutions of higher education. In particular, it is necessary to ensure a high level of freedom for teachers in the choice of technologies, methodical and didactic material, organization of educational space, etc. A derivative need from this task is also the provision of a variety of means and methods of teaching scientific and pedagogical workers themselves. In modern conditions, innovative activity in education is becoming increasingly more significant, therefore the analysis and evaluation of new technical means, as well as the creation of the necessary conditions for their further successful application in the context of the development of continuous education in the conditions of e-learning, are important.

In addition, an understanding of soft skills is necessary for practical application as an element of the educational process that complements hard skills - professional skills that are part of job instructions and qualification characteristics of higher education applicants. At the same time, the objective necessity is to ensure the universal character of soft skills, which will be important for the successful professional realization of students.

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Primary Paper Section: A

Secondary Paper Section: AE, AM

THE USE OF BLENDED LEARNING INTERACTIVE TECHNOLOGIES IN THE EDUCATIONAL PROCESS IN THE CONTEXT OF EUROPEAN INTEGRATION PROCESSES IN UKRAINE ON THE EXAMPLE OF HUMANITARIAN SPECIALITIES

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Abstract: The article examines the modern specifics of the formation of the use of interactive learning technologies in the process of modernization of the educational process. The changes taking place in the education standards of many countries, which provide for the expansion of teaching methods for students of humanitarian specialties, including due to the intensive implementation of interactive learning technologies, have been determined. The task of training specialists in the conditions of the introduction of modern innovative technologies into the educational process has been defined. The role of the teacher in the process of learning with the use of interactive technologies, as well as the principles of his interaction with students under new conditions, were studied. It is proposed to implement the model of mixed learning in the educational process based on the use of computer-oriented learning tools.

Keywords: Interactive learning technologies, Soft skills, Blended learning, Educational communications.

1 Introduction

Modern world standards in education require the training of highly qualified specialists capable of integrating theoretical knowledge and practical skills into a coherent system, mastering new technologies, etc. For the successful realization of the personal potential of each student in the educational process, conditions must be created for the formation of such personality qualities as mobility, the ability to integrate into a dynamic society, critical thinking, the ability to generate new ideas, the knowledge allowing making non-standard decisions and bear responsibility for them, communicative skills, the ability to work in a team, the ability to model educational situations, etc. The use of interactive learning technologies contributes to the solution of such tasks. New forms of education also develop new relationships between teacher and student, and new subject-subject relationships. Namely the group form of work has gained popularity in educational institutions, as it contributes to personally oriented learning, which requires the development of scientifically based content and methods of organizing the educational process. Therefore, modern pedagogical science is in search of such learning technologies that would ensure the comprehensive development of the individual. As it is known, learning technology is a complete system, the main structural element of which is the learning situation, characterized by such components as the purpose, content, methods, and means of learning, the activities of the subjects of education, the form of organization of the learning process, and technical support.

Therefore, it can be argued that modern tasks of training qualified specialists in the system of higher education are usually solved by introducing innovative interactive technologies into the educational process. Therefore, the specified problem takes one of the first places in the theory of pedagogy and the practice of training students in higher education. At the same time, future specialists must possess a wide range of basic soft skills used in various spheres of life – emotional literacy, critical thinking, coordination and interaction skills, etc. Thus, the relevance of researching the problems of effective implementation of interactive learning technologies in the educational process is quite high at present. In addition, interactive technologies become important in the context of the strengthening of European integration processes in Ukraine after its acquisition of the status of a candidate for EU membership, which requires the adaptation of the national system of training specialists to European requirements.

2 Literature Review

The study of the principles of the use of interactive learning technologies proves that in the world`s leading psychological and pedagogical research and developments there is a sufficiently significant amount of work for reflection and own searches in relation to this issue. At the same time, in most cases, interactive technologies are considered an important component of the entire educational process for students of higher education. It should be noted that modern pedagogy studies and practice develop ways of using interactive learning technologies in the context of educational activity research taking into account the dialogic construction of content and learning technologies themselves and considering it as one of the aspects of pedagogical communication. In this context, it is necessary to note the research of such scientists and practitioners as M. Atkins [1], M. Gysels [4], A. Khan [7], Y. Kolisnyk-Humeniuk [8], L. Lebedyk [10], O. Pavelko [13], R. Tori [19], G. Volpe [21], S. Voloshyna [22], and others

In addition, it is worth noting a number of studies on the application of the most optimal interactive methods of training future specialists based on the organization of the educational process in an interactive mode and increasing the opportunities for an informal discussion. In this aspect, the most relevant are the works of such researchers as I. Balaniuk [2], Y. Chaliuk [3], S. Hennessy [5], M. Kademiia [6], T. Koval [9], N. Lokhman [11], D. Ostapchuk [12], M. Radchenko [14], V. Redko [16], N. Semenyshena [17], M. Violante [20], I. Yakoviyk [24], O. Zubenko [25] and others

At the same time, it should be noted that in modern conditions, when there is a need to adapt the Ukrainian higher education system to the requirements and criteria of the European Union, there is an objective need to improve existing methods of interactive learning based on the implementation of best practices of EU countries.

3 Materials and Methods

The study of the process of introducing interactive and computer-oriented technologies into the educational process was carried out using the following research methods:

- Monographic method, which was used for a comprehensive and deep study of individual phenomena, processes and identification of cause and effect relationships in the educational process. This method is important in the detailed study of individual observations selected as the object of a special study;
- Systems thinking – a direction of research methodology, which consists in the study of an object as a whole set of elements in a set of relations and connections between them, that is, consideration of an object as a system model. This method was used to assess the impact of computer-oriented technologies on the educational process;
- Generalization – a method of scientific knowledge, with the help of which the general features and properties of a certain class of objects are fixed and the transition from singular to general, from less general to more general is carried out;
- Abstraction - a method of scientific knowledge, which consists in mentally highlighting the essential, most essential features, relationships, aspects of the subject. With its help, the formation of interactive images in the learning process was studied.

4 Results and Discussion

Learning technology, as defined by UNESCO, in general terms means a systematic method of creating, applying, and defining the entire process of learning and assimilation of knowledge, taking into account technical and human resources and their interaction, which aims to optimize education. Educational technology is also often interpreted as a field of application for a system of scientific principles to the programming of the learning process and their use in educational practice with an orientation to detailed learning goals that allow for their evaluation. This branch is focused more on the person who doing training, but not on the subject of training, on the verification of the developed practice (methods and techniques of teaching) during empirical analysis and the wide use of audiovisual means in education, which defines the practice in close connection with the theory of education [9].

The accumulated experience of training students in higher education convincingly shows that interactive learning methods significantly contribute to the intensification and optimization of the educational process. In particular, they allow students to:

- Make the process of acquiring knowledge more accessible;
- Acquire the skills of formulating own opinion, expressing it correctly, proving own point of view, arguing and discussing;
- Learn to listen to another person and respect an alternative opinion;
- Simulate different situations, to enrich own practical experience through inclusion in different life situations and experiencing them;
- Learn to build constructive relationships in the group, determine own place in it, avoid conflicts, resolve them, seek compromises, and strive for dialogue;
- Analyze educational information; creatively approach the assimilation of educational material in the learning process;
- Find a joint solution to the problem;
- Develop the skills of project activity, independent work, and creative work [25].

Separately, it is necessary to highlight the latest computer-oriented teaching methods, which belong to the interactive ones, the main purposes of which are used in the process of training students of higher education:

- Development of attention, fantasy, imagination, observation, non-standard thinking, and interest in learning;
- Formation of a multicultural personality;
- Education of systematic, logical, critical, and creative thinking, as well as work capacity, inquisitiveness, cognitive independence, and persistence in achieving the set goal;
- Activation of educational and cognitive activity of students;
- Filling gaps in knowledge, skills, and abilities;
- Development of self-learning skills, self-development, and self-improvement;
- Formation of the ability to think, create, independently acquire and assimilate knowledge, skills, abilities, etc. [9].

As it is known, in the context of interactive learning, knowledge takes on a different form. On the one hand, this knowledge represents certain information about the surrounding world, which students receive not in the form of a ready-made knowledge system, but in the process of their own cognitive activity. On the other hand, in the process of interaction with other students and the teacher, the student masters the system of proven methods of activity in relation to him, society, and the world in general, and learns various mechanisms for finding knowledge in individual, group, or collective work. Therefore, the knowledge acquired by students in this way is at the same time a tool for their independent knowledge acquisition [14].

Thus, the goal of interactive learning can be defined as the teacher`s creation of such learning conditions under which the student himself will discover, acquire, and construct knowledge and his own competence in various spheres of life. This is the fundamental difference between the goals of interactive learning and the goals of the traditional education system currently operating in Ukraine.

During interactive learning, there is mutual learning, where both the student and the teacher are equal, equivalent subjects of the educational process. During interactive training, the teacher acts as an organizer of the learning process and a consultant. Interaction between students and cooperation are the main factors in the learning process. Learning outcomes are achieved through the mutual efforts of participants in the learning process; students take responsibility for learning outcomes. In the process of communication, students learn to solve complex problems based on the analysis of source data, identify contradictions, express alternative opinions, make balanced decisions, participate in discussions; simulate different social situations, and enrich their own social experience through inclusion in different life situations and experience them. They learn to build constructive relationships in the group, determine own place in it, avoid conflicts or resolve them, seek compromises, strive for dialogue, find a joint solution to the problem, and develop the skills of project activity, independent work, the performance of creative works.

It is important to consider that each learning subject needs to use an individual method because some can read by themselves, others – in a group, some need general silence, while others can study in a team. Some prefer the visual presentation, others perceive learning material by hearing, touching, or moving. Some have excellent visual memory and memorize printed text, while others perceive learning more easily in communication in an interactive group. Interactivity is also a characteristic feature of modern information and communication technologies, which contributes to the establishment of subject-subject interaction between the teacher and students based on the activation of processes of empathy, reflection, compassion, etc. Signs of interactive learning are the following:

- Focusing on the needs and self-worth of the individual;
- Prioritizing individuality;
- Cooperation and co-creation between students and teachers;
- Improvement of pedagogical relations [8].

It should also be noted that interactive learning technologies include a planned expected learning result, separate interactive methods, learning tools that stimulate the learning process, mental and learning conditions, and procedures, with the help of which the planned results can be achieved [6]. The essentiality of modern interactive learning technologies lies in determining the most rational of its components to achieve the ultimate educational goal. At the same time, the educational process should be considered comprehensively as an integrated system, and one should not limit oneself only to the analysis of its elements. Therefore, interactive learning technologies represent a holistic and integrative system of the learning process, which, by the goals and content of learning, provides for the complex application of interactive methods, means, and forms of learning selected according to the principles of expediency of implementation and mutual complementation to achieve a pre-planned educational result.

The effective conduct of educational interactions in a mixed form of education depends on the creation of an atmosphere of friendliness and attention to each student. An unconditional rule is an interesting attitude towards students when they feel that the teacher listens to everyone with equal attention and respect for both the individual and his point of view. One of the most difficult problems is reacting to errors [23]. An absolute rule of interactive learning is to refrain from any praise or criticism. At the same time, the teacher should not ignore the illogicality of reasoning, obvious contradictions, unsubstantiated statements. It is necessary to use tactful remarks to clarify statements or given factual data, to support the expressed opinion, and encourage to think about the logical consequence of the expressed ideas. During a long discussion, an intermediate determination of the results of specific interaction is carried out – summarizing the

results of the discussion at the current moment so that the participants can better orient themselves in the directions of further discussion [22].

An effective type of group activity in a mixed form of education is the "Jigsaw" method developed by E. Aronson in 1978. In the created educational situation, students act as a teacher, passing on the learned information to each other. The educational activity is carried out in groups of 6 people to work with certain parts of the educational material, which are combined into blocks according to content and logic. Each member of the group works on his part of the material, and then representatives of different groups that studied the same issue meet and exchange information. Such an exchange is called a "meeting of experts". After that, the "experts" teach their own groups what they learned. In turn, other members of the group similarly process their own part of the material like the 'teeth of the same saw'. Mastering the material and getting a holistic view of the phenomenon being studied is possible only by carefully listening to colleagues and making appropriate notes, so students will be interested in conscientiously performing their own and joint parts of the work. It is interesting that each individual and the group as a whole report on the topic. At the final stage, the teacher offers any group member a question on the topic. All these aspects make it possible to involve and attract to activity even passive students with low motivation or insufficient level of proficiency [25].

At the same time, it is necessary to understand that there are certain difficulties that hinder the instant, quick, and effective application of interactive methods. First of all, studies show that most teachers themselves do not know the content of the methods and ways of organizing students` interactive cooperation. This toolkit still remains new and poorly researched in the domestic Ukrainian didactics of higher education and is not sufficiently used in its practice. In addition, the issue of how to select the interactive methods needed for a particular subject and how to "incorporate" interaction into the forms of classes traditional for higher education in Ukraine – lectures, seminars, workshops – is not sufficiently clarified. Therefore, it is necessary to ensure the gradual transition of the entire system of training students of higher education to EU standards, according to which the interactive learning model involves the use of a technological approach based on a set of interactive technologies, the common feature of which are the principles of interaction: multilateral communication, interaction and mutual learning of students, cooperative educational activities with relevant changes in the role and functions of both students and teachers. Such a model also involves a special understanding of classes in institutions of higher education as a form of education, which is also based on a technological approach.

In today`s conditions, such a technological approach is transformed into a system based on the use of mobile gadgets for learning, with the use of special software applications. All this significantly increases the effectiveness of the educational process, especially in the case of a mixed form of student education. The main advantages of such technological solutions related to the use of mobile devices in the educational process are as follows:

- The use of communication channels in order to receive instant consultations;
- The possibility of continuous training in the Internet;
- Testing and self-monitoring of knowledge;
- The use of electronic publications;
- The use of audio and video files in the learning process [6].

Thus, interactive learning not only provides knowledge, skills, methods of activity, and communication skills, but it is a necessary condition for establishing and perfecting professional competence (competence as a proven readiness to act) by involving the students in the educational process in the deliberate maintenance of individual and collective activities for the promotion of knowledge, awareness, and adoption of values.

On the other hand, since interactive learning provides the possibility of communication with the teacher and students on learning, co-competition in the process of cognitive and creative activity, then the system of control over the acquisition of knowledge and methods of cognitive activity, the formation of the ability to apply the acquired knowledge in later situations can be built on the basis of operative feedback, which makes the control of knowledge, skills, and abilities permanent and more flexible and humane [18].

In general, it can be stated that the use of computer-oriented tools in the learning process increases interest and general motivation due to new forms of work and involvement in the priority direction of scientific and technical progress. It implies activation of training thanks to attractive and rapidly changing forms of information presentation, individualization of training, prompt access to information. The use of computer-oriented learning tools significantly increases the intensity of the educational process and allows covering a significant amount of educational material, which is assimilated more effectively thanks to positive motivation.

It should also be noted that computer-oriented learning tools are of leading importance not only as an element of the interactive learning system but also as a key element of distance learning, which is used in its mixed form and has gained special relevance in recent years. At the same time, the introduction of the blended learning model into the educational process based on the use of computer-oriented learning tools is based on:

1. Usage multimedia and virtual resources when working in the classroom.
2. Usage of created sites to support blended learning.
3. Usage of course management systems.
4. Usage of synchronous and asynchronous discussions [15].

Therefore, the use of a mixed form of education in the educational process can become one of the key directions of modernization of education in higher education institutions, as it opens up wide opportunities for independent work of students under the guidance of a teacher, promotes the development of an independent creative activity, stimulates the acquisition of additional knowledge and their consolidation, which gives the opportunity to train competitive specialists based on the integration of new interactive learning technologies in the process of training future specialists.

5 Conclusion

Thus, we come to the conclusion that interactive learning technologies represent a holistic and integrative system of the learning process, which provides, in accordance with the learning goals, the most rational application of interactive methods, techniques, means, and forms of learning selected according to the principles of communicativeness, the expediency of implementation, and mutual complementation in order to achieve in advance planned learning outcome. Hence, the use of interactive technologies in the educational process of higher educational institutions enables:

- Increasing the effectiveness of classes and students` interest in future professional activities;
- Developing communication skills and abilities, forming emotional contact between students;
- Forming analytical abilities and a responsible attitude to one`s own actions;
- Forming students` planning skills;
- Ensuring the formation of self-control and self-assessment skills in students of higher education.

The expected result of such a process of forming students` skills, when using interactive learning methods, should be a conscious mastery of the method of organizing interactive learning. Also, such activity significantly contributes to the more effective form of professional competence of future specialists in general.

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Primary Paper Section: A

Secondary Paper Section: AM

D EARTH SCIENCES

DA	HYDROLOGY AND LIMNOLOGY
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DC	SEISMOLOGY, VOLCANOLOGY AND EARTH STRUCTURE
DD	GEOCHEMISTRY
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DF	PEDOLOGY
DG	ATMOSPHERIC SCIENCES, METEOROLOGY
DH	MINING INDUSTRY INCLUDING COAL MINING AND PROCESSING
DI	POLLUTION AND AIR CONTROL
DJ	POLLUTION AND WATER CONTROL
DK	CONTAMINATION AND DECONTAMINATION OF SOIL INCLUDING PESTICIDES
DL	NUCLEAR WASTE, RADIOACTIVE POLLUTION AND CONTROL
DM	SOLID WASTE AND ITS CONTROL, RECYCLING
DN	ENVIRONMENTAL IMPACT ON HEALTH
DO	PROTECTION OF LANDSCAPE

FORMATION OF THE NATURAL RESOURCE ECONOMICS IN THE SYSTEM OF ENVIRONMENTAL AND ECONOMIC SECURITY IN UKRAINE

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Abstract: The article examines the modern specifics of the formation of the system of ecological and economic security and the construction of an effective economy of nature use in Ukraine. Modern concepts aimed at solving the problems of ecological and economic security in conditions of limited and depleted natural resources are considered. The problems of ensuring environmental safety in the business processes of modern enterprises have been identified. The methodological basis of the study of the problems of ensuring environmental safety and economic development was studied. It is proposed to apply greening of production as a priority direction of economic development to build an effective economy of nature use.

Keywords: Ecological safety, Economics of nature use, Greening of production, Ecological and economic efficiency.

1 Introduction

The modern specificity of approaches to environmental protection involves a significant variety of approaches to the practical implementation of environmental standards in the process of conducting economic activity. At the same time, it should be noted that quite often the issues of nature protection and the need to ensure the expanded and effective development of the economy are often considered as separate and sometimes mutually contradictory activities. All this leads to the accumulation of systemic negative environmental consequences due to insufficient consideration of possible impacts on the surrounding natural environment in the process of planning and implementation of economic policy, strategic planning, and design of the development of the national economy. Therefore, the emergence of a problem related to the fact that environmental issues cannot be solved only by singling out environmental protection as one of the directions of socio-economic development, considering it separately from the general complex of existing socio-economic and technological problems, is indisputable. It should be noted that economic development, in general, causes an increase in the volume of harmful emissions, and also leads to the gradual depletion and irrational use of natural resources, contributing to the increase of anthropogenic load on the environment. That is why a situation existing in the system of ecological and economic nature management requires the implementation of a sound economic policy aimed at balancing the ecological and economic goals of development and thereby contributing to the formation of an effective system of ecological and economic security.

In addition, the use of various tools to create a business environmental security system is actively implemented in modern enterprises and is one of the criteria for the effectiveness of their activities. In this aspect, approaches to ensure the greening of investments in production activities, the formation of mechanisms for improving the system of environmental taxation in the aspect of ensuring the ecological and economic impact on the activities of business entities, and methodological approaches to the improvement of economic tools of environmental management to ensure the balanced development of the environment are becoming particularly relevant. All this also leads to a growing need for in-depth research on ensuring the ecological and economic safety of the business and solving the pproblems of rational nature management.

2 Literature Review

The study of the issues of ensuring the effective use of nature and reducing the anthropogenic burden on the surrounding natural environment in the process of economic activity is not new for scientists, and the key provisions of this issue are widely disclosed in the works of such Ukrainian scientists as O. Apostolyuk [2], O. Binert [4], I, Britchenko [7], A. Cherep [9], P. Ghisellini [20], K. Kostetska [22], R. Kothari [23], T. Mishustina [24], O. Pavelko [25], T. Shmatkovska [28-32], R. Sodoma [34-37], S. Voloshyna [43], I. Yakoviyk [44], Ya. Yanyshyn [45], P. Young [47] and many others.

In addition, it is worth noting the significant contribution made to the study of aspects of ensuring environmental and economic safety of economic activity in modern business conditions by such scientists and practitioners as O. Agres [1], I. Balaniuk [3], A. Boiar [5], A. Braga [6], Y. Chaliuk [8], M. Dziamulych [10-19], S. Schaltegger [26], N. Semenyshena [27], O. Stashchuk [38-40], A. Tiurina [41], D. Tiwari [42], O. Yatsukh [46], and others.

At the same time, today`s urgent need is to deepen research in the field of integration of economic and ecological security policy, improving the quality of the natural environment and ecological conditions of human habitation, forming a balanced ecologically oriented model of economic development, guaranteeing ecological and economic security of conducting business activities in general.

3 Materials and Methods

The methodological basis for ensuring ecological and economic security in the field of nature economy is a set of methods and techniques for conducting research on the availability, movement, and efficiency of the use and protection of natural resources. This methodological foundation is based on general scientific and special methods of scientific knowledge.

An important place among the special methods of ensuring environmental and economic security is occupied by economic and statistical methods, which are systematized according to their intended use in the order of the sequence of economic and statistical research:

- A collection of primary statistical information;
- Statistical compilation and processing of primary information;
- Analysis of statistical information [33].

The method of comparative (variant) calculations can be used to compare the economic efficiency of various environmental protection measures and environmentally safe production technologies. Comparative calculations can be used to compare normative and actual costs with the subsequent clarification of the reasons for their discrepancy.

With the aim to coordinate and interrelate the components of the studied phenomenon, to maintain the balance of quantitative proportions, the balance method of research is used. This method plays an important role in the preparation of national economic coordination plans.

In the economics of nature use, mathematics is applied through the construction of economic-mathematical models, which have an economic meaning and are designed to highlight the most important features of the studied object, facilitate cognition and determine the ways of effective development of the process. Mathematical modeling in the economics of nature use is applied

when optimal quantitative expressions of predicted indicators are determined on the basis of source information using software methods [33].

4 Results and Discussion

Among the concepts aimed at solving the problems of ecological and economic security in the conditions of limited and depleted natural resources, the leading place belongs to the model of ecologically oriented development, which contributes to the simultaneous solution of two key issues: ensuring economic development and reducing the negative impact on the environment.

At the international level, environmental and economic policy is primarily aimed at ensuring coordinated actions in the field of environmental safety, establishing norms, rules, and standards of state behavior in this field. In particular, a number of documents in this direction are being developed under the auspices of the UN:

- Agreed principles of ecological integration of countries into the world community;
- A single international system of environmental monitoring;
- Unified methods of assessing the state of natural resource potential;
- Unified methods of environmental impact assessment;
- The general methodology for assessing the risk of occurrence and development of emergency situations and disasters of a natural and man-made nature;
- Unified rules and regulations in terms of personnel and equipment for the rapid response service for emergency situations;
- International conventions, agreements, rules, and procedures that ensure the coordination of joint actions in the field of risk assessment and the implementation of measures to prevent and eliminate the consequences of emergencies and disasters of a natural and man-made nature [41].

At the same time, the problem of environmental security of business lies in the question: is it possible to avoid threats to ecological and economic security, not reducing, but on the contrary, accelerating the development of productive forces and at the same time preserving the biosphere? It is quite clear that the coexistence of these two trends also implies the presence of limitations for their general development and the search for compromise solutions since a bias in one direction generates negative consequences. The most effective and efficient levers in the system of ecological security are undoubtedly the economic mechanisms of nature management. The inclusion of an environmental protection component in the price structure is intended to correct business defects associated with the incomplete reflection of certain costs and benefits related to environmental pollution and its control. Implementation of the main principle of ecological business – "the polluter pays" – can not only increase the value, improve or support the quality of the environment, but also contribute to reducing the production of goods, from the sale of which these payments come. In these conditions, the principle of the inevitability of punishment should be applied, and the number of fines (if a stricter measure is not applied) should far exceed the value of the damaged objects in the natural environment [47].

It should also be noted that the development of scientific directions of research in the field of ensuring environmental and economic security requires the mandatory use of a holistic methodological basis and its elements - in particular, approaches, methods, and theories that determine the intended purpose of practical results (Table 1).

Table 1: The methodological basis for the study of the problems of ensuring environmental safety and economic development

Scientific approaches to research	Structural elements of the methodology
Institutional approach	Definition of the object and subject of research
The systemic approach	Goal setting and tasks
The systemic and functional approach	Formation of a conceptual model for ensuring environmental and economic security
Dialectical approach	Identification of threats and risks of environmental and economic security
Functional approach	Diagnostics of the level of environmental and economic security
The structural and functional approach	The implementation mechanism and models for ensuring environmental and economic security
Program-targeted approach	Formation of a strategy for ensuring environmental and economic security
Scientific approaches to research	Structural elements of the methodology

Source: generated by the author.

Thus, we come to the conclusion that the study of modern trends in nature management and the use of resources in economic activities prove that the current trends in the movement towards achieving environmental goals are accompanied by a shift in emphasis in the system of ecological and economic security. In this aspect, some scientists suggest considering the right to pollute the environment as a specific part of natural capital, which leads to a change in subject-object relations in nature management. And although the ultimate goal remains the reduction of anthropogenic impact, the process of virtualizing nature use, transferring it to the sphere of waste and emissions trade, shifting attention directly from natural resources to technological development and its consequences is taking place. Today, nature management is turning into waste management, and its basis is the technosphere. The latter requires an update of approaches to ensuring the environmental security of the strategic potential of the progressive dynamics of the development of the productive forces in the regions of Ukraine based on taking into account global development factors, determining the main trends of socio-economic development and structural shifts of the productive forces, as well as an integral assessment of the ecological state of the regions [23].

Thus, the strategy of ensuring ecological and economic security moves into the plane of forming a general system of ecologically oriented development of society, which involves comprehensive assistance in establishing optimal parameters of the ecological and economic system, that do not threaten its integrity and create opportunities for dynamic development and establishing a balance between the needs of society and limitations of the natural environment. Therefore, this type of development is able to effectively ensure the preservation of the assimilation potential of the natural environment for safe use in the process of economic activity.

Therefore, in addition to the problems, the development of a new paradigm for ensuring environmental and economic security is of primary importance. Considering that the process of its provision in the theoretical-applied aspect is a complex object of research, which is primarily caused by a set of different elements that perform different functions, we consider it necessary to use a system-functional approach and appropriate tools. Thus, the main theoretical and methodological provisions for ensuring ecological and economic security are based on the imperatives of the concept of sustainable development, the theory of external effects, the theory of public welfare, the general theory of security, as well as on a number of state conceptual provisions, in particular: Concepts of balanced development of

agroecosystems in Ukraine for the period up to 2025; Concepts of the national environmental policy of Ukraine; The main directions of the state policy of Ukraine in the field of environmental protection, use of natural resources and ensuring environmental safety, etc. [27].

On the basis of the conducted research, several scenarios for ensuring the ecological and economic security of the strategic potential of the progressive dynamics of the development of the productive forces in Ukraine have been determined [23].

The territorial scenario involves an orientation towards reducing the man-made load on territorial recipients (elements of the natural environment, people). This scenario determines the priority of the formation of management strategies for the protection of recipients from harmful man-made influences. At the same time, the main territorial recipients are considered, as a rule, a person (his health, working capacity, normal conditions of recreation, etc.), natural complexes, and ecosystems (ensuring their stability, not exceeding the assimilation potential, structural integrity), material objects of production and life activities (observance of normal conditions for their preservation and functioning). Accordingly, management decisions within the framework of the territorial scenario are primarily aimed at ensuring compliance with standards of permissible levels of pollution and harmful man-made impacts, which are considered safe for the specified recipients [21].

The organizational and management scenario is primarily focused on reforming existing management mechanisms (institutional, regulatory, administrative, economic, etc.) and introducing the latest management technologies. It provides for methodological and methodical reform of the management strategy based on the involvement of more effective mechanisms and tools. As a rule, the main efforts are aimed at improving the structure and tools of the economic mechanism of technogenic and ecological safety management [23].

The technological scenario provides for the primary identification of the most man-made and dangerous objects and the technological and technical root causes of excessive load on the environment and the development of organizational and technical measures to eliminate or minimize their harmful effects. The technological scenario emphasizes the search for “key links” of the regional technogenic-ecological crisis and the formation of management decisions regarding their “disposal” or transfer to an ecologically safe functioning mode [21].

Moreover, the system of environmental and economic security includes a number of elements and subsystems that closely interact and logically complement each other. First, these are the subjects of ensuring environmental security (state authorities, local self-government bodies, and agricultural producers) and the object (ecosystem), the safety of which these subjects must ensure, and the principles and functions of ensuring ecological and economic security. The main goal of the ecological and economic safety system in such a case is to prevent the occurrence of environmental threats and risks, and their timely detection, localization, and elimination. To realize this goal, tasks are formed and performed taking into account the specifics of the object of ensuring environmental and economic security. Knowledge of the essence of the principles enables subjects to consciously organize their activities and accordingly influence the process of ensuring environmental and economic security in general [27].

Ensuring the integration of economic and environmental development largely depends on the transformation of the economy and structural changes which occur regardless of its state. At the same time, in some cases, such changes play the role of a structural limitation of growth, while in other cases, they create prerequisites for a rapid rise. Structural transformations are also the cause of the economic crisis, which can be overcome thanks to changes in the composition of driving forces and sources of economic growth. Therefore, a prerequisite for the sustainable development of Ukraine is the integration of environmental policy into sectoral and regional plans and programs in order to find opportunities for their mutual strengthening, as well as coordination of environmental priorities. However, for the sectoral ministries and agencies, this has not yet acquired primary importance and is often perceived as setting restrictions on sectoral activities, creating difficulties and additional costs for the purpose of developing a specific industry. Strategic planning in Ukraine is not focused on ecological development, but only on socio-economic development, and practically does not take into account the third component of sustainable development – the environment. The reflection of issues of environmental protection in the plans of ecological and economic development is done by preparing a small separate section that does not contain environmental requirements and a description of alternative ways of development [41].

5 Conclusion

Therefore, it can be stated that the real threats to ecological and economic security confirm the need to improve the system and the process of its provision, which involves prevention of these threats, as well as their detection and localization, and the formation of a directly effective mechanism for preventing the occurrence of danger to human health and the degradation of natural resources, and protect biological diversity from the possible negative impact of ecologically destructive factors impacting the surrounding natural environment. Therefore, it is very important, in contrast to the traditional idea, to consider the system of ecological and economic security not as an element of purely environmental policy, but as a set of elements and interconnected subsystems: informational-analytical, supply, functional-instrumental, and result-targeted.

In addition, one of the priority directions of economic development should be the greening of production, the implementation of which will allow solving specific environmental problems at the level of enterprises in the conditions of the environmental crisis. Environmentalization is possible in two directions. The first one is the comprehensive environmentalization of the entire production, which involves the use of environmentally friendly fuels, technologies, and highly efficient cleaning equipment followed by waste disposal. However, direct implementation is usually associated with significant capital expenditures and long implementation times. The second direction involves the greening of the entire management system of the production complex by taking into account the environmental factor in its structural elements.

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Primary Paper Section: D

Secondary Paper Section: DI, DJ, DK, DN, EH

F MEDICAL SCIENCES

FA CARDIOVASCULAR DISEASES INCLUDING CARDIO-SURGERY
FB ENDOCRINOLOGY, DIABETOLOGY, METABOLISM, NUTRITION
FC PNEUMOLOGY
FD ONCOLOGY AND HAEMATOLOGY
FE OTHER FIELDS OF INTERNAL MEDICINE
FF ENT (IE. EAR, NOSE, THROAT), OPHTHALMOLOGY, DENTISTRY
FG PAEDIATRICS
FH NEUROLOGY, NEURO-SURGERY, NUERO-SCIENCES
FI TRAUMATOLOGY AND ORTHOPAEDICS
FJ SURGERY INCLUDING TRANSPLANTOLOGY
FK GYNAECOLOGY AND OBSTETRICS
FL PSYCHIATRY, SEXOLOGY
FM HYGIENE
FN EPIDEMIOLOGY, INFECTION DISEASES AND CLINICAL IMMUNOLOGY
FO DERMATOLOGY AND VENEREOLOGY
FP OTHER MEDICAL FIELDS
FQ PUBLIC HEALTH SYSTEM, SOCIAL MEDICINE
FR PHARMACOLOGY AND APOTHECARY CHEMISTRY
FS MEDICAL FACILITIES, APPARATUS AND EQUIPMENT

RESULTS OF SELECTIVE CAPSULOTOMY AND SUPRASPINATUS TENDON REPAIR IN PATIENTS WITH DIABETES (RETROSPECTIVE STUDY)

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Abstract: The article describes selective capsulotomy for RC repair in DM patients with RC tendon ruptures. The results of surgery and post-op follow-up in 3 and 6 months after surgery for two groups of patients (the group who underwent arthroscopic selective capsulotomy of the shoulder joint and the group who did not undergo selective capsulotomy) are presented. The total size of sample of included patients was 110 participants. The function of the shoulder joint was evaluated using the Constant Shoulder Score and VAS Descriptive statistics methods were used to display the general characteristics of the initial parameters, indicating the average value and standard deviation. Patients with type 2 diabetes who underwent supraspinatus tendon suture and selective capsulotomy had better average functional results 3 months after surgery on the Constant Shoulder Score and VAS scale, and in 6 months patients who underwent selective capsulotomy reported better level f VAS pain syndrome.

Keywords: Shoulder joint, Tendon ruptures, Capsulotomy, Diabetes mellitus.

1 Introduction

Ruptures of rotator cuff of the shoulder (RC) range from 18% to 36% among all shoulder joint injuries [6, 9, 16]. In at least 40% of cases, RC tendon ruptures are accompanied by a contracture of the shoulder joint [13, 18]. The main causes of post-traumatic contracture in patients with RC tendon rupture are considered to be pain, hemarthrosis or inflammatory changes in the capsule of the shoulder joint [6, 9, 18]. During arthroscopy in such patients, we can detect inflammatory changes and thickening of the capsule of the shoulder joint. The frequency of contracture after RC repair (so-called post-immobilization contracture) ranges from 4.9% to 23% [13, 18].

Patients with diabetes mellitus (DM) have a greater tendency to develop contractures in the shoulder joint. In this case, adhesive capsulitis is diagnosed. Contracture of the shoulder joint in patients with diabetes occurs with a frequency from 10% to 41.7% [4], while in the general population it ranges from 2–5% [1, 15, 16].

The debatable issue is if we need to perform selective shoulder capsulotomy during RC repair in patients with DM. On the one hand, the thickened capsule and the contracture of the shoulder joint have a positive effect on the RC healing, and the long-term results after one year of observation have no differences in patients who underwent selective capsulotomy and who did not undergo this procedure [2, 13, 8, 11]. On the other hand, a contracture that lasts for a long time leads to hypotrophy of the RC and deltoid muscles, decrease of bone density, and degenerative changes in the articular cartilage [4, 16].

Some authors recommend staged treatment: on the first stage - conservative treatment of adhesive capsulitis, on the second stage - the suture of the RC tendons [19]. However, this approach significantly prolongs the duration of treatment, and in patients with diabetes mellitus, it can lead to a series of complications (infection after injections in shoulder joint, fractures during redressing procedure, separation of the scapula labrum, formation of rotator cuff arthropathy, etc.).
The aim of our study was to compare the results of treatment of patients with diabetes who underwent selective capsulotomy and those who did not undergo this procedure during RC repair.

2 Materials and Method

From 2015 to 2020, we performed 825 RC repairs in the clinic of Microsurgery, reconstructive and restorative surgery of the upper limb of the State Institution "Institute of Traumatology and Orthopedics of the National Academy of Medical Sciences of Ukraine" (Kyiv). Of these, 169 patients were with DM type 2, supraspinatus tendon rupture, and shoulder joint contracture of various degrees (restriction of passive movements in the shoulder joint). All 169 patients underwent arthroscopic double-row suture of the supraspinatus tendon and tenodesis of the long biceps head tendon. Part of these patients underwent arthroscopic selective capsulotomy of the shoulder joint (group 1), while another part did not undergo selective capsulotomy (group 2). All patients were warned about the specifics of their surgical intervention and gave informed written consent to perform the surgical intervention.

59 patients were excluded from the study: 37 patients did not find time for control observation and visit to a doctor in 3 months after the surgery; in 9 patients, there were a repeated rupture of the supraspinatus tendon within 3 months after the operation, which was discovered during ultrasound examination; 13 patients did not followed the standard rehabilitation program.
We included into the study 110 patients who underwent full rehabilitation program and all stages of post op follow-up until 6 months after surgery. The average age of the patients was 51.4 ± 12.6. All patients were divided into two groups (group 1 – with selective capsulotomy that was performed during RC repair, group 2 – without selective capsulotomy during supraspinatus tendon suture). The general characteristics of the groups are given in Table 1.

Table 1: Main characteristics of groups

Characteristic	Group 1 (n=74)	Group 2 (n=36)	p
Age	42.1±8.9	40.1±16.1	0.731*
Gender: male/female	39 (52.7%) / 35 (47.3%)	20 (55.6%) / 16 (44.4%)	0.182**
Tear size, mm	12.5±10.2	18.1±12.1	0.52*
Time from injury to surgery (months)	1.51±0.91	1.92±0.44	0.061***
Flexion angle in the shoulder joint before surgery	80.8±8.2	90.1±16.2	0.42*
Extension angle in the shoulder joint before surgery	8.8±10.1	15.1±6.1	0.71*
Abduction angle in the shoulder joint before surgery	20.7±18.2	31.1±14.4	0.74*

* — Student's criterion; ** — χ^2 criterion; *** — Mann–Whitney test.

In our study, we evaluated the function of the shoulder joint using the Constant Shoulder Score and VAS before surgery, in 3 and 6 months after surgery. According to the Constant Shoulder Score scale, the maximum number of points is 100, the minimum is 8. The injured and healthy upper limbs were compared. A difference of more than 30 points between two limbs was considered an unsatisfactory result, 21–30 points – a satisfactory result, 11–20 points – a good result, and less than 11 points – an excellent result [12].

All patients were examined clinically and radiologically, and all patients underwent an MRI examination. MRI studies of the anatomical structures of the shoulder joint, including the tendon of the supraspinatus muscle, were performed in the following modes: T1, T2, Pd and Pdfatsat.

In 4.1±0.9 months after surgery, the patients underwent an ultrasound examination for assessing the supraspinatus muscle tendon healing. Ultrasound with multifrequency sensors were used (stationary Philips ATL 3500 and a portable Honda-2000). Optimal visualization was achieved using the "musculocutaneus superficialis" mode, which corresponded to a frequency of 7.5 MHz.

The criteria for inclusion in to the study were as follows:

- Injury of the shoulder in the anamnesis, age from 30 to 60 years,
- A full thickness rupture of the supraspinatus muscle tendon (from 15 to 30 mm, which we determined objectively with the help of an arthroscopic ruler (Fig. 1a)),
- Standard protocol of surgical intervention (double row RC repair),
- The duration of the disease from 10 to 100 days,
- Thickened capsule of the shoulder joint (Fig. 1b),
- Absence of concomitant pathology of the shoulder joint (omarthrosis, rupture of the scapula labrum, rupture of the subscapular muscle tendon, calcifying tendinitis of the RC tendons, any bone pathology of the proximal epimetaphysis of the humerus),
- Examinations of the patient after surgery in 3 and 6 months,
- Video record of surgery,
- Compliance to the terms of immobilization and rehabilitation programs.

Surgical technique: the patient was placed in the "beach chair" position with 2-3 kg traction on the affected limb, 5 arthroscopic portals were performed (2 into the shoulder joint, 2 into the subacromial space, 1 in the projection of the long biceps head tendon, which was later used as a port into the subacromial space). Intraoperative diagnosis was carried out using an arthroscope with a diameter of 4.5 mm with an optical tilt of 30º.

All patients underwent: tenodesis of the tendon of the long biceps head at the level of the intertuberous groove with fixation with a SwiveLock screw (diameter of 7-9 mm) (Fig. 1c), acromioplasty (Fig. 1d), subacromial bursectomy, synovectomy of the rotator interval. In group 1, dissection of the anterior and posterior parts of the shoulder joint capsule was performed using a vaporizer (Fig. 1e) or arthroscopic scissors (Fig. 1b). In addition, the following was applied: a double-row supraspinatus tendon repair using two BioComposite Corkscrew FT Suture Anchors, 5.5 mm x 14.7 mm in the proximal row and one BioComposite SwiveLock SP Self Punchsng with Titanium Eyelet in the distal row. In this way, we performed a double-row "V"-shaped RC repair (SpeedFix) (Fig. 1f).

After surgery, all patients in the operating room were immobilized in bandage with abduction pillow (angle of 20º). After 6 weeks, all patients began to perform a standard rehabilitation program. Exercises were performed three times a day for 30 minutes in the first 2 weeks under the supervision of a rehabilitation specialist, then by the patient independently for 30 minutes 3 times a day until a normal shoulder-scapular rhythm was achieved.

Statistical data processing was carried out using the Statistica 12 package (StatSoft, USA). Descriptive statistics methods were used to display the general characteristics of the initial parameters, indicating the average value and standard deviation. For variables with a normal distribution, group comparisons were performed using the Student's test. The condition of equality of variances was checked using the Livigno test. In order to determine the statistical significance of differences between groups, the Mann-Whitney test was used for quantitative (non-normally distributed) and ordinal variables, and the $\chi 2$ test and Fisher's exact test were used for qualitative ones. Comparison of quantitative and ordinal variables in dependent samples was performed using the Wilcoxon test.

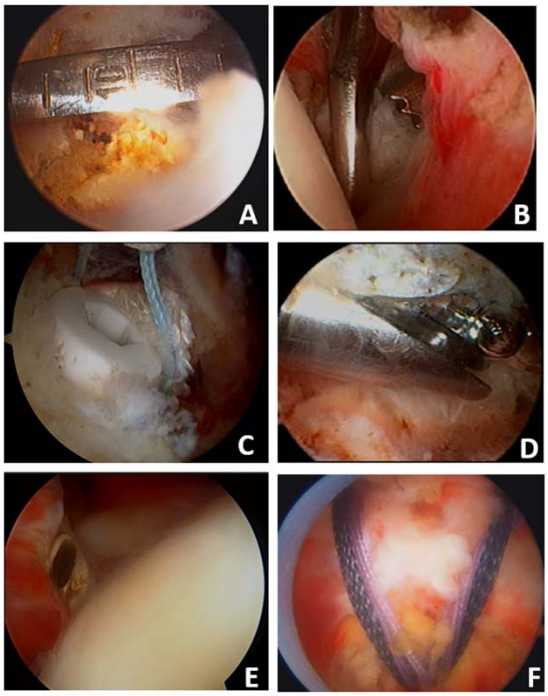

Figure 1. Stages of surgical intervention (explanation in the text).

3 Results

In Table 2 and Table 3, the average results of treatment of patients in two groups before surgery, 3 and 6 months after surgery are shown. Each time, patient independently filled out the form with the Constant Shoulder Score scale and VAS. The patient performed the test with a dynamometer until pain sensations appeared. Control of the correctness of all tests of the Constant Shoulder Score scale was performed by one doctor, who was an assistant during the surgical intervention.

Table 2: Average results of treatment of patients in groups 1 and 2 according to the Constant Shoulder Score at different periods of observation

Terms of examination of patients	Group 1 (n=74)	Group 2 (n=36)	P (Wilkson's criterion) †
Before the surgery	25.8±13.1	23.5±9.3	0.91
3 months after the surgery	15.5±7.2	19.5±6.1	0.33
6 months after the surgery	12.1±5.2	11.1±6.2	0.54

As one can see from Table 2, before surgery, the average results of shoulder joint function according to the Constant Shoulder Score in the two groups were practically the same and ranged within 24 points (the difference in scores between healthy and diseased shoulder joints). Three months after the surgery, in group 1, the average functional result on the Constant Shoulder Score was slightly better than in group 2 and ranged approximately 15.5±7.2 points. Six months after surgery in groups 1 and 2, the average functional results on the Constant Shoulder Score scale did not differ and ranged from 11 to 12 points. We rated them as excellent. According to the VAS scale, we obtained the following results (Table 3).

As we can see from Table 3, before the surgical intervention, the average score of the pain syndrome of patients in groups 1 and 2 according to the VAS scale were practically the same and ranged from 3.6 to 3.8 points. Three months after the operation, in group 1, the average score on the VAS scale was slightly better than in group 2 and ranged approximately 1.55±1.2 points. Six months after surgery, the mean VAS score in group 1 was also slightly better than in group 2.

Table 3: Average results of treatment of patients in groups 1 and 2 according to the VAS scale at different periods of observation

Terms of examination of patients	Group 1 (n=74)	Group 2 (n=36)	P (Wilkson's criterion) †
Before the surgery	3.8±2.1	3.6±1.8	0.9
3 months after the surgery	1.55±1.2	1.91±0.8	0.33
6 months after the surgery	1.8±1.2	2.2±1.3	0.5

Thus, patients in group 1 (suture of the supraspinatus tendon and selective capsulotomy) had better average functional results 3 months after surgery according to the Constant Shoulder Score scale and according to the VAS scale. At 6 months postoperatively, the Constant Shoulder Score scores were almost identical, but according to VAS patients in group 1 had better results.

4 Discussion

The issue of optimal treatment tactics for RC rapture and various concomitant pathologies of the shoulder joint in patients with DM remains relevant and understudied. This is related to the peculiarities of blood supply and regeneration of various parts of body, including tendons of the RC in patients with DM.

Most of the studies conducted by our colleagues, comparing the results of selective capsulotomy in patients with contracture of the shoulder joint that occurred after RC rupture, do not take into account the presence of diabetes or any other pathology that may negatively affect rehabilitation [6, 9, 18]. In their studies, the results of treatment in patients who underwent selective capsulotomy and in patients who did not undergo this procedure were almost the same 12 months after the surgery [6, 9, 18].

H.S. Park and co-authors in their study indicate that the results of selective capsulotomy in patients who underwent RC repair one year after surgery are better than in the group where selective capsulotomy was not performed [14]. Also, it is interesting that this work proves the need for only anterior and anteroinferior capsulotomy and excludes the need for posterior capsulotomy, which reduces the duration of surgical intervention [14].

In the work of Y.S. Kim and co-authors, the results of early and delayed surgical interventions are compared, in which the authors performed a RC repair and a selective capsulotomy. It has been proven that early and delayed surgical interventions show the same results 12 months after surgery, so it does not make sense to carry out long-term conservative treatment in patients with RC tendon rupture and secondary adhesive capsulitis [14].

The issue of treatment of shoulder joint contracture in patients with DM can be considered solved, since a huge number of works indicate positive results of selective capsulotomy under arthroscopic control in this group of patients [12]. Despite this, the results of RC repair in patients with DM and secondary adhesive capsulitis remain uncovered.

In the study of J.Y. Park et al., it is indicated that the results of selective capsulotomy in combination with the RC repair in patients with diabetes were better than the results of the supraspinatus tendon suture without selective capsulotomy, however, this study was conducted on only 15 patients and needs to be continued [13].

The strengths of our study is that in our work we evaluated the results of selective capsulotomy of the shoulder joint both by the objective scale (Constant Shoulder Score) and by the subjective scale (VAS); we managed to create statistically identical study groups which are clearly determined by the type of diabetes, age, and size of the supraspinatus tendon rupture.

The weaknesses of our study is that we did not take into account the specific level of blood sugar before surgery and during rehabilitation in our patients, the lack of control over the exercise during rehabilitation program. Also, we did not take into account other concomitant pathology (coronary heart disease, hypertensive disease etc.), which can negatively affect the rehabilitation of patients.

5 Conclusion

Patients with type 2 diabetes who underwent supraspinatus tendon suture and selective capsulotomy had better average functional results 3 months after surgery on the Constant Shoulder Score and VAS scale (p=0.33). Six months after surgery, the Constant Shoulder Score results were almost the same in the two groups, but the VAS pain syndrome level in the group that underwent selective capsulotomy was better (p=0.5).

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Primary Paper Section: F

Secondary Paper Section: FI, FJ, FB

J INDUSTRY

JA ELECTRONICS AND OPTOELECTRONICS
JB SENSORS, DETECTING ELEMENTS, MEASUREMENT AND REGULATION
JC COMPUTER HARDWARE AND SOFTWARE
JD USE OF COMPUTERS, ROBOTICS AND ITS APPLICATION
JE NON-NUCLEAR POWER ENGINEERING, ENERGY CONSUMPTION AND UTILIZATION
JF NUCLEAR ENERGY
JG METALLURGY, METAL MATERIALS
JH CERAMICS, FIRE-PROOF MATERIALS AND GLASS
JI COMPOSITE MATERIALS
JJ OTHER MATERIALS
JK CORROSION AND MATERIAL SURFACES
JL FATIGUE AND FRACTURE MECHANICS
JM STRUCTURAL ENGINEERING
JN CIVIL ENGINEERING
JO LAND TRANSPORT SYSTEMS AND EQUIPMENT
JP INDUSTRIAL PROCESSES AND PROCESSING
JQ MACHINERY AND TOOLS
JR OTHER MACHINERY INDUSTRY
JS RELIABILITY AND QUALITY MANAGEMENT, INDUSTRIAL TESTING
JT PROPULSION, ENGINES AND FUELS
JU AERONAUTICS, AERODYNAMICS, AEROPLANES
JV COSMIC TECHNOLOGIES
JW NAVIGATION, CONNECTION, DETECTION AND COUNTERMEASURE
JY FIREARMS, AMMUNITION, EXPLOSIVES, COMBAT VEHICLES

REDUCING THE POLLUTION OF THE AIRSPACE OF THE CITY'S MAIN HIGHWAY AREAS

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Abstract: The article deals with problems of air pollution in large cities and how to solve them. In Europe, road transport produces nearly half of NO_x emissions, which ensures urban air quality. Analysis of reference data has revealed scientists' active interest in reducing air pollution in large cities. However, since the objects of territorial planning continue to develop dangerously, one can speak of the absence of a sufficiently compelling concept of architectural and urban planning to ensure the environmental safety of the air basin of urban areas. Therefore, we propose to consider the object of the research and protection as systemic integrity of three entities: areas near trunk roads, air basins, and population. The paper presents an ER model of the research object and determines the main parameters of each entity, their interrelationships, and the action area. We propose an engineering and planning solution for installing special units to remove the most dangerous admixtures of nitrogen oxides and dust from the air basin near the city trunk roads through ozonation and absorption. The basis of the proposed treatment plant is a scrubber with combined processes of wet dust collection and ozonation characterized by high efficiency in removing fine dust and nitrogen oxides. The work presents a process flow diagram of purification and determines the operating conditions of the equipment. To substantiate the unit's operational safety in an emergency with ozone emission, we have simulated the process of ozone dispersion in the surrounding areas.

Keywords: Airspace, Air pollution, Engineering solution, Highway areas, Urban air quality, Urban planning.

1 Introduction

In 2015, environmental pollution caused approximately 9 million premature deaths worldwide (16% of all deaths), which is three times more than deaths from AIDS, tuberculosis, and malaria combined, and 15 times more than from all wars and other diseases [3]. Ukraine took 43rd place out of 92 countries provided official information in the World Air Quality Ranking $PM_{2.5}$ in 2020 [19].

In Europe, road transport produces almost half of NO_x emissions, so it plays a key role in ensuring air quality in cities [14]. The average annual values of nitrogen oxide concentrations in urban conditions are 20-90 $\mu g/m^3$, and the hourly maximums are in the range of 75-1015 $\mu g/m^3$, while at the intersections with heavy traffic during traffic jams NOx concentrations are several times higher (especially in 'urban canyons' where the road is narrow and buildings are tall). When exposed to sunlight, NO_x together with volatile organic compounds produces secondary pollutants that are more hazardous to health and the environment. The lifetime of NO_x is about a day. Some NO_x interacts with moisture and tu$_r$ns into HNO_3 producing acid precipitation. Some NO_x produces mineral salts in the form of dust with an aerodynamic diameter of fewer than 2.5 microns. The p$_{re}$sence of NO_x in the air is one of the main reasons for photochemical smog. Ozone and nitrogen oxides have poor solubility in the mucous membrane. Therefore, they are almost freely transported to the lower respiratory tract with the inhaled air, where they cause inflammation and oxidative stress.

To reduce damage to the natural environment due to eutrophication of water bodies, acidification of soils, the formation of ground-level ozone, and depletion of the stratospheric ozone layer, The United Nations Economic Commission for Europe signed The 1988 Sofia Protocol and The 1999 Gothenburg Protocol on the reduction of anthropogenic NO_2 emissions.

Analysis of reference data has revealed an active interest of scientists in the state of air quality and its relationship with health risks.

The authors of the article [9] have studied the level of air pollution with particulate matter in 56 largest cities of the world (with a total population of 608 million people) based on data from The WHO monitoring, atmospheric modelling, satellite remote sensing, and surface monitoring data. They have found out that at least 96% of the population of these cities are exposed to $PM_{2.5}$ in concentrations higher than those recommended by The WHO. Notably, cities with the highest levels of pollution are in low-income countries.

Spanish researchers note [10] that a high level of NO_2 is quite frequent in Spanish cities causing annual mortality (6085 deaths) due to natural causes. At the same time, the impact of NO_2 on daily mortality is three times higher than that of PM, and daily mortality associated with circulatory causes is twice as high as that from respiratory causes.

Chinese scientists have summarized the publications of different authors on the impact of air pollution on public health by analysing space-time series, cohort, panel, and cross-sectional studies. They have concluded [1] that most of the data show a positive relationship between the concentrations of PM, SO_2, NO_2 and an increased risk of mortality. SO_2 and NO_2 in the environment may be high-risk factors for sudden infant death syndrome. NO_2 is the cause of hospitalization because of respiratory and cardiovascular diseases with exacerbation of asthma in children. There is also a clear impact of NO_2 on the frequency of viral infections among asthmatics. Children, the elderly, asthmatics, and people with chronic obstructive pulmonary disease are more sensitive to the effects of ozone. However, risk assessment of ozone-related mortality is higher in the warm season.

The article [12] assesses the risks of threats to the health of the population of Kyiv from 2005 to 2017 based on the developed modelling software complex for solving the problems of environmental pollution in the technogenic-loaded territories. Risk analysis has shown that most of the territory of Kyiv is characterized by increased values of risks (both chronic intoxication and reflex effects) that differ across city districts indicating the instability of the atmospheric air quality in Kyiv. At the same time, the lowest risk values have been found on the territory of Hydropark (park complex), and the highest have been observed on the Bessarabska Square and Maidan Nezalezhnosti (the city centre with heavy traffic).

The work [2] has studied the level of pollution with the main pollutants (NO_x, O_3, SO_2, CO, PM_{10}, $PM_{2.5}$, C_6H_6 over five years in 5 cities (> 50,000 inhabitants), five towns (5,000-50,000 inhabitants) and five villages (<5000 inhabitants) in Central Europe based on data from 15 automatic stations. The authors have found out that air quality varies greatly for different settlements, for different seasons, and during the day from 08:00 to 09:00 a.m.

The studies [11] carried out in India have shown that there are distinct seasonal variations in the concentrations of O_3 and NO_x with a maximum observed in winter and a minimum during the rainy season. As for daily variations, the concentration is higher at night than during the day. In this case, the correlation coefficient of 0.52 for the O_3 and $[NO_2]/[NO]$ ratio indicates the role of photolysis of NO_2 producing ozone in this place.

Chinese scientists [17] note that seasonal and average daily variation of NO_x concentration in Changchun has a bimodal distribution, which is higher in autumn and winter than in spring and summer. The daily change in NO_x concentration peaks first at 07:00–08:00 a.m. and then between 8:00 and 10:00 p.m. At the same time, there is a positive correlation of NO_x concentration with NO_2, NO, $PM_{2.5}$, PM_{10}, CO, and pressure, while a significant negative correlation is with O_3, temperature, wind speed, and humidity.

Work [13] assesses the concentration of NO_2 and NO_x on roads using data from the monitoring network of adjacent roads. Average and maximum NO_2 concentrations on roads are 33 and 105 ppb, respectively, with higher concentrations with winds

perpendicular to the road rather than parallel. The NO_2/NO_x ratios ranged from 0.25 to 0.35, which is significantly higher than the expected tailpipe emission ratios.

Thus, due to the increasing negative anthropogenic impact of urbanization on people taking into account the concept of zero pollution within the framework of the EU's Circular Economy Action Plan by 2050 [6], the issues of environmental protection of the urban environment and natural ecosystems are becoming increasingly acute indicating the importance and relevance of the problem raised.

2 Materials and Methods

A scrubber is the main equipment. It is a device for wet air purification, which structurally consists of a section for contaminated air inlet, a working chamber, a nozzle block, a recirculation system, a cuttings chamber, and a gas removal section.

The main gases used as a working medium are nitrogen monoxide, nitrogen dioxide, and ozone.

Nitric oxide (NO) is a colourless, odourless, and tasteless gas, non-flammable, and with low water solubility (4.6 ml/100 ml of water at 20°C) that oxidizes to NO_2 in air. The melting point is 164.4°C; the boiling point is 152.2°C. Vapours are heavier than air. It is very toxic when inhaled and absorbed through the skin. The low odour threshold is 0.36 mg/m^3; the strong odour threshold is 1.2 mg/m^3.

Nitrogen dioxide (NO_2) is a reddish-brown highly toxic gas with a sweetish, pungent odour. The melting point is 11.2°C; the boiling point is 21.2°C. It reacts with water. The low odour threshold is 2.0 mg/m^3; the strong odour threshold is 10.0 mg/m^3.

Ozone (O_3) is an explosive pale blue gas with a characteristic pleasant odor that resembles chlorine at high concentrations. The boiling point is 112°C; the melting point is 193°C. The smell is noticeable even at a dilution of 1:100,000.

Oxidation of nitric oxide by ozone proceeds completely according to the reaction (1)

$$NO + O_3 = NO_2 + O_2, \quad (1)$$

followed by chemisorption by irrigated water according to the reaction (2)

$$3NO_2 + H_2O = 2HNO_3 + NO, \quad (2)$$

where the degree of interaction is 90%.
In modelling ozone dispersion profiles, the Gaussian mixture model algorithm is used, which is the most common in air dispersion analysis modelling. It is based on the assumption that the pollutant will spread according to a normal statistical distribution. When implementing the model, some simplifications have been made, i.e., the emission concentration does not affect the rarefied flow; molecular diffusion and longitudinal diffusion (along the wind direction) are negligible; turbulent flows are linear; lateral average wind speed and vertical wind speed are zero, ideal for an underlying surface.

3 Results

Under modern economic conditions, many large cities are unable to quickly and effectively improve the quality of atmospheric air by re-planning territories (e.g., building interchanges, bypass roads, redesigning cities as for landscaping, arranging pedestrian zones, bicycle paths, etc.) or adopting unpopular decisions (bans or restrictions on traffic in the city centre, penalties, etc.), since this requires large investments in urban transport infrastructure and hinders the sustainable existence and development of society. In addition, the transition to green energy and the use of electric vehicles cause difficulties and high economic costs.

Currently, there are different proposals for protecting the air basin, especially in large cities. The authors of [7] consider the possibilities of promising architectural design of highly urbanized areas using TiO_2 nanoparticles as a component of construction materials such as concrete and gypsum, or a component of active membrane tissues. They are activated by UV radiation and neutralize various atmospheric pollutants, especially acidic gases due to photocatalysis. However, this is applicable for newly built communities and does not fully solve the problem of air purification.

An article by Korean researchers [5] describes the development of a system of artificial soil-plant and electrostatic filters for air purification from fine particulate matter in the urban environment, especially in hot spots. Due to plant leaves, the filter based on multi-layered different artificial soils has an efficiency of 78.5% for $PM_{2.5}$ and 47% for PM_{10} at the incoming airspeed of 0.15 m/s.

The modern European market has ready-made solutions for removing pollutants and viruses from urban and indoor air using biotechnology, fine filtration, UV irradiation, and air ionization.

For example, U-Earth [https://www.u-earth.eu/products] has developed a bioreactor that neutralizes viruses, volatile organic compounds, and fine particles. However, such an air purifier needs to be refilled every 30 days with a special mixture of biotechnological bacteria and enzymes.

ENS has developed the Clean Air technology [https://www.ens-cleanair.com] to remove dust, soot, and other contaminants from the air without using filters. In this system, fine dust particles are positively charged and move to the negatively charged collector plate, where they adhere to the surface. Unfortunately, this solution does not solve the problem of removing gas pollutants from the air.

The British company Airlabs [https://www.airlabs.com] offers devices based on a chemically modified nanocarbon filter for capturing and destroying ozone, nitrogen oxides, and volatile organic compounds. However, it operates in confined spaces (premises, transport).

The German developer Purevento [https://www.purevento.com] offers mobile containers for removing fine particles and nitrogen oxides in a synchronized four-stage filter element treating up to 60,000 m^3 of air per hour with an efficiency of 85%. This solution requires replacement and disposal of filters.

The Italian company Is Clean Air [https://www.iscleanair.com] has presented the APA technology to reduce industrial emissions, which can be used outdoors and indoors to remove particulate matter, heavy metals, hydrocarbons, pollen, spores, NO_x, SO_x, CO_2 from the air within a radius of 25 m. It uses centrifugal force and water in combination with UV treatment with consequent water-based waste. Compared to other systems, filterless technology significantly reduces the cost of production and system maintenance.

Another Italian company Airlite [https://www.airlite.com] offers interior and exterior paints that use photocatalytic properties of mineral components to neutralize pollutants such as formaldehyde and nitrogen oxides (88% efficiency) when exposed to light, and to prevent the growth of bacteria, mold, and spores. At the same time, the produced salts are fixed on walls. However, reactions only take place on the surface leaving contaminants in the air.

The Dutch project (see the following link on the project: https://www.studioroosegaarde.net/project/smog-free-tower)
called The Smog Free Tower is a 7-meter high aluminium tower with positive ionization technology that purifies 30,000 m^3/h of air and uses a small amount of green energy. This project has already been launched in China, South Korea, the Netherlands, Mexico, and Poland.

However, despite the variety of treatment facilities and protective materials, many problems of maintaining clean air have not been resolved yet. Therefore, they require an urgent solution to reduce the negative impact of urban road transport emissions on the health of population of urbanized areas and the environment. We propose a conceptual model of the transition to clean air in urbanized areas shown in Figure 1, according to which it is necessary to solve the triune problem of coexistence and protection of:

- A person who seeks to live comfortably that requires constant progress, and at the same time preserve their main treasure, i.e. health;
- Transport, which is associated with the need to quickly move goods and services requiring sustainable economic development and leading to climate change;
- The environment, the state of which is deteriorating against the background of intensification of natural disasters due to anthropogenic influence.

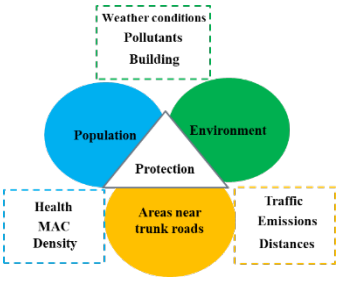


Figure 1. Conceptual Model of the Transition to Clean Air in Urbanized Areas

The research objective was the systemic integrity of three entities, namely, areas near trunk roads, air basin, and population.

The purpose of the work is to propose an engineering and planning solution for purifying the air basin in areas near trunk roads of large cities within the framework of the conceptual model of the transition to clean air in urbanized areas.

The basis of the proposed treatment plant is a scrubber with combined processes of wet dust collection and ozonation characterized by high efficiency of removing fine dust up to 2 microns in size. It operates using the principle of dust particle settling on the surface of droplets under inertial forces or Brownian motion, and nitrogen oxides (acid gases). It is a vertical, hollow stainless steel unit with a grate at the bottom. A layer of nozzles is laid on it to uniformly distribute the gas flow over the cross-section of the unit and to increase the degree of absorption. A mist extractor is placed in the upper part of the unit to avoid drop entrainment. Purified air enters the atmosphere at a height of over 3.5 m. The irrigation water is supplied in the counter-current to the gas flow by means of several rows of radially placed nozzles. Ozonized air is supplied through the side connection. Filters for coarse air purification are placed on the air intake connections. The body is made with noise reduction, lightning and vandalism protection.

The scrubber works periodically, turns on automatically when the sensor is triggered indicating that the NO_x concentration in the air exceeds The WHO recommended value [18], or it can be controlled remotely upon request.

In the place of direct installation of the unit, access to tap water, power supply, and sewerage is required.

Absorption is highly effective for purifying gases with a noticeable concentration but it is also possible for gases at low concentrations, when a gas is highly soluble in the absorbent. Since purified air is a gas with low concentration and low oxidation (NO content is up to 80-90%), it is poorly absorbed. To ensure better absorption of NO_x, it is necessary to oxidize NO to NO_2 by at least 55%. Therefore, ozone is supplied to the scrubber.

To make quantitative calculations of the process, including the consumption coefficients for ozone and water (per one m3 of purified air), the concentration of NO_x in the atmospheric air is considered in the range of 0-1 mg/m^3 [16]. The share of NO_2 in NO_x emissions is usually up to 20% [8]. The purifying efficiency in the ozonized scrubber reaches 75-80%, the productivity is 2500 m^3/h, and the residence time in the unit is 6-7 seconds [15]. The volume of water supplied for irrigation is determined taking into account the dilution of the produced nitric acid to pH = 5.5, which makes it possible to send wastewater to the city sewage system according to the rules for receiving wastewater into it.

Figure 2 shows the dependences of the amount of ozone required for NO oxidation and water for irrigation of the scrubber on the initial content of nitrogen oxides in the purified air.

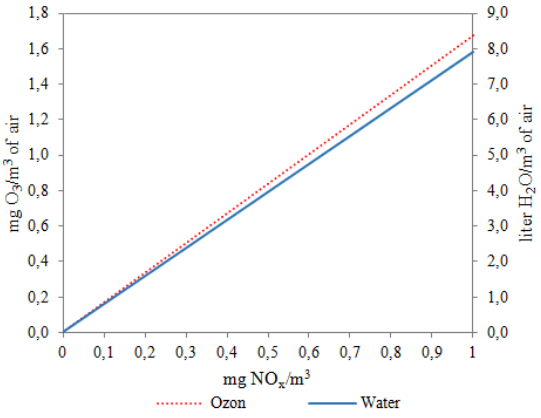


Figure 2. Consumption of Ozone and Water Depending on the Content of NO_x in one m^3 of Purified Air

To purify air with an initial NO_x concentration of 0.5 mg/m3, about 2.1 g of O_3/h is required, which is provided by an ozone generation unit with a capacity of 3 g/h. Unreacted ozone will reach 0.9 g/h, 0.279 g/h of which will dissolve in the irrigation water (solubility coefficient is 0.31 at 20ºC [4]). The rest will be carried away by exhaust air. To ensure the concentration of ozone at the level of standard values, a catalytic ozone destruction unit is placed in the gas outlet pipe at the scrubber outlet. The hourly water consumption will be about 10 m^3.

Recycling can be used to reduce water consumption. Automatic control of the supply of material flows (air, ozone, and water) according to a specific local pollution scenario will reduce consumption expenditures. Depending on the degree of air pollution in the predetermined urban locations, it is planned to place units of various capacities.

Thus, the proposed engineering and planning solution for the use of special units will allow purifying the air basin near the city trunk roads by removing the most dangerous admixtures of nitrogen oxides and dust by physicochemical methods. It should be noted that, in comparison with the known analogues, the unit is not difficult to maintain with sufficiently effective air purification in a short period. The economic efficiency of using purification plants in urban systems will be primarily manifested in reducing medical costs for the treatment of vulnerable groups of the population (children, the elderly, as well as people suffering from asthma, allergies, and immune system disorders).

4 Discussion

The objects of territorial planning continue to develop dangerously; therefore, one can speak of the absence of a sufficiently effective concept of architectural urban planning to ensure the environmental safety of the air basin of urban areas. Therefore, we propose an ER model consisting of three entities,

namely, areas near trunk roads, air basin, and population. Table 1 presents its infological model. For each entity, the main parameters, their interrelationships, and the action area are determined. The main parameters for areas near trunk roads are the number of vehicles moving along this road, emissions of harmful substances into the environment, and the distance from the treatment plant to the trunk road, from the trunk road to the building. These parameters are linked to other parameters by basic links such as displacement, dispersion, and arrangement. Air basin and large cities are the main areas for using protective structures.

Table 1: ER Model of the Research Object

Object	Parameters		Action	Area
	Name	Description		
Areas near trunk roads	Traffic	the number of vehicles moving along the given trunk road	Displacement	Large cities
	Emissions	release of harmful substances into the environment	Dispersion	Air basin
	Distances	the distance from the treatment plant to the trunk road, from the trunk road to the building	Arrangement	Large cities
Air basin	Weather Conditions	a short-term special combination of meteorological factors	Displacement	Air basin
	Pollutants	an anthropogenic agent that enters the environment in quantities exceeding the values established by The WHO	Dispersion	Air basin
	Building	arrangement of buildings and structures	Arrangement	Large cities
Population	Health	a natural state of the body characterized by its balance with the environment	Displacement	Air basin
	MAC	maximum allowable concentrations	Dispersion	Air basin
	Density	the number of inhabitants per 1 km² of the territory	Arrangement	Large cities

A process is shown on flow diagram of the polluted air purification consisting of four steps, at each of which the main components are determined in Figure 3. Atmospheric air monitoring to determine the content of pollutants (nitrogen oxides and dust) and environmental parameters is carried out continuously. If the specified values are exceeded, the next step takes place, i.e., chemical and mechanical air purification is started, material flows are supplied. The main components of this step are the site of the treatment plant location, the treatment equipment. The third step is the disposal of wastewater into the sewerage with the determination of the pH scale to control the disposal. The final step is the control of the exhaust air with the determination of the content of ozone and nitrogen oxides. The process is automatic and regulated by the level of air pollution.

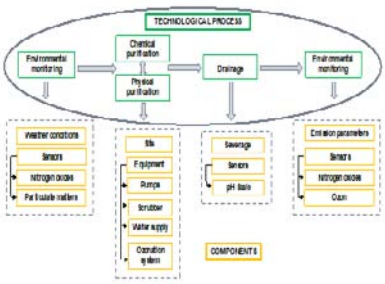


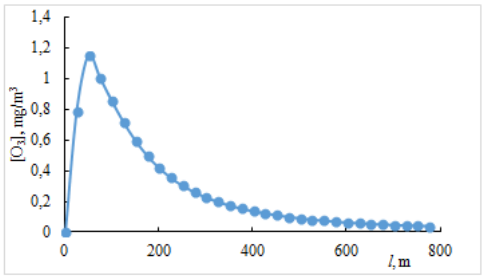
Figure 3. A Process Flow Diagram of Purifying the Air Basin of Areas near Trunk Roads with the Corresponding Components

The main conditions for the operation of the treatment plant (including restrictions) have been determined:

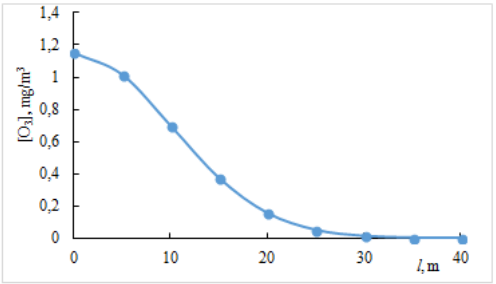
- The level of air pollution exceeds the maximum allowable concentrations;
- Availability of utilities such as power supply network, water supply, sewerage;
- Urban planning indicators, namely, building lines, planning requirements at different types of intersections;
- Weather conditions such as low temperatures, strong wind, rain, thunderstorm, snow;
- The ozone concentration level at the outlet exceeds the maximum allowable concentrations.

To take into account the emergency with ozone emission from the unit, we have carried out the modelling of ozone dispersion in the surrounding area shown in Figure 4. The following parameters have been taken into account during modelling:

- Emission height is 3.5 m;
- Wind speed is 1.25 m/s;
- Background pollution is conventionally assumed to be zero;
- The OX axis is oriented in the direction of the wind, the OY axis is perpendicular to the OX axis;
- Mass of ozone emitted into the atmosphere is 3 g/h.



a)



b)

Figure 4. Ozone Dispersion Profiles in the Surrounding Area: a) along the OX Axis; b) along the OY Axis

When there is one source of emission, the main parameter is the calculated maximum concentration, which is predicted for cases where a dangerous wind speed is expected in the lower atmosphere. The obtained dispersion profiles make it possible to optimally determine the rational and most economical set of measures that ensure the necessary purity of the air basin, to establish the measurement of the emission parameters, the concentration field.

According to the obtained profiles of the dispersion of ozone leaving the unit, one can see that the maximum concentration along the OX axis (the wind flow) will be at a distance of 50 m from the emission source decreasing to the permissible value at distances of about 500 m. At the same time, with transverse dispersion along the OY axis (perpendicular to the wind flow) the standard value is at a distance of 30 m.

We should note that dispersion of the maximum possible ozone emission in case of an emergency, shown in Fig. 4, does not take into account the active rapid decay of ozone and its interaction with air impurities. In addition, the unit is equipped with an ozone concentration sensor, and if the standard values are exceeded, the ozone generator turns off.

5 Conclusion

The objects of territorial planning continue to develop dangerously; therefore, one can speak of the absence of a sufficiently effective concept of architectural urban planning to ensure the environmental safety of the air basin of urban areas. We propose to consider the object of research and protection as a systemic integrity of three entities, namely, areas near trunk roads, air basin, and population. The paper presents an ER model of the research object and determines the main parameters, their interrelationships, and the action area for each entity.

Based on the conducted studies, we propose an engineering and planning solution for using special facilities for removing the most dangerous impurities of nitrogen oxides and dust from the air basin near the city trunk roads through ozonation and absorption. The research determines the operating conditions of the unit and presents a process flow diagram of purification. To take into account the emergency of ozone emission, we have carried out the modelling of ozone dispersion in the city.
At this stage, the proposed solution for non-regenerative air purification in urbanized areas requires small investments and fits into the linear economy model. However, according to the Concept of Zero Pollution by 2050 within the framework of the EU's Circular Economy Action Plan, such an approach is undoubtedly promising.

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Primary Paper Section: J

Secondary Paper Section: CI, DI, JM, JN

K MILITARISM

KA MILITARISM

THE IMPACT OF THE 4.0 TECHNOLOGICAL REVOLUTION ON THE HYBRID WAR OF THE RUSSIAN FEDERATION IN UKRAINE

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Abstract: The authors analyze the impact of the 4.0 technological revolution on the development of russia[1] hybrid war in Ukraine. The article examines the confrontation in frames of 4.0 technological revolution during the Fourth Generation Warfare (4GW), characterizes the hybrid warfare types and the impact of 4.0 technological revolution on each aspects. It is proved that hybrid warfare occupies an important place in the state domestic and foreign policies. Now it is gaining new importance in the information age. It is noted that, due to the development of new technologies, hybrid wars have become one of the most effective methods in achieving the goals. The modern hybrid war of the Russian Federation against Ukraine is monitored. It is emphasized that the formation of a single global information space, being a natural result of the world scientific and technical thought development as well as the improvement of computer and information technology, creates the preconditions for the development and use of information weapons. Both an effective information weapons possession and means of protection against them is becoming one of the main conditions for ensuring the national security of states in the 21st century. It is an instrument in the Russian-Ukrainian confrontation. The created information troops in Ukraine have become a community of active Ukrainians united to protect Ukraine from aggressive information propaganda of russian special services and to monitor information provocations against Ukraine, the russian media lies, and counter-propaganda spread.

Keywords: Hybrid war, 4.0 Technological revolution, Ukraine, russian federation, Misinformation, Manipulation, War.

1 Introduction

The relevance of the topic is determined by the fact that information can simultaneously contribute to stability in the state, its socio-economic and political development, but also pose a threat to the national interests of the state. Digital technologies are entangled in the structures of society. The dynamics of information transfer has changed greatly. Klaus Schwab claimed in 2016 that we are already facing artificial intelligence such as autonomous machines, drones, virtual assistants, translation programs, and advisor programs. The constant growth of computing power and ever-increasing amounts of data have allowed making increasingly more breakthroughs in the creation of artificial intelligence over the past few years: there are programs that develop new drugs, new algorithms and predict new trends in culture [24].

A significant percentage of the world population today uses social networks and media to communicate, learn and disseminate information. This should strengthen intercultural ties and cooperation, but freedom of information also leads to rising unsupported expectations, a lack of understanding of success criteria for groups and individuals, and the spread of extremist ideas and ideologies. In the current conditions of the Russian-Ukrainian war, Ukraine should take a more careful and balanced approach to protect the national information space, in particular, to take care of information hygiene. That is why strategic communications of the state as sovereign, democratic, legal as well as economically stable member of international relations are to be directed to assure national information security of all subjects to information relations and to institutionalize the process of keeping information hygiene. The special situation needs rapid and effective decisions in a course of the hostilities that are currently underway in Ukraine and represent the result of russian aggression.

[1] Since February 24, 2022 spelling of words «russian federation», «russia», vladimir putin in lowercase letters is common in Ukraine to emphasize the contempt to the aggressor and occupier.

2 Materials and Method

To solve a set of tasks, the following approaches such as interdisciplinary, complex and system-synergetic ones considering the modern paradigm of national information security in dialectical unity with the state information policy and introduction of an effective system of strategic communications at micro-, mezzo- and macro-levels are used. The chosen methodology of conducting the investigation combines and applies the following methods and approaches such as network analysis, systematic, integrated and civilizational research approaches, system analysis, systematization and classification methods as well as analysis of synthesis, objectivity, generalization, analogy, case-study, and others. The integrated approach fostered the identification of information intervention trends and patterns, anticipation of the consequences and possible developments of political events taking into account the peculiarities of geopolitical rivalry. The structural and functional approach involves research in terms of the interconnectedness of the elements that make up its structure and the functions inherent in all elements. Political-system analysis provided an opportunity to explore comprehensively the political space as a system of communicative relations.

The authors of the article are scholars of the International Relations Faculty at the Lesya Ukrainka Volyn National University and have long studied the impact of the 4.0 technological revolution on the development of Ukraine and Ukrainian foreign policy. In 2012-2014, they conducted a research “Information and Communication in the Modern World” (State Registration No.112U001779). In 2013–2015, the research topic was “Information Support of Cross-border Cooperation in Ukraine (State Registration No. 0113U002221), in 2018–2019 – “Information War as a New Dimension of Geopolitical Rivalry” together with the Institute of Security Sciences at the Krakow Pedagogical University) (State Registration No. 0119U001621). Currently, they are working on the topic within the Scientific Research Work “Information Hygiene as a Direction of National Security” (State Registration No. 0120U104944).

3 Results and Discussion

4.0 Technological Revolution vs Fourth Generation Warfare (4GW)

Technologies that have emerged at the intersection of the physical, digital, and biological worlds have led to the creation of new platforms through which citizens can communicate their views to the government, coordinate actions, and even avoid the attention of the authorities. At the same time, states have gained new tools to control the population based on a widespread surveillance and power over the digital infrastructure. The ability of states to change has become a matter of the survival. If they accept a new, transparent, ever-changing world, they will survive. By refusing to change, they doom themselves to growing internal conflicts. The fourth industrial revolution accelerated development so much that the old methods of regulation simply do not keep up with the current and new technologies today.

Currently, we can say with confidence that the 4.0 technological revolution gave rise to the Fourth Generation Warfare (4GW), to a conflict characterized by blurring the distinction between direct warfare and politics, between the military and civilians involved [22]. The idea of the Fourth Generation War was originated during the Cold War when the Soviet Union and the United States realized that large-scale use of tanks, aircraft, and missiles in these conditions is ineffective in the struggle for presence in different parts of the world. The role of guerrillas and various political, economic, financial, informational and psychological subversive operations has increased dramatically. In 1989, the American military expert W. Lind introduced the 4GW concept.

He believed that the Fourth Generation War was characterized by decentralization and the disappearance of the state's monopoly on war. This is what makes it possible to return to the war of cultures when immigration and multiculturalism create the preconditions for a war of identities [22].

Such war type is considered effective in terms of “cost-benefit”. In 2014-2022, russia did not invest huge sums in large-scale war, but used various latest subversive tactics to force the victim country to constantly exhaust its military, financial resources in the course of continuous and constantly externally fueled guerrilla warfare and terrorist activities. At the same time, the socio-economic chaos in the country was purposefully initiated to intensify psychological and informational pressure on Ukrainians and to push the undesirable power as the aggression object to be ready to surrender and leave.

Technological breakthroughs have potentially reduced the risk of hostilities by creating defense systems or increasing the accuracy of weapons. Namely during the Russian-Ukrainian war, unmanned aerial vehicles are used (or “drone” referring to an aircraft platform with additional equipment, that can be used interchangeably with terms such as BSP (drone), UAV (unmanned aerial vehicle)), which are designed to collect and provide information using on-board devices. They can be controlled from anywhere through using existing communication technologies (radio, microwave, satellite, optical, etc.). They can move along a predetermined route or between certain points with different levels of autonomy (independent choice of route, avoiding designated areas, identifying and avoiding both natural and civil threats, and others). Depending on the installed equipment, drones can perform image recognition (photo, video, infrared or thermal imaging, radar), electronic (radio monitoring), and the collected information can be transmitted in real time via wireless lines for operators, headquarters, and operational departments in the area. They are so small in size that they can start directly from the ground or small pneumatic launchers as well as the operator's ejection. Their main task is to monitor and track them in real time, so they can support the operation of the battalion in the given area [15; 23].

Increasingly, the 4.0 technological revolution is leading to asymmetrical warfare as a war characterized by significant differences in military power or the ability of participating countries to use strategies and tactics. In such a conflict, the resources of both sides differ significantly and during the struggle, the opponents try to use each other's characteristic shortcomings [22]. In 2001, the US Institute for Strategic Studies defined “asymmetry” as a strategic concept in the military and national security and the ability to act, organize, and think differently from opponents in order to maximize one's own strengths and vulnerabilities, seize initiative, or ‘conquire’ initiative space for maneuvering. Andrew Mack introduced the term “asymmetrical war” in 1975 in the article “Why Great Nations Lose Small Wars?” in magazine “World Politics”. The word “asymmetrical” was simply explained as the significant difference in strength between the various parties to the conflict (“strength” in such sense meant material force such as a large army, the latest weapons, a developed economy, etc.). In the 1990s, the special research was conducted based on the E. Mack concept. The U.S. military has been conducting a thorough analysis of the asymmetric wars issues since 2004. The traditional war involves at least two professional armies with roughly the same experience, resources, and technology. The only real difference is how they implement their strategies. Such a war is called symmetrical, because both sides are essentially the same. For example, when the Allies fight against the Axis powers, it was a conflict between professional, national armies that were mostly similar [16].

An information warfare as variety of modern wars is a form of information confrontation between different actors (states, non-governmental, economic, and other structures). It involves an implementation damage complex to the information sphere of the competing party and protection of own information sphere, as well as actions taken to achieving information advantage by harming information processes based on the very information and the information systems of the enemy while protecting own information [15; 23]. Blocking or distorting information flows and decision-making processes of the enemy are the main methods of information warfare [27]. The Chinese military leader Sun Tzu was the first to use the term “information warfare” in 1985. He attempted to generalize the experience of informational influence on the enemy. The concept of “information warfare” was introduced into scientific use by the American researcher M. McLuhan.

NATO uses the term iWar (information warfare) to describe a form of cyber warfare involving attacks on the Internet that target consumer Internet infrastructure, such as websites that provide access to online internet banking services. In this sense, iWar is different from cyber warfare, cyberterrorism, information warfare, or information warfare involving the use of computers, the Internet, and other means of storing or disseminating information to attack enemy information systems by using teleinformation systems and networks relating to communications control by access to military and critical infrastructure, electronic espionage, and battlefield command and control. The communications networks and satellite reconnaissance are their battlefields [12; 31].

Researchers [6] have identified the following five characteristics of iWar indicating that it can revolutionize conflict such as the potential for expanded offensive action, geographical coverage, difficulty of exposure (recognition), ease of spread and impact on “ready” goals. These qualities suggest that the advent of iWar could mean a new military revolution along with the invention of gunpowder or the atomic bomb.

One of the main information warfare objects is ideological and psychological environment of society associated with the use of information. Information resources and information infrastructure influence the psyche and behavior of people as well as resources that reveal the spiritual, cultural, historical, national values, traditions, heritage of the state, and nation in various spheres of society. Information infrastructure - namely all intermediate links between information and people and a system of public consciousness formation - is viewed as information warfare object too together with a system of public opinion formation and a system of development and decision-making, human consciousness and behavior.

Psychological warfare, cyber warfare; network war, ideological war, electronic warfare as types of information warfare can manifest in the following ways when television and radio broadcasting can be suppressed: television and radio resources are seized for misinformation; communication networks are blocked or inaccessible; stock exchange operations are sabotaged by means of electronic interference through information leaking or spreading misinformation [19].

Media warfare being a type of information war can be considered in two aspects. The former is a phenomenon of negative attitude in the media audience to the enemy (subject of international relations or participant in the political process within the country). The latter is the widespread use of media as a factor influencing the enemy to achieve the necessary political or military advantages and encouraging the adoption of favorable decisions for the initiator of the information impact, to affect human consciousness resulting in performance of the necessary actions [20]. Media war is a form of war lasting unofficially, even in clearly peaceful conditions. Each country tries to make the most of the media to achieve its political goals. The main “soldiers” of the media war are publicists, international propaganda experts and media agents. Media war requires closer cooperation and coordination from the country's military, political, information, security, media and advertising sectors [13].

The main goal of the media war is to create chaos when it becomes unclear who is a friend, who is an enemy, who has won the war and who has lost. The typical war methods are hiding real events and the real state of affairs and taking phrases out of

context followed by focusing on them. It is achieved through identification of negative aspects of a certain phenomenon with the phenomenon itself and its essence and hanging label. One of the methods is defamation, namely insult or ridicule of a person, people, emphasizing the personal traits of the opponent, spreading gossip, rumors, etc. It also includes involvement of persons in the situation which they are not involved in at all, suggesting to the opponent feelings of anxiety, depression, sometimes leading to complete despair and suicide [17].

Unresolved domestic problems and the desire to unite the country's population against an external enemy are often the main causes of media warfare, thereby diverting attention from domestic problems. Such type of war affects the mentality and behavior of people, stimulates radical sentiment in society. The main means of media war are radio, television, websites, the press. Hybrid warfare is known to have no rules. The tactics are flexible and are planned under the strategy of information war rather than frontal warfare, where an alternative reality is built, within which it is possible to turn an opponent into an enemy. The main and managing component of hybrid warfare is information warfare taking on today a new, modified form and emerging as a network-centric warfare. Under such concept, we understand the war of the new generation, in which the modeling and programming of the necessary processes in the enemy state is carried out by means of informational influence [4].

The object of network-centric warfare is mass and individual consciousness. Information influence can be carried out both against the background of information noise and in the information vacuum. Information and network warfare is built on the same principles as any advertising campaign, but its task is to 'sell' the idea of a hybrid aggressor. The attack is not aimed at the body, but at the soul of the enemy, because the strongest conflicts in human history, as it is known, were basically religious in nature. Therefore, network information warfare is a strong part of hybrid warfare [4].

Analysis of the most famous international military, political, and economic conflicts in the late 20th − early 21st centuries testified that information and psychological weapons as one of the means of hybrid warfare should be equated with weapons of mass destruction. Without killing physically, psychotechnologies become the cause of group as well as mass mental disorders that lead to social conflicts. Information impact on the population is carried out through various channels of information transmission such as the Internet, media, television, software, and more. Computers and information systems are affected by information warfare. In the information and psychological war, the informational direction is joined by the psychological one, in which the object of influence is individual and mass consciousness [18].

In the format of using the full range of information and psychological operations, social online networks have the opportunity to coordinate protest and terrorist movements. They are capable of dissemination of content related to information weapons, gathering important information of interest to the aggressor, tracking public sentiment and localization of information sources that pose a danger [14].

Thus, hybrid warfare occupies an important place in the domestic and foreign policies of states, and now it is gaining new importance in the information age. Due to the development of new technologies that have accelerated the spread of globalization processes and contributed to the creation of a single information space, information wars have become one of the most effective methods of achieving the goal. The use of information warfare as a means of geopolitical confrontation can be seen in the wars in the Persian Gulf, Chechnya, eastern Ukraine and Crimea, and Syria. Therefore, the study of this phenomenon in order to protect country' own information space and own position in the global space becomes especially relevant.

Modern Hybrid Warfare: Russian Federation vs Ukraine

The revolution 4.0 has changed the meaning of both national and international security. It affects the type of conflicts and their nature. A retrospective of military affairs and national security is a history of technological progress. Modern interstate conflicts are increasingly "hybrid"; they combine direct action on the battlefield with non-state phenomena and elements. The line between war and peace, soldier and civilian and even violence and non-violence is blurred [24]. Society information security is an unhindered implementation by society and its individual members of their constitutional rights related to the possibility of free possession, creation, and dissemination of information, as well as the degree of their protection from destructive information. Information policy is designed to promote information security as much as possible, namely the state activities and citizens in the field of production, dissemination, exchange, protection of information, its use in management processes. The greatest threat to today's information security in Ukraine is the hybrid war of the russian federation that is the war combining fundamentally different types and methods of conduct by ignoring the universal values and principles of modern warfare to achieve its goals.

Hybrid warfare is the result of hybrid dangers or threats created by the enemy with the intention and ability to use both traditional and non-traditional means of struggle and influence, depending on the urgent need to achieve enemy goals (according to the NATO Strategic Concept 2010). This is a concentrated, fully controlled and aimed at undermining and destabilizing the opponent, supporting guerrilla movements, covert invasion through the use of various (not necessarily limited to one form) open and secret tactics implemented by coercive military and non-military means (propaganda, disinformation, disinformation, disruption of communications, electricity supply, sabotage, etc.), due to information and economic pressure, the ultimate goal of which is not only to achieve full political influence, but also complete domination over the object - the victim country [3]. We see hybrid threats as a combination of coercive and subversive activities of traditional and non-traditional methods (diplomatic, military, economic, technological) that can be used in a coordinated manner by states or non-state actors to achieve specific goals, remaining below the threshold of formally declared war.

The "ancestor" of hybrid warfare, as well as modern hybrid threats, is the russian federation, especially regarding its illegal actions against Ukraine, as well as modernized ISIS operations that use a huge number of hybrid methods and means against a weakened state. Types and areas of hybrid threats are the following: terrorism, propaganda, organized crime, cybersecurity, piracy, resource scarcity, space, intelligence networks, political movements, speculation and manipulation of historical facts, legal wars, incitement to ethnic and ethnic conflicts. Today, hybrid threats are an effective and efficient tool for russia to change the current world order by regional and global leaders, which causes the significant pressure in the international arena [9].

The fact of Russia' use iWar methods (Hybrid war – does) is confirmed by the following factors: an atmosphere of negative attitude to culture and historical heritage in Ukrainian society is formed; public opinion and political orientation of the Ukraine population are being manipulated in order to create a state of political tension; destabilization of political relations between parties, associations and movements in order to incite conflicts, stimulate mistrust, suspicion, aggravate hostilities, struggle for power; provocation of social, political, national-ethnic and religious clashes; provocation, repressive actions by the authorities against the opposition; reducing the level of information support of government and administration; misleading the population about the work of state authorities, undermining their authority, discrediting their actions; undermining the international prestige of the country, its cooperation with other states; creation or strengthening of opposition groups or movements; discrediting the facts of the historical and national identity of the people; formation of preconditions for economic, spiritual, or military defeat, loss of

will to fight and win; undermining the morale of the population, reducing the country's defense capabilities and combat potential; causing damage to information and technical infrastructure.

According to Polish researcher O. Vasiuta, the “red thread” of the russian hydride war in Ukraine is the ideology of the “Russian World”, which uses various tools to implement its ideology from creating influence in neighboring countries to limiting their sovereignty and establishing full control over their economic, political, informational, religious structures and historical, cultural, and linguistic policies. This is soft power, a form of gradual elimination of state independence. To achieve its goals, the Kremlin uses its attachment to energy resources, buys strategic objects of the chosen state, and seizes the main political levers of the state object of the “russian World”. In addition, there is an extensive promotion of common benefits, and the fifth column is also used. “russian World” encourages constant instability within the chosen state, because on religious and ethnic grounds it calls for the fight against “inorodtsy/resident aliens” (people of other nationalities who are not members of the “russian World”), among whom there is the search for all existent troubles reasons, and firstly terrorism roots [28].

The Russian diaspora, cultural and educational foundations and unions are the main tools for implementing such ideology. In addition, it is planned to deepen the legal project of the “russian World”. An active implementation of real political tasks is among the main directions of the concept, in addition to cultural and educational aspects, namely the development of russian diasporas, increasing their influence on public policy of the countries where they live, using russian-speaking societies as a tool to lobby the Kremlin. Such tasks conflict with the national security of other states [30].

We consider the following to be possible measures to prevent and overcome hybrid threats of the russian federation in the Ukrainian information space [29]: improving and raising public awareness of possible current threats, information on the stability of structures, data protection on the Internet, intensification of international cooperation in this field, development of relevant documents/regulations to prevent and respond quickly to such crises, constant and detailed cooperation with the EU and NATO since the hybrid threats are not limited to internal borders but involve cross-border networks or infrastructure. It is necessary to highlight the clear need to develop hybrid thinking, focusing on mental characteristics such as understanding the strategic context, holistic vision and approach to the operation, focusing on potential, covering the natural complexity of the operating environment.

Information Weapons in the Russian-Ukrainian Confrontation

The formation of a single global information space, which is a natural result of the development of world scientific and technical thought and the improvement of computer and information technology, creates the preconditions for the development and use of information weapons. Possession of effective information weapons and means of protection against them is becoming one of the main conditions for ensuring the national security of states in the 21st century.

Information warfare is characterized by information weapons namely a type of weapon, the main elements of which are information, information technology (including information technology impact technologies), information processes and technical means used in information warfare [21]. Information weapons should be understood as a set of organizational and technical influences on information systems, automated and automatic control systems, communication systems and networks, etc., carried out using systems and means of destruction, distortion, disclosure, theft, creation of false information. It is also represented by systems and means of overcoming protection systems, means of restricting or expanding access to information and resources of legitimate users, systems and means of counteracting and disorganizing the work of technical means, computer systems, systems and tools of information systems resource management [7].

The rapid transmission of large amounts of information is becoming a major challenge in the creation of modern control systems, the solution of which is associated with the development of space communications systems and the widespread use of fiber-optic lines. At the same time, such elements of the information infrastructure become the most vulnerable in terms of information offensive operations. Purposeful organization of such situations is a priority in the case of using information weapons in the course of offensive information warfare and achieving information superiority over the enemy. Effective counteraction to such actions of the enemy determines the purpose of defensive information warfare [25]. The main ways and methods of using information weapons of the russian federation against Ukraine are the following: damage to physical elements of information infrastructure (destruction of power grids, interference, use of special programs that stimulate the decommissioning of hardware and biological and chemical means of destruction of the element base); destruction or damage of information, software and technical resources of the enemy, overcoming protection systems, introduction of viruses, software and logic bombs; impact on software and databases of information systems and control systems in order to distort or modify them; threat or commission of terrorist acts in the information space (disclosure and threat of disclosure of confidential information about elements of national information infrastructure, socially significant and military encryption codes, principles of encryption systems, successful experience of information terrorism, etc.); seizure of media channels in order to spread misinformation, rumors, demonstrate power and bring demands to light; destruction and suppression of communication lines, artificial overload of switching nodes; influence on operators of information and telecommunication systems with the use of multimedia and software tools for subconscious information or deterioration of human health; impact on computer equipment of military equipment and weapons in order to disable them [5].

Use of Chatbots in the Russian-Ukrainian War

Chatbots are computer programs developed on the basis of neural networks and machine learning technologies that communicate using auditory or textual methods. They have become a help to solve the problem of information hygiene and security during the 2022 Russian-Ukrainian war. The Ukrainian Virtual Army is our superiority over an enemy who has nothing like it. russia is launching a million bots that spread messages on social networks, but cannot mobilize a million living people who will sincerely tell the world what they really see, experience, and feel. The information army has three important fronts:

-Global / Western. It is aimed to bring to the world the news of russia's attack on Ukraine, to voice Ukraine's needs and requests for help, to call for tougher sanctions and international isolation of the aggressor. In the first weeks of the war, Ukraine was already on the front pages of all publications and in the first stories of all news releases, but, unfortunately, over time, the world's attention will weaken. Letters, messages, and signatures on petitions will then be needed to hold such attention. Many resources have already been created for this, for example, We Are Ukraine, and multilingual Post to Stop War in Ukraine, Stop Russi Channel|MRIYA, UA Student Union.

-russian. It breaks the plans of the russian government, according to which society should exist in a fictional reality created by the Kremlin propaganda. Such front brings many disappointments to Ukrainians, as Russians are often hopeless.

-Ukrainian. It disseminates important and truthful information, I aimed at helping the government, the military and volunteers to work and coordinate, raises morale and quenchs panic. In a situation of constant stress, danger, uncertainty, healthy communication is helpful and necessary for people [8].

The “information army” that helps the regular army in cyberspace has also defended Ukraine against russia. Activists have created Telegram-bots, where one can “surrender” the enemy as well as volunteer or seek help with housing, medicine,

transport. The Ministry of Digital Transformation has compiled a list of useful chatbots during the war [2].

Bots where one can learn how to join the territorial defense, how to survive a civilian and what to do in a crisis situation are Dzhhut 2.0. Persha dopomoga /First aid/ explains what to do if one does not know or has forgotten the algorithms for emergency help in case of heart attack, stroke, cardiac arrest, and gives other advice on first aid. SaveUA is a bot to help in finding volunteers in specific area or vice versa give the opportunity to offer own help. On March 1, the State Emergency Service of Ukraine launched an information chatbot in WhatsApp with important updates, reliable information, and instructions on emergency response procedures. The Institute of Cognitive Modeling together with the Department of Medical Psychology, Psychosomatic Medicine and Psychotherapy and specialists of the project "Friend" launched a telegram-bot of first aid "Friend. First aid" (@friend_first_aid_bot). The Institute of Cognitive Modeling, the Ministry of Health and the Office of the President of Ukraine have designed a 24-hour psychological assistance platform "Tell me". We are going the same way is the bot to help Ukrainians with cars and people who have nothing to go, find each other. Shelters for Ukrainians is the bot to help people in need of asylum to find those who can provide it.

The Ministry of Digital Transformation and Corezoid have launched a Telegram and Viber for migrants, military and territorial defense chatbot "Turbotnyk". It helps the Ukrainian migrants day and night to get a temporary home and necessary things in CNAPs that work as points of concern.

Many chatbots have been created to gather objective information and evidence of war crimes. Thus, Cyberpolice has launched the following services: a chatbot "Narodnyy mesnyk" in telegram (@ukraine_avanger_bot) where Ukrainians will be able to send information about enemy signs on the country's roads and the movement of Russian aggression forces; SBU chatbot "TRIBUNAL.UA" to collect photo and video evidence for legal claims. Today, every Ukrainian is a witness to the war. All cases of crime must be recorded and used in the legal field in the international arena in order to see vladimir putin in The Hague. The following are recorded: 1. Evidence of murder and violence of civilians or military personnel (murder, torture (beating, rape, mutilation)), hostage-taking or captivity; 2. Evidence of use of weapons and military equipment of the russian federation, shelling, small arms, artillery or air, use of firearms, movement and use of military equipment; 3. Evidence of robbery, seizure and destruction of civil and state property (appropriation and destruction of property, transport, fuel, destruction of cultural monuments); 4. Personal data of the enemy (personal data, documents , passports, call signs and pseudonyms, identification marks). All submitted materials will be collected and used in the case against Russia [11].

The Armed Forces of Ukraine chatbot "eVorog" is a one where Ukrainians can report the movement of the occupiers, enemy equipment and explosive devices for their demining. The service works even without the Internet, and all information is automatically sent to the official chatbot. The main advantage is authorization through Diya. As a result, saboteurs cannot spam fake photos or videos, and the military receives truthful information [2]. Later the official bot "eVorog" launched a new feature that can be used to report the killers in Bucha, Irpen and Gostomel. SBU chat bot "STOPRussianWar" enables to report the movement of enemy equipment, Russian sabotage and reconnaissance groups, troops and equipment of the russian federation; it also has features that can be used to report detected explosive devices and equipment left by the russian occupiers. On March 10, 2022, the SBU expanded the channels for obtaining information from citizens about the war crimes of the Russian occupiers in Ukraine. From now telephone hotlines, emails and other messengers have been added to the Telegram chatbot. SBU has also launched a service "Bachu.info", which can be used to report the movement of russian troops and equipment, even in the absence of the Internet [26].

StopRussia | MRIYA (https://t.me/stopdrugsbot) enables the citizens to send links to enemy channels, groups, and profiles on social networks and messengers such as Telegram, YouTube, Facebook groups, Instagram profiles, which spread misinformation, as well as "leak" the locations of the Armed Forces. To block sabotage resources, one can use the channel https://t.me/stoprussiachannel with the detailed instructions on how to do it. Foundation "Povernys'zhyvym" and volunteers have launched another service - FindOkupant. Znaydy zradnyka! (t.me/Traitor_Search_bot) to collect data on the movement of the Russian military as wells as to inform about traitors and collaborators who collaborated with the occupiers, and to expose Internet agents who "leak" important information to the enemy or distribute content on social networks in support of the invaders. Stop maroder (t.me/stop_marauder_ua_bot) is a chatbot to collect information about looters who steal other people's property during the war. This data will be verified and posted on the SBU website: stopmarauder.com.ua. The civil network Opora has launched a collection of evidence of Russia's war crimes to be presented to the international prosecutor in the Hague. IT company KitSoft has launched a telegram bot SmartNews, which collects news from official sources and they can be filtered by keywords. The State Environmental Inspectorate has created a bot and the website of the Operational Headquarters – Shtab.gov.ua, where one can report environmental crimes in Russia. TacticMedAid, a home care application, has been launched in Ukraine. The Center for Strategic Communications and Information Security at the Ministry of Culture and Information Policy has launched a bot in Telegram and Viber. The Dovidka Info bot gives advice on how to prepare and how to act in emergencies.

The last three months are marked by the following important events: an official chatbot eVorog was launched to enable every Ukrainian to report the location and movement of enemy equipment. More than 10 thousand Starlinks arrived in Ukraine to maintain and restore critical infrastructure. The first IT army was created in the world, which unites more than 300 thousand volunteers who are working to strengthen the country's cybersecurity. A crypto fund was launched and it raised more than $60 million in the crypt to help the Ukrainian army. Artificial intelligence is used to recognize the faces of dead Russians and designed UNITED24 - as the main window for collecting donations in support of Ukraine.

The number of chatbots of the authorities and structures operating on the protection of the information front testifies to the considerable support from the population and the coordination of the institutions actions to protect the information space. Such actions maximally achieve the goals of information hygiene during the war. It involves the ability to think critically, analyze texts and be able to create them. It is also necessary to understand the nature of information and techniques of its impact on the environment and people.

4 Conclusion

Modern globalization processes have qualitatively changed the content and forms of information wars. At the present stage of historical development, the tendency to resolve foreign policy conflicts without armed violence dominates. The information war has ceased to be a secondary factor, a supplement to the "main" events. It has become one of the most important mechanisms of warfare, which is talked about along with the use of armed forces and equipment. All types of hybrid warfare have become a legitimate means of political struggle. Despite the fact that a large part of society is aware of the process of targeted information attack on the enemy and allows the possibility of using "dirty" technologies, it is still subject to manipulation by the media. As a result, the winner in the communicative confrontation is not the one who tells the truth, but the one who managed to show the audience a more exciting "information series" and justify position very clearly. That is, the greater the information and technical capabilities of the country, the more likely the possibility of achieving strategic advantages in the future system of international relations. Hybrid wars have

become an axiom of modern international relations and make it possible to achieve the desired goals quite effectively, with the involvement of small financial and human resources: it all depends on the degree of professionalism of the implementers of information operations. It will be easier for those countries that will have a harmoniously developed and, therefore, protected information society to defend their positions in the information conflict.

Thus, at the present stage, hybrid wars have become one of the main threats to international security, which in the future may lead to the destruction of international relations as such. Uncontrolled information flows pose even greater risks to information conflict.

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Primary Paper Section: K

Secondary Paper Section: JY, KA