THE STATE OF FORMATION OF THE CULTURE OF SAFETY OF PROFESSIONAL ACTIVITY IN FUTURE OCCUPATIONAL SAFETY AND HEALTH ENGINEERS

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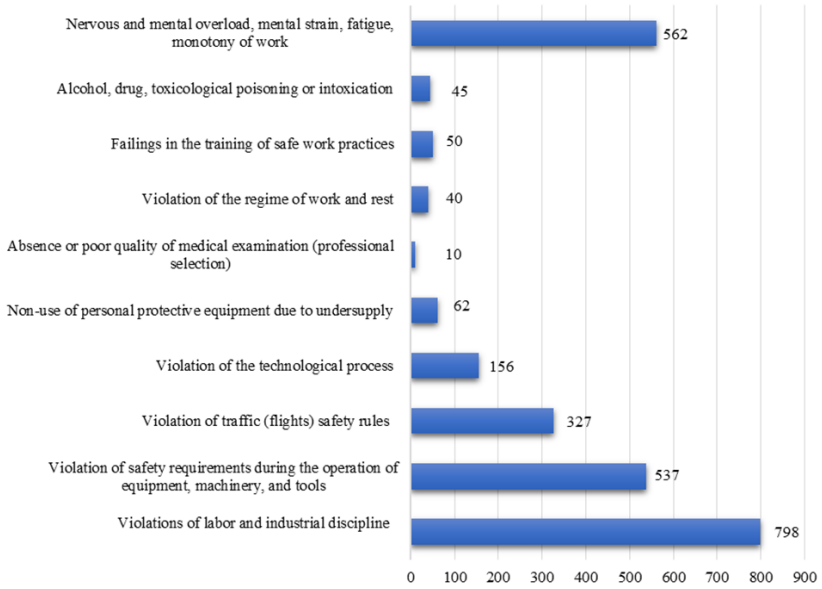
Abstract: This study examined the state of formation of the culture of safety of professional activity of future safety engineers. The sample consisted of 946 students majoring in 263 "Civil Safety" in the field of knowledge 26 "Civil Safety" with specialization "Occupational Safety", 127 teachers of higher education and 112 occupational safety engineers of industrial enterprises and organizations. Problems that hinder the effective formation of the culture of safety of professional activity have been identified. It is concluded that it is necessary to conduct a thorough and experimental study of the scientific problem of formation of the culture of safety of professional activity of future occupational safety and health engineers.

Keywords: Culture of safety of professional activity, vocational training, occupational safety and health engineer, occupational injuries.

1 Introduction

Issues of creating safe working conditions and prevention of occupational injuries are important and relevant at the present stage of development of production. Accidents at work indicate an unsatisfactory state of labor protection at a particular technological site. Based on statistical information presented on the website of the State Statistics Service of Ukraine (Injuries at work, 2018, 2019, 2020), we found that the number of victims of accidents, acute occupational diseases, accidents and fatal accidents, related to production in 2018 amounted to 4040 people, 4394 people in 2019, 6646 people in 2020. As we can see from the above data, occupational injuries in the period from 2018 to 2020 tend to increase. The structure of the causes of accidents related to production is dominated by organizational (2882 victims) and psychophysiological (607 victims) nature. Thus, the analysis of the causes of occupational injuries showed (Figure 1) that, in 2018, the number of victims caused by violations of labor and industrial discipline was 798 people; by violation of safety requirements during the operation of equipment, machinery, and tools – 537 people; by violation of traffic (flights) safety rules – 327 people; by violation of the technological process – 156 people; non-use of personal protective equipment due to undersupply – 62 people; by absence or poor quality of medical examination (professional selection) – 10 people; by violation of the regime of work and rest – 40 people; due to failings in the training of safe work practices – 50 people; alcohol, drug, toxicological poisoning or intoxication – 45 people; nervous and mental overload, mental strain, fatigue, monotony of work, which led to erroneous actions of the employee – 562 people.

Figure 1: The number of victims of accidents related to production formed on the basis of a detailed analysis of their causes



After the detailed analysis of the causes of accidents we can see the significant role of the human factor in creating the preconditions for traumatic situations. In this context, it is important to foresee and prevent occupational injuries taking measures, among which we highlight:

- high-quality professional training of occupational safety and health engineers, whose activities are aimed at creating and operating a occupational safety management system;
- formation of the safety culture among occupational safety and health engineers and development of the safety culture among staff and officials;
- organization of training on occupational safety.

Thus, the analysis of statistical data confirms the position that the key method of prevention of workplace accidents and occupational diseases is the formation of the safety culture at the stage of higher education training, as well as in the process of professional activities. In this regard, there is a need to modernize the training of occupational safety engineers, focused on the formation of a high level of the culture of safety of professional activities (CSPA). Thus, the problem of formation of CSPA in future engineers-teachers on occupational safety is relevant and needs more thorough research.

Searching for scientific literature and dissertation research works on this problem, we found that the definition of "the safety culture" is considered from the standpoint of social, philosophical, psychological, pedagogical, technical, and medical sciences. This concept is becoming increasingly relevant in areas related to the study of the human factor (engineering psychology, ergonomics of the workplace, psychology of occupational safety, management theory, and occupational safety management). The concept of "the safety culture" is very widely used in world science. In particular, scientists from different countries consider it important to form the culture of safety in workers whose mistakes may lead to threats, injuries due to human factors. The analysis of scientific works in the

international Scopus database showed that the formation of the safety culture is carried out in the following areas:

- in the construction industry (Dongping & Haojie, 2013);
- in health care (medical staff training) (Huang, Wu, & Lee, 2018; Ramos, & Calidgid, 2018);
- in transport safety (Timmermans, Alhajyaseen, Reinolsmann, Nakamura, & Suzuki, 2019; Nævestad, Phillips, Laiou, Bjørnskau, & Yannis, 2019);
- in nuclear power generation industry (Nascimento, Andrade, & Mesquita, 2017);
- in the food industry (Jespersen, & Wallace, 2017);
- in the sector of industry (Strauch, 2015).

In Ukraine, the issue of safe human existence is considered in two directions: the culture of life safety and the culture of safety. Thus, M. Zorina studied the problem of formation of the life safety culture of future specialists. She singled out and studied the essence of the interrelated mandatory components of the culture of life safety: motivational, cognitive, creative and technological (Zorina, 2011, p. 40). The article by O. Tretyakov and O. Dashkovskaya is of scientific interest. They emphasize that the mastery of the culture of safety, its principles is aimed to ensure the formation of a new, modern worldview on the attitude to the constant concern for the preservation of life and health of people in work and life (Tretyakov, & Dashkovskaya, 2012, p. 83). L. Kravchenko highlighted the issue of forming a culture of life safety of students of pedagogical universities (Kravchenko, 2016, p. 21).

The dissertation of T. Petukhova is also important for our study. It substantiates and determines the pedagogical conditions for preparing future teachers to form the culture of life safety in middle school students, as well as the structure, levels and criteria of readiness of future teachers to form the culture of life safety in middle school students (Petukhova, 2010). A significant contribution to the development of the theory and methods of vocational education on this topic was made by N. Kulalaeva, as evidenced by her monographs (Kulalaeva, & Mikhailyuk, 2011; Kulalaeva, Mikhailyuk, & Marmazinsky, 2013).

Scientists O. Kobylyansky and I. Kobylyanska believe that the process of formation of the safety culture in future specialists of higher education institutions within the framework of standard programs of normative disciplines “Safety of life”, “Fundamentals of occupational safety”, “Occupational safety in the field”, “Civil protection” requires improvement, as these programs do not properly take into account the requirements of a systemic approach, as well as socio-political and economic conditions in the country (Kobylyansky, & Kobylyanskaya, 2013, p. 83). The same opinion is held by V. Demyanchuk, I. Ryzhenko and V. Chaban (2014). From O. Sharovatova’s point of view, the main methods and means of influencing the formation of safety culture, in addition to improving knowledge in the field of safety of life and work, should be improving moral and ethical ideas of the individual, paying attention to psychological and patriotic education, which will limit the number of potential threats and risks in the context of social nature (Sharovatova, 2018, p. 93).

Scientific interest of our study is also falls on I. Grabovska’s organizational model of formation of readiness of future professionals for professional activities that was developed on the basis of higher education institutions of the State Emergency Service (Grabovska, 2016, p. 161). Of great interest is the scientific article by O. Pulyak, which examines the safety culture of students of higher education institutions through the process of education (Pulyak, 2015, p. 140). Among other works that attract attention are the publications of scientists of the Lviv State University of Life Safety, in which various aspects of training of life safety specialists are presented (Koval, Kozyar, & Lytvyn, 2018; Povstin, & Kozyar, 2019; Evsyukov, 2017).

Further study of information sources showed that the term “safety culture” was first used in 1986 by the International Atomic Energy Advisory Group (abbrev. INSAG) of the International Atomic Energy Agency (abbrev. IAEA), which has published a series of reports on safety culture: Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident, No. 75-INSAG-l (INSAG-l, 1986); Basic Safety Principles For Nuclear Power Plants, No. 75-INSAG-3 (INSAG-3, 1989); Safety Culture No. 75-INSAG-4 (INSAG-4, 1991); The Chernobyl Accident: Updating of INSAG-1, No. 75-INSAG-7 (INSAG-7, 1993); Basic Safety Principles For Nuclear Power Plants No. 75-INSAG-3 Rev. 1, No. 75-INSAG-12 (INSAG-12, 2015).

The analysis of international legal instruments shows that the concept of “safety culture” is widely used by the International Labor Organization (abbrev. ILO). Through its adoption of the Global Strategy on Occupational Safety and Health (Global Strategy, 2003), Promotional Framework for Occupational Safety and Health Convention No. 187 (ILO Convention, No. 187, 2006), the ILO Report Series (ILO Report, 2004, 2015), the ILO emphasizes the need to enhance and maintain a culture of prevention of occupational safety at the national level, emphasizes the feasibility and importance of identifying industrial risks and hazards in the workplace, preventive measures for occupational safety.

The results of the analysis of scientific sources, legal documents and consideration of various theoretical positions and conceptual ideas covered in domestic and foreign research indicate the need to study such an important issue as formation of the culture of safety of professional activity in future occupational safety and health engineers. Given this, the purpose of the article is to determine the state of formation of the culture of safety of professional activity in future occupational safety and health engineers.

2 Research methodology

The aim of the study is to study the state of formation of the culture of safety of professional activity in future occupational safety and health engineers. The logic of the study required the solution of the following tasks: establishing awareness of the essence of the concept of “the culture of safety of professional activity”; determination of the state of CSPA formation; identification of factors and problems that contribute to or negatively affect the effectiveness of the formation of CSPA in future occupational safety engineers; analysis of educational and professional training programs for future engineers in order to identify the content of their professional training with the CSPA component; conducting a survey of respondents on the importance of professionally important qualities; as well as identifying the needs for the formation of professional knowledge and skills necessary for the effective formation of CSPA.

2.1 Research hypothesis

The hypothesis of the study is that the developed methodology will determine the state of formation of the culture of safety of professional activity in future occupational safety engineers and identify problems that hinder the effective formation of the culture of safety of professional activity in future occupational safety and health engineers.

2.2 Research sample

To identify the state of formation of the CSPA, we involved in the survey majoring in 263 “Civil Safety” in the field of knowledge 26 “Civil Safety” with specialization “Occupational Safety”, teachers of higher education institutions that provide training to future occupational safety engineers, and occupational safety engineers of leading enterprises and organizations of Ukraine. The study involved 1,185 respondents, including 127 teachers, 112 occupational safety engineers, and 946 students.

2.3 Research methods and data collection instruments

In the process of research and experimental work to achieve the goal and solve the formulated problems, we used a set of methods which included the following types of methods: questionnaires, observations, testing, expert method, method of diagnostic work, method of diagnostic situations, statistical methods of interpretation. These methods were used in accordance with the program of the experiment by stages.

The complexity and versatility of the object and subject of research, the goals and objectives in view necessitated the use of different methods of research and experimental work: general, partial and specific. Together, they compiled tools for conducting theoretical research and obtaining experimental material. The variety of methods used in the research and experimental activities are valid and reliable, as they have been tested in scientific research works, and allow us to talk about the reliability of the results of the experiment. To diagnose the formation of CSPA in future occupational safety and health engineers, each individual component was evaluated, and substantiated with the selected set of methods.

Theoretical methods allowed us to conduct interdisciplinary analysis and synthesis of data of philosophical, sociological, culturological, general scientific, psychological and pedagogical literature, legal documents, educational and methodological documentation of higher education institutions. In particular, the analysis of the current state of the formation of CSPA in future safety engineers; methods of questionnaires, interviews, interlocutions, logical and structural analysis made it possible to identify the main problems of formation of CSPA in future safety engineers.
In order to study the state of the problem, its relevance, study trends and prospects at all stages of the work we used theoretical analysis and generalization of scientific and methodological literature on the problem of research. The conceptual analysis of dissertation research on similar issues over the past twenty years has been conducted.

In the process of research we used the method of content analysis (qualitative and quantitative study of documents), which was used to assess the strategy of reforming the system of higher professional education in general and the training of occupational safety engineers in particular. The application of the method permitted to determine the directions of state policy in the field under consideration, against the background of changes in methodological directions and pedagogical paradigms, to form an idea of their essence. This work allowed us to rethink the leading methodological approaches in the field of higher professional education in the context of the social order of society; to give theoretical and logical substantiation of the main ideas of development of system of preparation of occupational safety engineers; to determine the strategic goals and content of professional training of safety engineers, to develop conditions that ensure its implementation. Consideration of these issues was important to address the main objectives of the study, aimed at justifying the need for a pedagogical system of formation of CSPA of future occupational safety and health engineers.

The analysis of curricula and programs of professional training of future occupational safety and health engineers helped to reveal the absence of the component of formation of CSPA in the content of disciplines of general and professional training. The ranking method helped to identify professionally important personal qualities of future occupational safety engineers to form the culture of safety. Analysis and generalization of foreign experience in the training of occupational safety and health engineers and in the formation of the safety culture made it possible to identify forms, methods, innovative techniques and technologies for their training.

In order to determine the state of formation of the culture of safety of professional activity, we developed questionnaires for teachers of higher education institutions and students majoring in 263 “Civil Safety” in the field of knowledge 26 “Civil Safety” with specialization “Occupational Safety” (Appendix, tables A-1, A-2, A-3).

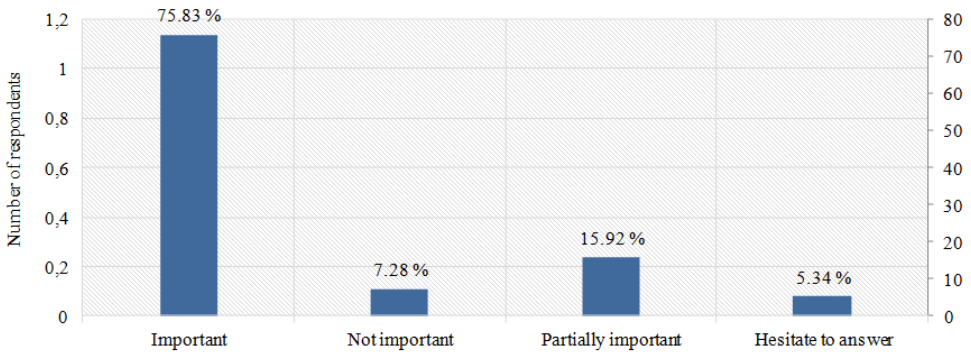
3 Results and discussion

In the process of the research, we conducted the survey of students, teachers and occupational safety engineers on understanding the essence of the concept of “culture of safety of professional activity”. The results of the survey showed (Table 1) that 48.9 % of teachers of higher education institutions, 47.5 % of safety engineers and 43.6 % of students understand the etymology of the concept of “culture of safety of professional activity”. In general, 44.47 % of respondents have a general idea of the essence of the definition of “culture of safety of professional activity”. At the same time, the problem of formation of CSPA in future safety engineers requires finding ways and mechanisms to solve it.

Table 1: The results of the survey of respondents on the understanding of the concept of “culture of safety of professional activity”

Categories of respondents	Total number	%	Results of the survey			
			incorrect		correct	
			Number	%	Number	%
Students	946	79,83	534	56.44	412	43.6
Teachers of higher education institutions that train future occupational safety engineers	127	10,71	65	51.18	62	48.99
Occupational safety and health engineers	112	9,45	59	52.67	53	47.5
Total	1185	100	658	55.52	527	44.47

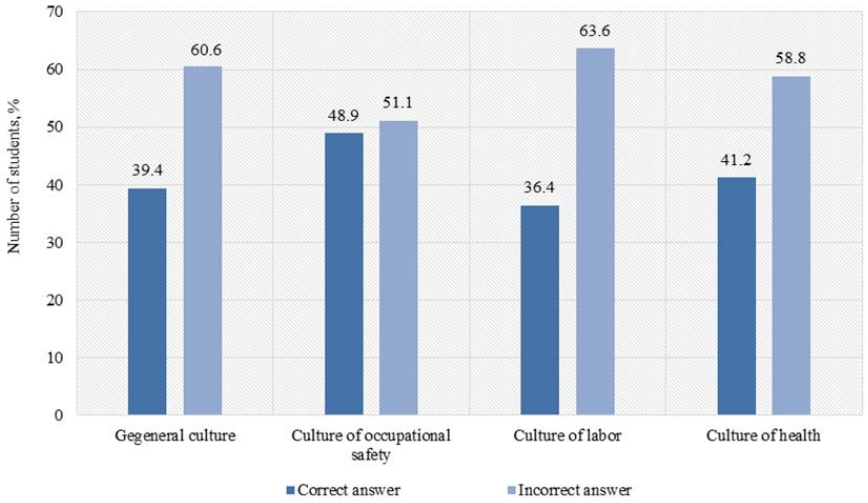
Figure 2: The results of the survey of respondents on the importance for occupational safety engineers to possess the culture of safety of professional activity (compiled by the author)



To the question of the questionnaire "Do you consider it necessary for occupational safety engineers to have the CSPA" the majority of respondents gave the positive answer (75.83 %); 7.28 % of respondents noted that CSPA is not particularly important for a safety engineer; 15.92 % of respondents indicated that CSPA is partially important; 5.34 % of respondents were hesitant to answer (Figure 2).

Based on the etymology of the concept of CSPA, we tested occupational safety engineers on the level of knowledge and mastery of the culture of safety of professional activity, labor culture, health culture, general culture. To this end, we developed a questionnaire for students (Appendix Table A-3), which provides a list of questions that made it possible to determine the availability of relevant knowledge related to the culture of occupational safety, labor culture, health culture, and general culture. An in-depth study of the results of the questionnaire revealed that students needed to develop knowledge related to labor culture, health culture and general culture (Figure 3). Thus, questions related to general culture were answered correctly by 39.4 % of students, incorrect answers were given by 60.6 %; 48.9 % of students gave the correct answer to the questions related to the culture of occupational safety, 51.1 % gave the wrong answer; 36.4 % of students answered the questions related to the labor culture correctly, 63.6 % answered incorrectly; 41.2 % of students answered the questions related to the culture of health, 58.8 % gave the wrong answer.

Figure 3: The results of the survey of students on the knowledge of general culture, culture of occupational safety, culture of labor, culture of health



The results of the survey of students on knowledge of general culture, occupational safety culture, labor culture, health culture allow us to draw the following conclusions: the formation of CSPA in future occupational safety engineers in higher education institutions is spontaneous, not systematic; most students need to improve their knowledge on certain types of cultures that form the foundation of CSPA; in the content of professional training of future occupational safety engineers insufficient attention is paid to the formation of CSPA and its individual components.

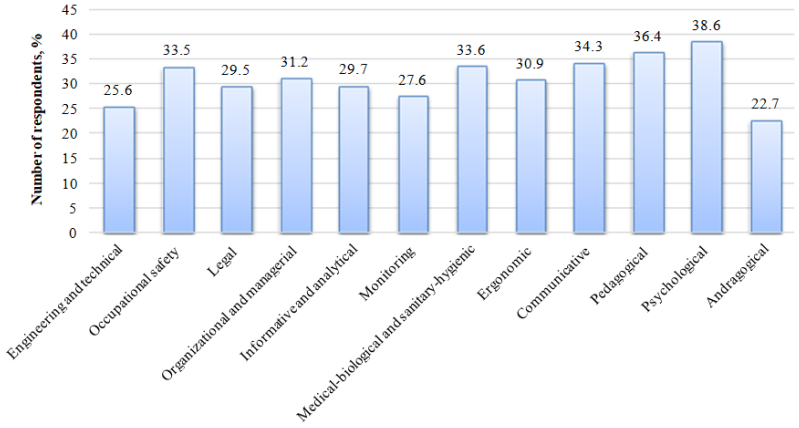
In addition to the study of students' theoretical knowledge, the state of professional skills required for future occupational safety engineer to carry out professional activities on the principles and priorities of CSPA, including: organizing the work of the team and performers with due regard to occupational safety requirements; assessing and analyzing the condition of hazardous production facilities, technological processes and equipment for compliance with the level of safety; applying the requirements of occupational safety legislation, regulations and equipments' regulatory and technical documentation; assessing the level of one's own health culture and using health-preserving technologies to improve it; establishing interaction with employees, heads of structural subdivisions of enterprises, employers, representatives of trade unions, public administration bodies of occupational safety, state supervision and control and finding optimal solutions in conflict situations. In the process of questionnaire survey, we found (Figure 4) that 31.2 % of respondents need improvement of organizational and managerial skills, medical-biological and sanitary-hygienic skills – 33.6 %, ergonomic skills – 30.9 %, andragogical skills – 22.7 %. At the same time, 25.6 % of students expressed a desire to improve engineering and technical skills; 33.5 % – occupational safety skills; 29.5 % – legal skills; 29.7% – informative and analytical skills; 27.6 % – monitoring skills. Particular attention was paid to communicative skills (34.3 %), pedagogical skills (36.4 %), psychological skills (38.6 %). Analysis of the results of the survey of students shows that during the formation of CSPA in future safety engineers there is a need to pay attention on improving medical and biological, ergonomic, communicative, pedagogical, psychological skills. In turn, this requires consideration when structuring the content of the formation of

CSPA in future occupational safety engineers of the relevant disciplines, which are part of the ergonomic, communicative, health-preserving content components.

In the process of monitoring the state of formation of CSPA of future occupational safety engineers in students, we found out the level of readiness of future specialists to perform their duties according to the principles and priorities of CSPA. The results of the survey showed that 45 % of respondents rated their capabilities at a sufficient level, 11 % – at a high level. It should be noted that 14 % of respondents said they were unsure of their abilities, 30 % of students believe that their preparedness to perform professional tasks on the principles and priorities of the CSPA is insufficient.

In order to find out the reasons for the low readiness of students to perform professional tasks on the basis of safety priorities, we conducted questionings and interviews. In the process of generalization and systematization of respondents' answers it was found that students have difficulties in organizing the occupational safety management system at the enterprise, as well as insufficient knowledge of document management in the field of occupational safety, and occupational safety control, low level of knowledge of labor law. There was a low orientation in the methods of prevention of occupational injuries, measures to organize the safe performance of work at high risk facilities. For some respondents, important limiting factors were: high responsibility for maintaining the health and lives of others, possible emotional overload in the event of an accident, psychological tension due to constant monitoring by the state occupational safety supervision authorities.

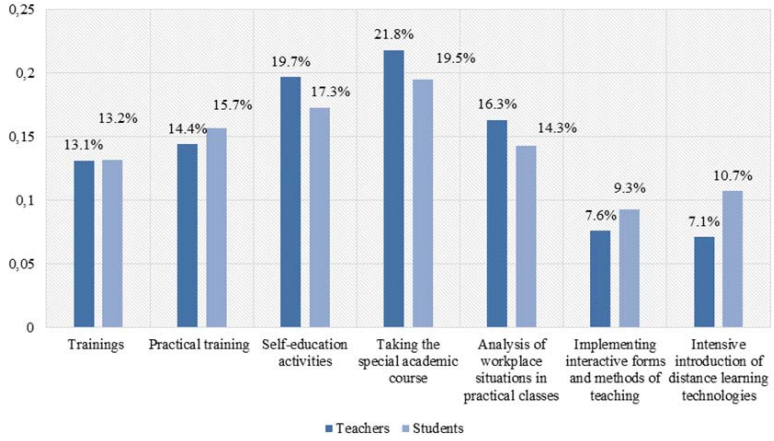
Figure 4: The needs of students in improving professional skills related to the implementation of professional activities on the principles and priorities of CSPA



One aspect of the survey was to find out the opinion of higher education teachers and students on organizational forms that effectively influence the formation of CSPA in future occupational safety engineers (Figure 5). Thus, the survey of teachers shows the following results: trainings were noted by 13.1 % of respondents; practical training – 14.4 %; self-education activities – 19.7 %; taking the special academic discipline "Culture of Safety of Professional Activity" – 21.8 %; analysis of workplace situations in practical classes related to the academic discipline "Culture of Safety of Professional Activity" – 16.3 %; implementing interactive forms and methods of teaching – 7.6 %; intensive introduction of distance learning technologies, blended learning – 7.1 %. The results of the survey of students on this issue were distributed as follows: trainings were noted by 13.2 % of respondents; practical training – 15.7 %; self-education activities – 17.3 %; taking the special academic discipline "Culture of Safety of Professional Activity" – 19.5 %; analysis of workplace situations in practical classes related to the academic discipline "Culture of Safety of Professional Activity" – 14.3 %; implementing interactive forms and methods of teaching – 9.3 %; intensive introduction of distance learning technologies, blended learning – 10.7 %.

Thus, according to the results of the questionnaire, it should be noted that, according to students and teachers, the main forms that contribute to the effective formation of CSPA in future safety engineers are: taking the special academic course "Culture of Safety of Professional activity", self-education activities, practical training, and analysis of workplace situations.

Figure 5: The results of the survey of respondents assessing the effectiveness of forms of CSPA formation in future occupational safety engineers

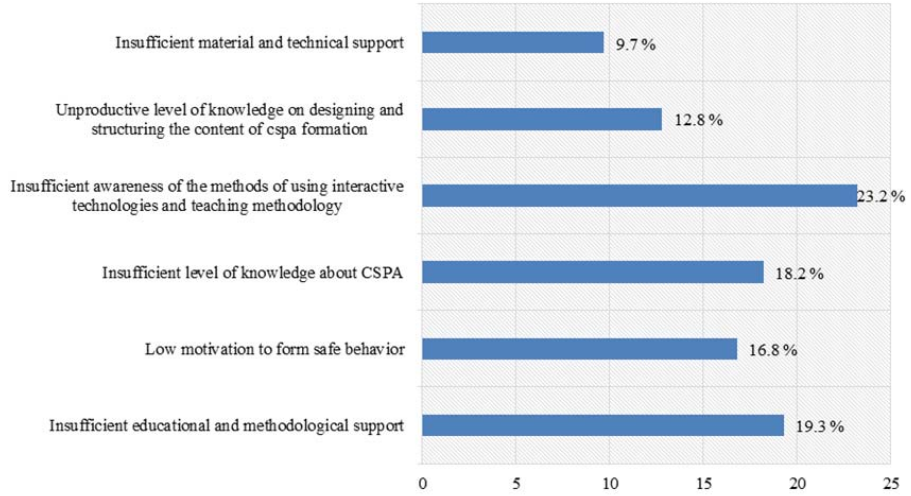


At the same time, students noted that the implementation of measures for the formation of CSPA in future safety engineers in higher education institutions is carried out constantly (23.2 %); sometimes (54.6 %); never (22.2 %). As the main activities the students highlight: holding Academic Olympiads, competitions for the Occupational Safety Day, holding scientific and practical conferences on occupational safety, studying certain issues of the culture of safety of professional activity in classes on professionally-oriented academic disciplines in the field of occupational safety. The analysis of the data shows non-systemic nature of the measures of implementing CSPA.

In the course of further research, we identified problems that prevent teachers of higher education institutions effectively form CSPA in future occupational safety engineers. The main reasons named by teachers (Figure 6) are: insufficient educational and methodological support (19.3 %); low motivation to form safe behavior (16.8 %); insufficient level of knowledge about CSPA (18.2 %); insufficient awareness of the methods of using interactive technologies and teaching methodology (23.2 %); unproductive level of knowledge on designing and structuring the content of CSPA formation (12.8 %); insufficient material and technical support of the process of professional training of future safety engineers (9.7 %).

The results of the survey of the teaching staff of higher education institutions show that teachers need to improve their knowledge on the use of interactive learning technologies, as well as to implement effective methods of forming CSPA; there is an urgent need to update the content of professional training of future occupational safety engineers with the component CSPA; we also detected the disinclination of teachers for systematical implementing and applying information and communication technologies, distance learning technologies, as well as the using blogs, chats to promote CSPA issues. Thus, this leads to further research to determine the organizational and pedagogical conditions for the effective formation of CSPA, as well as the development of appropriate pedagogical system, and educational and methodological support for the formation of CSPA in future occupational safety engineers, creating methodological recommendations for teachers on CSPA formation.

Figure 6: The results of the survey of teachers to identify problems that hinder the effective formation of CSPA



One of the structural components of CSPA is subjective, which includes professionally important qualities and abilities of the individual, the presence of which affects the level of CSPA in future occupational safety engineers. With this in mind, the next step in our study was to identify the opinion of students, teachers, and occupational safety engineers on the importance of the professionally important qualities that a future occupational safety engineer with a high level of CSPA should possess. To this end, we conducted a questionnaire asking respondents to rank the professionally important qualities of a future occupational safety engineer, which in their opinion are significant. The following were identified as fundamental (Figure 7): responsibility (48.3 %); persistence (41.5 %); discipline (33.7 %); purposefulness (43.5 %); powers of observation (36.3 %); fidelity to one's principles (39.4 %); emotional stability (14.8 %); self-control (13.6 %); restraint (13.2 %) efficiency (17.3 %); mobility (21.8 %); communicative abilities (15.1 %).

The results of the survey show that respondents think that the main professionally important qualities of an occupational safety and health engineer are responsibility, persistence, purposefulness, fidelity to one's principles, powers observation and discipline.

At the same time, such qualities as emotional stability, self-control, restraint, communicative abilities did not receive due attention. This indicates that in the process of professional training of future occupational safety engineers, insufficient attention is paid to the analysis and formation of individual components of CSPA, as well as to the problem of personal development of these professionals. Thus, in the process of forming CSPA in future occupational safety engineers we should provide for the formation of the above qualities through the content of disciplines "Psychology of Occupational Safety", "Business Communications", "Safety Pedagogy".

At the same time, one of the stages of our study was to find out the opinion of teachers of higher education and occupational safety engineers of industrial enterprises, institutions, organizations on the importance of professional skills of occupational safety engineer to carry out professional activities on the principles and priorities of CSPA. To this end, we proposed a questionnaire of professional skills of an occupational safety engineer, which could be used to rank the skills of an occupational safety engineer, which they determined themselves. Thus, from among the professional skills of a future occupational safety engineer, the respondents compiled the following rank: 1st place – occupational safety skills; 2nd place – legal; 3rd place – organizational and managerial; 4th place – monitoring; 5th place – engineering and technical; 6th place – ergonomic; 7th place – informative and analytical; 8th place – medical-biological, sanitary-hygienic; 9th place – communicative; 10th place – psychological; 11th place – pedagogical; 12th place – andragogical. So, as we see, according to the respondents, for the future safety engineer it is important to form occupational skills like occupational safety, legal, organizational and managerial, monitoring. We agree with the opinion of teachers of higher education institutions and occupational safety engineers, but we also consider it necessary in the process of forming CSPA to focus on the development of such skills as communicative, pedagogical and psychological.

Self-education is important in the activity of an occupational safety engineer, because the skill is essential for systematizing and

analyzing legislative and regulatory acts on occupational safety. In addition, the formation and development of CSPA is possible only through the process of self-education. Given these provisions, one of the stages of the study was to determine the importance of self-education in the students' educational process. Survey data showed that 72.4 % of respondents said that little attention is paid to self-education activities. Students named the following reasons that have negative impact on self-education in the course of CSPA formation (Figure 8): low motivation for self-education (21.4 %); lack of understanding and awareness of the need for self-education activities (10.1 %); insufficient educational and methodological support of independent work (20.7 %); lack of skills to organize self-education (25.1 %); lack of proper control over self-education activities by teachers (16.5 %); inefficient timing of the working day (6.2 %).

The results of the survey indicate the need and actualization of logical planning and development of educational and methodological support for independent work of students in disciplines that ensure the formation of CSPA in future occupational safety engineers.

Figure 7: The results of the survey of respondents on the significance of professionally important qualities of future safety engineers

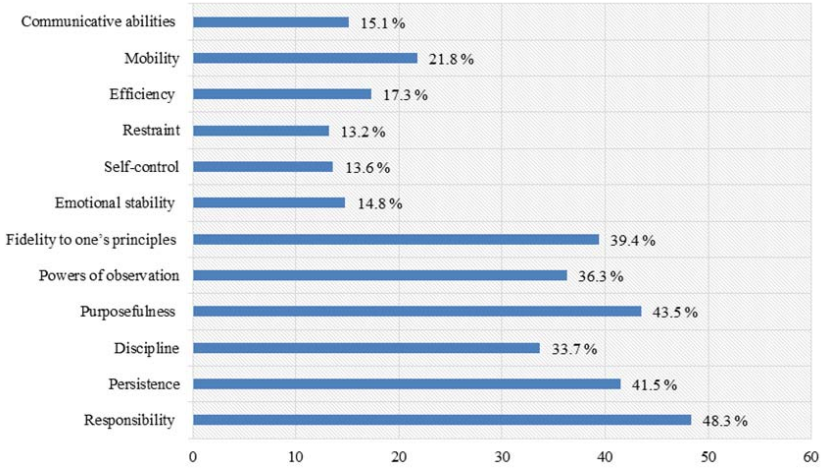
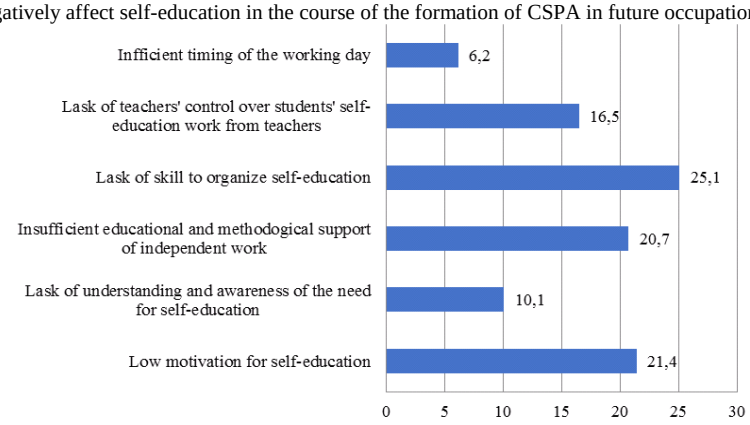


Figure 8: Reasons that negatively affect self-education in the course of the formation of CSPA in future occupational safety engineers



Taking into account the identified content components of CSPA (occupational safety, organizational and managerial, legal, ergonomic, health care, communicative), we analyzed Educational and Professional Programs (EPP) and curricula of specialty 263 "Civil Safety" in the field of knowledge 26 "Civil Safety" in specialization "Occupational Safety" of the first (Bachelor's) level for the availability of disciplines that ensure the formation of CSPA, in the following universities: Zaporozhye National University (2019), Lutsk National Technical University (EPP, 2019), Khmelnytsky National University (EPP, 2019), National University Water Management and Nature Management (EPP, 2017), National University of Civil Defense of Ukraine (EPP, 2019), Lviv State University of Life Safety (EPP, 2017), Ukrainian State University of Railway Transport (EPP, 2019). The results of the analysis of educational and professional programs and curricula allow us to state the insufficient number of subjects aimed on ensuring the appropriate level of formation of CSPA, and significant differences in the list of disciplines and the number of credits. Consider this aspect of the analysis in more detail.

According to the data, the occupational safety component in all these higher education institutions is widely represented. The main professionally-oriented disciplines in the field of occupational safety, which ensure the formation of occupational safety knowledge, are "Industrial Sanitation", "System of Control of Hazardous and Harmful Production Factors", "Fire Safety", "Safety of Technological Processes and Equipment", "Electrical Safety", "Investigation, Accounting and Analysis of Accidents, Occupational Diseases and Accidents", "Examination of Occupational Safety". Only at Khmelnytsky National University there are no disciplines related to the prevention of occupational injuries, investigation of accidents, occupational diseases. Note that these disciplines are key to the formation of CSPA. In addition, it should be emphasized that for the formation of informative and analytical knowledge, the ability to draft local acts of the enterprise an important discipline is "Documentation and Training in Occupational Safety", which is presented only at Zaporozhye National University. There are also disciplines that are part of the organizational and managerial content component of the curriculum of higher education institutions. Thus, Zaporizhzhya National University, Lutsk National Technical University, Khmelnytsky National University, National University of Civil Defense of Ukraine, and Ukrainian State University of Railway Transport provide this component with the following disciplines: "Occupational Safety Management", "Organization of Supervision in the Field of Occupational Safety Protection"; in Lviv State University of Life Safety there is only one course – "Occupational Safety Management".

The formation of legal knowledge is carried out through the content of the following disciplines: “Legal and Socio-economic Foundations of Occupational Safety” at Zaporozhye National University; “Jurisprudence”, “Organizational and Legal Aspects of Working with Staff” at Lutsk National Technical University; “Legal Bases of Civil Safety of Labor Policy and Occupational Safety” at Khmelnytsky National University; “Labor Law”, “Legal basis of Civil Safety” at the National University of Water Management and Environmental Sciences; “Regulatory and Legal Framework in the Field of Civil Protection”, “Legal Aspects of Occupational Safety” at the National University of Civil Protection of Ukraine; “Jurisprudence and Legal Principles of Civil Protection”, “Regulatory Work in the Field of Civil Protection”, “Legal Basis of Occupational Safety” at the Lviv State University of Life Safety; “Legal Basis of Occupational Safety Policy” at the Ukrainian State University of Railway Transport. We should make a special mention of the logical sequence and continuity of training in the process of designing curricula at Zaporizhia National University and Lutsk National Technical University. Thus, in the first year students receive general knowledge of law, and in the senior – professional legal knowledge in the field of occupational safety and civil protection.

Ergonomic content component, which includes “Ergonomics” and “Occupational Psychology and Safety” is presented in three institutions of higher education: Ukrainian State University of Railway Transport, Zaporozhye National University and Lutsk National Technical University. At the National University of Water Management and Nature Management this component is provided only by Labor Psychology, at the National University of Civil Defense of Ukraine this component is completely absent. At Khmelnytsky National University and Lviv State University of Life Safety, psychological aspects of occupational safety are considered as part of the integrated disciplines “Socio-economic and psychological foundations of civil security” and “Fundamentals of psychology and pedagogy”. Accordingly, ergonomic issues in these higher education institutions are not studied, which negatively affects the formation of CSPA. These differences and shortcomings indicate the need to develop appropriate content and educational and methodological support for the disciplines “Workplace Ergonomics”, “Psychology of Occupational Safety”.

In the process of analyzing educational and professional programs and curricula, we found that the communicative content component is insufficiently represented, and in some institutions it is completely absent. Thus, pedagogical knowledge and skills are formed through the content of disciplines “Teaching the Population to Act in Emergencies” (Lutsk National Technical University), “Fundamentals of Psychology and Pedagogy” (Lviv State University of Life Safety), “Fundamentals of Pedagogy” (Ukrainian State University of Railway Transport) . In other institutions of higher education (Zaporizhzhya National University, Khmelnytsky National University, National University of Water Management and Environmental Sciences, National University of Civil Defense of Ukraine) the study of disciplines included in the communicative component is not provided. The results of the analysis of educational and professional programs in this direction actualize our attention to the design of the content of disciplines that provide the formation of pedagogical and communicative knowledge, which are elements of the cognitive component of CSPA.

Further research has shown that this trend is observed in the analysis of curricula for the presence of disciplines that are part of the health component. Thus, at Lutsk National Technical University the health-preserving component is implemented through the course “Occupational Safety and Human Health”, at the National University of Water Management and Nature Management – “Life Safety and Pre-Medical Care”, at the National University of Civil Defense of Ukraine – “Preparation for Pre-Medical Assistance”, at Lviv State University of Life Safety – “Medical Training”. There are no disciplines related to health culture at Zaporizhia National University, Khmelnytsky National University and Ukrainian State University of Railway Transport. Thus, it indicates a solution to the problem of structuring the content of the health component.

During the research we analyzed the educational and professional programs for the special academic discipline “Culture of Safety of Professional Activity”, which showed that this discipline is provided only in the curriculum of the National University of Civil Defense of Ukraine. The results of this analysis confirm the importance of creating a special academic course “Culture of Safety of Professional Activity”. Thus, the study of the state of formation of CSPA in future occupational safety engineers allowed us to conclude that the substantive components of CSPA we identified are represented partly in the above institutions of higher education. The results of the analysis of educational and professional programs for training of occupational safety engineers show that in each institution of higher education there are differences in the list of subjects and the number of hours; the substantive components of the CSPA are not sufficiently disclosed; there is a need for designing the content and developing the educational and methodological support of the special academic course, as well as disciplines that are part of the ergonomic, communicative, health-preserving components.

4 Conclusion

This study substantiates the state of formation of the culture of safety of professional activity in future occupational safety and health engineers. The study of the state of the culture of safety of professional activity allows us to draw the following conclusions: the formation of the culture of safety of professional activity in future occupational safety engineers is mostly spontaneous, not focused, and not enough attention is paid to updating the content of vocational training of occupational safety engineers with the component culture of safety of professional activity. It was found that the process of forming the culture of safety of professional activities of future safety engineers is carried out with a focus on traditional teaching methods. The results of the analysis of educational and methodical documentation show that: training of future occupational safety engineers needs to be improved in the educational and methodical aspect; the content, methods and technologies of theoretical and practical training do not provide the appropriate level of culture of safety of professional activity, which in the future will negatively affect the quality of their professional activities.

Thus, the study of educational and methodological documentation (educational and professional programs, curricula), monitoring the training of future occupational safety and health engineers suggests that: the content of the formation of CSPA in future occupational safety engineers needs to be updated with component CSPA; the formation of CSPA in future safety engineers should be improved in the teaching and methodological aspect; methods and technologies used in the training of future occupational safety engineers do not sufficiently contribute to the effective formation of CSPA. The results of the analysis of the researched problem testify to the need to significantly improve the formation of the culture of safety of professional activity in future safety engineers, which should be based on improving the system of professional knowledge and skills, professionally important qualities, improving approaches to the introduction of modern pedagogical technologies and innovative methods of the educational process of higher education institutions.

Analysis of the results of theoretical and experimental research confirmed the need and relevance of a thorough study on the formation of the culture of safety of professional activity in future occupational safety and health engineers. We see the prospect of further research in the development of a pedagogical system of formation of the culture of safety of professional activity in future occupational safety engineers, aimed at increasing and improving the motivational and value sphere, professional knowledge, skills and professionally important

qualities to prevent occupational injuries, gaining experience in safe professional activities and communication on occupational safety issues.

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Primary Paper Section: A

Secondary Paper Section: AQ