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Methods of diagnosing the motivational and value component of the culture of safety of professional activity of future occupational safety and health engineers

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ABSTRACT

The article presents the results of the study, which reveal the methods of diagnostics of the motivational and value component of the culture of professional activity among future engineers in occupational safety, and aims to study the impact of the pedagogical system of the culture of safety of professional activity in future safety engineers, at work on the formation of the motivational and value component. The students who specialized in "Civil safety" in the field of knowledge, specialization "Labor protection" (226 students in the control group and 221 students in the experimental group) in different regions of Ukraine participated in the research. The results of the study confirm significant positive changes in the levels of formation of the motivational and evaluative component of the safety culture of professional activity in future occupational safety engineers. According to the results of the pedagogical experiment, the effectiveness of the proposed author's measures during the implementation of the pedagogical system of formation of the safety culture of professional activity in future occupational safety engineers is proved.

KEYWORDS: Culture of safety of professional activity, vocational training, occupational safety and health engineer, Development strategies, vocational education.

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Métodos de diagnóstico del componente motivacional y valorativo de la cultura de seguridad en la actividad profesional de los futuros ingenieros en seguridad y salud en el trabajo

RESUMEN

El artículo presenta los resultados del estudio, que revelan los métodos de diagnóstico del componente motivacional y valorativo de la cultura de la actividad profesional entre los futuros ingenieros en seguridad del trabajo, y tiene como objetivo estudiar el impacto del sistema pedagógico de la cultura de la seguridad de la actividad profesional en futuros ingenieros de seguridad, en el trabajo sobre la formación del componente motivacional y valorativo. Participaron en la investigación los estudiantes que se especializaron en "Seguridad civil" en el campo de conocimiento, de la especialización "Protección laboral" (226 estudiantes en el grupo de control y 221 estudiantes en el grupo experimental) en diferentes regiones de Ucrania. Los resultados del estudio confirman cambios positivos significativos en los niveles de formación del componente motivacional y valorativo de la cultura de seguridad de la actividad profesional en los futuros ingenieros de seguridad laboral. De acuerdo con los resultados del experimento pedagógico, se comprueba la efectividad de las medidas de autor propuestas durante la implementación del sistema pedagógico de formación de la seguridad de la cultura de la actividad profesional en los futuros ingenieros de seguridad en el trabajo.

PALABRAS CLAVE: Cultura de seguridad de la actividad profesional, formación profesional, ingeniero de seguridad y salud en el trabajo, estrategias de desarrollo, formación profesional.

Introduction

United Nations General Assembly Resolution of September 25, 2015 “Transforming our World: The 2030 Agenda for Sustainable Development” (UN General Assembly Resolution Transforming Our World: The 2030 Agenda for Sustainable Development, 2015), Draft Sustainable Development Strategy of Ukraine by 2030 (Sustainable Development Strategy of Ukraine by 2030: Draft, 2019), Conventions and reports of The International Labor Organization focuses on the need to assess occupational risks at work and implement

measures to prevent occupational injuries in order to reduce accidents and occupational diseases. Given this, the formation of the culture of safety of professional activity (hereinafter referred to as CSPA) in future occupational safety engineers, as main managers in the field of occupational safety in organizations, is an important component of their training.

The concept of "safety culture" was first introduced in 1986 by the International Atomic Energy Advisory Group (INSAG) of the International Atomic Energy Agency (IAEA), which in its report concluded the need to develop the culture of safety as the main safety principle of nuclear power plants (INSAG-4, 1991). The concept of the culture of safety was later supported by the International Labor Organization, the International Civil Aviation Organization, and the World Health Organization.

Theoretical analysis of scientists' views on this problem shows that the formation of CSPA among future occupational safety and health engineers as a subject of research has always been at the center of philosophical, noxological, economic, sociological, psychological, environmental and pedagogical research. In particular, it is established that from the standpoint of philosophy, the safety culture is seen as the security of the individual and the security of the state, philosophical understanding of the culture of safety lays the foundation for the development of such a direction as "safety philosophy" (Rybalkin, N. N., 2006), Fetisova, Yu. V., 2009). Noxological science promotes the development of risk-oriented thinking (Uglanova, V. Z., 2019), sociological science facilitates the formation of corporate values in the field of safety, as well as norms of safe behavior in the workplace (Doroshenko, V. A., Zhartaev, E. M., & Sekacheva, A. A., 2016, Kuznetsov, V. N., 2002). Economics considers the culture of safety as one of the methods of prevention of occupational injuries (Marchishina, Y. I., Melnik, V. V., & Sapura, N. V., 2016). In psychological and pedagogical research, the safety culture is associated with the role of the human factor in accidents at work, human behavior in dangerous situations, the theory of staff motivation, psychological methods of improving occupational safety, psychological climate in the team, organizational culture (Griffin, M. A., & Neal, A., 2000, Gutsykova, S. V., 2016, Zohar, D., 2000). At the same time, it was found that in the vast majority of scientific pedagogical works the safety culture is considered through the culture of life safety, culture of personal safety, culture of social

security, methods and forms of teaching or education (Gorbunova, K. M., & Kurepin, V. M., 2018, Ignatenko, S. A., 2019, Kuzmenko, O. S., 2017 Kulalaeva, N. V., 2018, Sharovatova, O. P., 2018). However, no fundamental work has been found on the formation of the culture of safety of professional activity directly among future occupational safety engineers. The results of the study of the formation of the culture of safety of professional activity in future occupational safety engineers indicate an insufficient level of theoretical development and practical implementation of solutions to this problem.

In the course of scientific research of this problem, we came to the conclusion that the CSPA of a future safety engineer is an integrative complex of the personality of a specialist, which is expressed in values to preserve life, working ability and health in the workplace; reflects the system of professional knowledge, skills, professionally important qualities for the prevention and prevention of occupational injuries, is characterized by a high degree of responsibility, self-organization and self-development, based on a deep awareness of safety priorities in solving professional problems (Abiltarova E. N., 2019). To the structural component of the CSPA of the future occupational safety engineer, we have included the following components:

– motivational and value (value orientations and attitudes, motives for safe professional activity);

– cognitive (knowledge of laws, regulations and standards in the field of labor protection);

– activity (ability to identify and assess hazards and risks to safety and health at work;

– ability to prevent hazards, accidents; ability to determine the adequacy of planned and effective measures to protect against hazards and risks;

– skills and abilities to use safe methods and tools);

– personal (professionally important qualities and abilities that ensure the safety of professional activity in the workplace).

In order to form certain components, we have developed a pedagogical system for the formation of CSPA in future occupational safety engineers, aimed at increasing and improving the motivational and value sphere, professional knowledge, skills and professionally

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important qualities to prevent occupational injuries, gain experience in safe professional activity and communication on occupational safety at the appropriate stages of its implementation (project, process-technological, evaluation-reflective) during the study in higher education institutions through the implementation of goals (general, strategic, tactical, final); content of formation (labor protection, organizational and managerial, legal, ergonomic, health, communicative); forms of organization of educational activities that provide interaction (problem lecture, lecture-visualization, lecture-dialogue, lectures-discussions, lectures one to one, practical and laboratory work of interactive work, workshops, problem seminars); methods (problem, moderation, training, brainstorming, professional activity modeling); interactive pedagogical technologies (games, technologies of cooperation, project, case studies, technologies of vitagenic training, information and communication); complex of educational and methodical support. In this article we aim to present the methods of diagnosing the motivational and value component of CSPA in future occupational safety engineers and reveal the results of experimental testing of the impact of pedagogical system of formation of CSPA in future occupational safety and health engineers on the formation of motivational and value component of CSPA.

1. Research methodology and methods

In order to test the influence of the pedagogical system of CSPA formation of future occupational safety and health engineers on the formation of CSPA components, we used a pedagogical experiment which covered three stages: ascertaining, formative and generalizing.

At the ascertaining stage of the experiment, we determined the criteria and indicators for diagnosing the level of formation of CSPA in future safety engineers; control and experimental groups were formed; the analysis of the current level of development of needs and motives in CSPA, formation of professional knowledge and skills, professionally important qualities is carried out. At this stage of the study, the following methods were used: statement experiment; study and generalization of pedagogical experience; interviews, questionnaires, conversations, self-assessment, and method of expert assessments, quantitative and qualitative analysis.

The formative stage of the pedagogical experiment included substantiation, development and testing of the pedagogical system of CSPA formation among future occupational safety engineers; final diagnosis of the results of approbation of the pedagogical system, determination of the levels of formation of CSPA in future occupational safety engineers. During the formative experiment we used the following research methods: pedagogical formative experiment, modeling, constructing self-assessment, expert assessment, conversation, observation, questionnaire, statistical analysis of the obtained data.

The generalizing stage of the experiment included statistical and quantitative descriptive analysis of the experimental results, systematization and generalization of the results of the experimental research. At this stage of the study, we used the following methods: methods of measurement and mathematical processing, qualitative and quantitative analysis, graphical interpretation of the data.

The pedagogical experiment was carried out in higher education institutions of six regions of Ukraine (Volyn, Zaporizhia, Khmelnytsky, Lviv, Rivne and Kharkiv regions). Students majoring in 263 "Civil Security" in the field of knowledge 26 "Civil Security" with specialization in "Labor Protection" (226 students of the control group and 221 students of experimental group) were involved in the pedagogical experiment. In addition, 127 teachers of higher education institutions and 112 occupational safety and health engineers of industrial enterprises and organizations took part in the study.

Given that the purpose of this article is to present and substantiate the results of the pedagogical experiment to diagnose the levels of CSPA in future occupational safety and health engineers by motivational and value criteria, we will further present the method of diagnosing motivational and value component. Thus, to determine the initial level of motivational and value component of CSPA in future occupational safety engineers the following methods were used:

– methods of assessing the "hierarchy of person's needs of A. Maslow";

– methods of assessing the motivation for success and fear of failure (N. Bordovskaya, A. Rean);

– methods of A. Rean and V. Yakunin in the modification by N. Badmaeva;

– self-assessment questionnaire on the formation of the motivational and value criterion of CSPA of future occupational safety engineers.

According to the method of assessing the "hierarchy of person's needs of A. Maslow", we obtained the results that characterize the distribution of the degree of importance of the need for professional safety among students (Raygorodsky, D. Ya., 2001). Answers in the methodology to the questions 2, 3, 9, and 19 allowed identifying the degree of formation of security needs from the presented list of needs: physiological needs, security needs, social needs, needs for respect, the need for self-expression. The sum of points for each type of need allowed us to track the structure of the hierarchy of needs. In general, out of the five possible degrees of hierarchy, it was accepted to assign 5 and 4 degrees to the low (basic) level (assignment of 1 and 2 points, respectively), to the middle (sufficient) level – 3 degrees (assignment of 3 points), to the high level – 2 and 1 degree with 4 and 5 points.

In the course of the research and experimental work, motivational advantages in students' educational activities were evaluated as the third indicator of the motivational component. The assessment was carried out according to the method of A. Rean and V. Yakunin in the modification of N. Badmaeva (Rean, A. A., Bordovskaya, N. V., & Rozum, S. I., 2002) from 1 to 5 points: up to 2.5 points – basic (reproductive) level, up to 3.75 points – sufficient (constructive) level, up to 5 points – high (creative) level). This technique allowed to identify the presence of communicative, professional, social, educational and cognitive motives, as well as motives for avoidance, prestige and creative self-realization.

The study used a method of assessing the motivation for success and fear of failure (N. Bordovskaya, A. Rean) (Rean, A. A., Bordovskaya, N. V., & Rozum, S. I., 2002). If the number of points ranged from 1 to 7, the motivation of fear of failure was stated. The sum of 8 to 13 points indicated that the motivational pole is not clearly expressed. However, for the number of 8–9 points, the benefits are shifted to the motivation of fear of failure, while for the number of 12–13 points – to the motivation of success. The sum of points from 14 to 20 allowed to state the motivation for success. The results of this technique are analyzed together with a methodology that demonstrates the attitude to risk. Researchers (D. McClemand, F. Burcard) claim that people with a high fear of accidents (fear of failure)

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are more likely to find themselves in similar situations than those who are highly motivated to succeed. Setting on protective behavior at work depends on the degree of perceived risk, the predominance of motivation and experience of failure at work (Raygorodsky, D. Ya., 2001).

In addition, the block of diagnostic methods included the questionnaire of self-assessment of the formation of motivational and value criterion of CSPA of future safety engineers, where students were asked to self-assess the level of formation of motivational and value criterion for each of the indicators on a 9-point scale. 1 point is assigned if the indicator is not formed, and 9 points if fully formed.

2. Results and discussion

Motivational and value component of the formation of CSPA in future occupational safety engineers provides motivation and focus of the safety engineer on the formation of safety culture and its further development in professional activities. This component is expressed in the value attitude to their own health and life, increased motivation to maintain health and life in the workplace, a positive attitude to health and safety requirements and the desire to implement and comply with them, focus on interaction and partnership in the development of conscious safety culture of employees, the pursuit of self-improvement.

To diagnose the levels of formation of the motivational component of CSPA in future occupational safety engineers, a motivational and value criterion was chosen, which includes the following indicators:

– value attitude to one's own health and healthy lifestyle;

– awareness of the value of human life in the process of work;

– positive attitude to legislative and regulatory requirements on labor protection;

– the need for conscious compliance with legal norms in the field of labor protection and a positive attitude to perform professional activities taking into account safety requirements;

– expressed interest in the rational organization of the workplace and work space;

– degree of understanding of the need to ensure and practical implementation of occupational safety at all levels of occupational safety management;

– positive motivation for communicative interaction and partnership in the field of developing the conscious culture of safety among employees;

– a strong desire of self-improvement of their own level of safety culture.

To differentiate the developed criteria and indicators of the formation of the motivational component of CSPA of future occupational safety engineers, we have identified the following levels of CSPA of future occupational safety engineers: basic (reproductive), sufficient (constructive) and high (creative).

At the ascertaining stage, the research of the level of formation of the motivational component of CSPA of future occupational safety and health engineers was carried out. The results of the study are presented in Table 1.

As can be seen from the data presented in the table at the ascertaining stage of the experiment, most students have the basic (reproductive) and sufficient (constructive) level of formation of the indicators of motivational and value component of CSPA of future safety engineers.

Table 1. The results of diagnosing the levels of formation of CSPA of future occupational safety and health engineers by motivational and value criterion (at the ascertaining stage of the experiment)

Indicators	Groups / Total number of people	Levels						χ^2
		Basic (reproductive)		Sufficient (constructive)		High (creative)		
		Number of respondents, persons	Relation to the total number of respondents,%	Number of respondents, persons	Relation to the total number of respondents,%	Number of respondents, persons	Relation to the total number of respondents,%	
1. Value attitude to one's own health and healthy lifestyle; awareness of the value of human life in the process of work	CG	79	35.0	113	50.0	34	15.0	0.2182
	EG	80	36.2	111	50.2	30	13.6	
2. Positive attitude to legislative and regulatory requirements of labor protection; the need for conscious observance of legal norms in the field of labor protection and a positive attitude to the performance of professional	CG	61	27.0	139	61.5	26	11.5	0.3144
	EG	59	26.7	140	63.3	22	10.0	

activities taking into account safety requirements								
3. Expressed interest in the rational organization of the workplace and work space; the degree of understanding of the need to ensure and practically implement the labour safety at all levels of occupational safety management	CG	69	30.5	139	61.5	18	8.0	0.5664
	EG	72	32.6	135	61.1	14	6.3	
4. Positive motivation for communicative interaction and partnership in the field of developing the conscious safety culture of employees	CG	54	23.9	156	69.0	16	7.1	0.8681
	EG	52	23.5	148	67.0	21	9.5	
5. Steady aspiration for self-improvement of one's own level of safety culture	CG	93	41.2	96	42.5	37	16.4	0.154
	EG	95	43.0	91	41.2	35	15.8	
The general level of formation of the component	**CG 226**	**71**	**31.5**	**129**	**56.9**	**26**	**11.6**	0.0941
	EG 221	**72**	**32.4**	**125**	**56.6**	**24**	**110**	

Analysis of the results of the diagnosis showed that the majority of students (50.0 % in CG and 50.2 % in EG) have the sufficient (constructive) level of values to their own health and healthy lifestyle and awareness of the value of human life in the workplace. It should also be noted that 45.2 % of CG students and 41.2 % of EG students have the sufficient (constructive) level of desire to self-improve their own level of safety culture. The number of students on the indicator of "positive attitude to legislative and regulatory requirements of labor protection; the need for conscious observance of legal norms in the field of labor protection and a positive attitude to the performance of professional activities taking into account safety requirements" with a basic and sufficient level is 27.0 % and 61.5 % in CG, and 26.7 % and 63.3 % in EG respectively. This indicator at a high (creative) level is 11.5 % in CG, and 10.0 % in EG.

The similar situation is observed in the analysis of the indicator of "positive motivation for communicative interaction and partnership in the field of developing the conscious safety culture of employees". In CG, the basic level and sufficient level are 23.9 % and 69.0 %, respectively, in EG – 23.5 % and 67.0 %. On the background of the indicators of positive motivation and lack of awareness of the need for safety, the indicator of "expressed interest in

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the rational organization of the workplace and work space; the degree of understanding of the need to ensure and practically implement the labour safety at all levels of occupational safety management" is also manifested mainly at the basic and sufficient levels. In CG and EG, the basic (reproductive) level of this indicator is 30.5 % and 32.6 %, respectively, with a share of sufficient (constructive) level of 61.5 % and 61.1 %.

The results of mathematical processing showed that at the beginning of the experiment CG and EG were identical on the motivational and value component. The tabular data show that $\chi 2_{emp} = 0.0941 < \chi 2_{cr} = 5.99$, i. e. the differences are considered insignificant, which proves, respectively, the homogeneity of the sample. In addition, the table presents statistical data on individual indicators of this component, thus, for the indicator #1 $\chi^2_{emp} = 0.2182 < \chi^2_{cr} = 5.99$, for the indicator #2 $\chi^2_{emp} = 0.3144 < \chi^2_{cr} = 5.99$, for the indicator #3 $\chi^2_{emp} = 0.5664 < \chi^2_{cr} = 5.99$, for the indicator #4 $\chi^2_{emp} = 0.8681 < \chi^2_{cr} = 5.99$, for the indicator #5 $\chi^2_{emp} = 0.1546 < \chi^2_{cr} = 5.99$. Accordingly, the characteristics of the compared samples for the motivational and value component as a whole (as well as for a single indicator) at the ascertaining stage coincides with the level of significance $p = 0.05$.

Thus, at the ascertaining stage of the study, the generalized indicators of the levels of the formation of CSPA among future occupational safety engineers according to the motivational and value criterion in CG and EG have insignificant deviations (Figure 1).

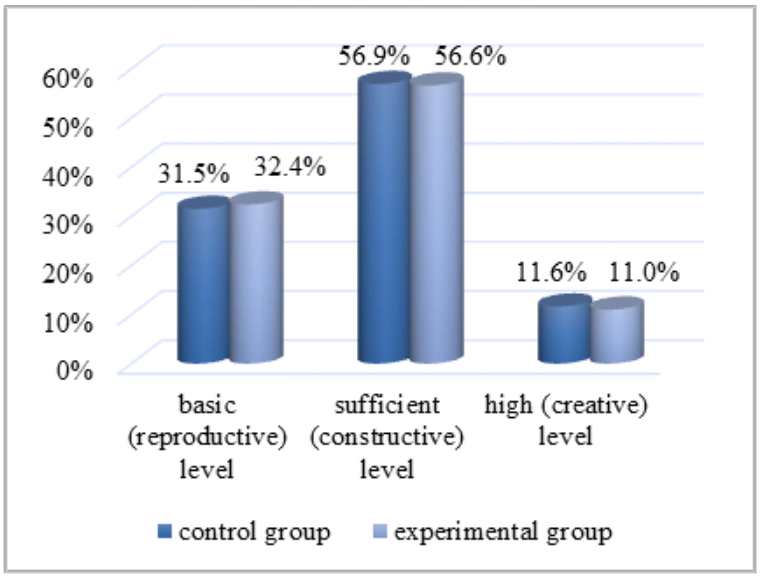
Thus, it can be stated that at the beginning of the experiment the students of CG and EG groups both did not have the need of professional safety formed. The results of the analysis showed that students demonstrate a propensity for risk and, as a result, may risk their health and lives. This is because the risk-taking is directly related to the number of mistakes made. In addition, the insufficient need for conscious observance of legal norms in the field of labor safety and positive attitude to lead professional activities with the consideration of safety requirements may be manifested in the absence or lack of interest in safety issues, which ultimately adversely affects professional choices between dangerous and safe activities.

In general, the study of the motivational and value component suggests that at the beginning of the formative experiment, students show a clear lack of understanding of the

importance of security issues and lack of interest in them in the context of majoring I 263 "Civil Security" in the field of knowledge 26 "Civil Security" of "Labor Protection" specialization. Thus, the data obtained at the ascertaining stage of the experiment, showed the need for the formation of CSPA in future occupational safety and health engineers on the motivational and value criterion.

The results of diagnosing the levels of formation of CSPA in future safety engineers by motivational and value criteria at the formative stage are presented in Table 2. As can be seen from the data presented in the table, at the formative stage, students of CG still have a basic and sufficient level of formation of indicators of the motivational and value component of CSPA.

Figure 1. Generalized results of diagnosing the levels of the formation of CSPA of future occupational safety and health engineers by motivational and value criterion (at the ascertaining stage of the experiment)



Thus, the indicator "value attitude to one's own health and healthy lifestyle" in the CG is demonstrated at the level of 33.0 % and 50.4 %. However, in EG, despite the fact that the sufficient level of this indicator is 34.5 %, the high level reached 50.0 %. The number of students in the CG at a high level on this indicator is 16.5 %. The most tangible positive changes have taken place in the formation of a lasting desire for self-improvement of one's

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own level of safety culture.

Comparative analysis (Table 3) of the results of the ascertaining and formative stages of the study of CSPA of future safety engineers of CG and EG on the indicators of motivational and value criterion made it possible to identify dynamic changes in the levels of values, motives and aspirations to master CSPA, in particular, more significant positive changes occurred in EG students. Compared to the results of CG respondents, the share of EG students with the high (creative) level of formation of the motivational and value component of CSPA in future safety engineers is higher by 29.2 %; with the sufficient (constructive) level is lower by 13.2 %; with the basic (reproductive) level is lower by 16.0 %.

The analysis of the levels of formation of the motivational and value component of CSPA of future occupational safety and health engineers shows the presence of effective positive changes. In particular, the number of students with the high (creative) level of formation of CSPA in future safety engineers on the motivational and value criterion at the formative stage in EG is 43.8 %, which is 32.8 % more than the results of the statement stage; with the sufficient (constructive) level is 43.5 %, which is 13.1 % less than the results of the statement stage; with the basic (reproductive) level is 12.7 %, which is 19.7 % less than at the ascertaining stage (Table 3).

According to the results of mathematical processing, after the experiment there were differences in CG and EG. The tabular data show that $\chi 2$ emp = 49.1318 > $\chi 2$ cr = 5.99. Accordingly, the reliability of the differences of the compared samples by the motivational component with the significance level p = 0.05 is confirmed. In addition, the table presents statistical data on individual indicators of this component ($\chi 2$ emp = 58.2786; 56.5512; 34.8547; 43.1741; 62.1150 > $\chi 2$ cr = 5.99). Thus, it is possible to assert a statistical significance of differences for the level of ρ = 0.05 in CG and EG after the experiment, both for individual indicator and for the component as a whole.

To illustrate the data in Table 3 and to display of the dynamics of changes in the levels of formation of CSPA of future occupational safety engineers on the motivational and value criterion, we present a diagram (Figure 2). The results of the diagram analysis show that the increase in indicators that characterize the high (creative) level and, accordingly, the decrease

in indicators that correspond to the sufficient (constructive) and basic (reproductive) levels are more represented in students of the experimental group.

The data of comparative analysis show that the indicators of the motivational and value component of CSPA of future occupational safety and engineers in traditional training are also formed, but the process is carried out sporadically and is not systemic. However, it is clear that students are changing their attitude to the problems of awareness of the value of human life in the process of work, and they began to understand what may be the consequences of non-compliance with safety requirements. Increasing interest in safety issues has affected awareness of the need for safety.

Table 2. The results of diagnosing the levels of formation of CSPA of future occupational safety engineers by motivational and value criterion (at the formative stage of the experiment)

Indicators	Groups / Total number of people	Levels						χ^2
		Basic (reproductive)		Sufficient (constructive)		High (creative)		
		Number of respondents, persons	Relation to the total number of respondents,%	Number of respondents, persons	Relation to the total number of respondents,%	Number of respondents, persons	Relation to the total number of respondents,%	
1. Value attitude to one's own health and healthy lifestyle; awareness of the value of human life in the process of work	CG	74	33.0	113	50.4	37	16.5	58.2786
	EG	34	15.5	76	34.5	110	50.0	
2. Positive attitude to legislative and regulatory requirements of labor protection; the need for conscious observance of legal norms in the field of labor protection and a positive attitude to the performance of professional activities taking into account safety requirements	CG	57	25.4	136	60.7	31	13.8	56.5512
	EG	21	9.5	101	45.9	98	44.5	

3. Expressed interest in the rational organization of the workplace and work space; the degree of understanding of the need to ensure and practically implement the labour safety at all levels of occupational safety management	CG	63	28.1	130	58.0	31	13.8	34.8547
	EG	26	11.8	118	53.6	76	34.5	
4. Positive motivation for communicative interaction and partnership in the field of developing the conscious safety culture of employees	CG	49	21.9	145	64.7	30	13.4	43.1741
	EG	21	9.5	112	50.9	87	39.5	
5. Steady aspiration for self-improvement of one's own level of safety culture	CG	78	34.8	111	49.6	35	15.6	62.11
	EG	38	17.3	71	32.3	111	50.5	
The general level of formation of the component	CG 224	**64**	**28.7**	**127**	**56.7**	**33**	**14.6**	49.1318
	EG 220	**28**	**12.7**	**96**	**43.5**	**96**	**43.8**	

Table 3. Dynamics of CSPA formation levels of future occupational safety and health engineers according to the motivational and value criterion (at the ascertaining and formative stages of the experiment)

Levels	Ascertaining stage of the experiment				Formative stage of the experiment				Dynamics, %	
	Control groups		Experimental groups		Control groups		Experimental groups			
	Number of respondent, persons	Relation to the total number of respondents,%	Number of respondents, persons	Relation to the total number of respondents,%	Number of respondents, persons	Relation to the total number of respondents %	Number of respondents, persons	Relation to the total number of respondents %	Control groups	Experimental groups
High creative	26	11.6	24	11.0	33	14.6	96	43.8	+3.0	+32.8
Sufficient constructive	129	56.9	125	56.6	127	56.7	96	43.5	-0.2	-13.1
Basic reproductive	71	31.5	72	32.4	64	28.7	28	12.7	-2.8	-19.7
Total	**226**	**100**	**221**	**100**	**224**	**100**	**220**	**100**		

Figure 2. Dynamic changes in the levels of formation of CSPA of future occupational safety and health engineers by motivational and value criterion

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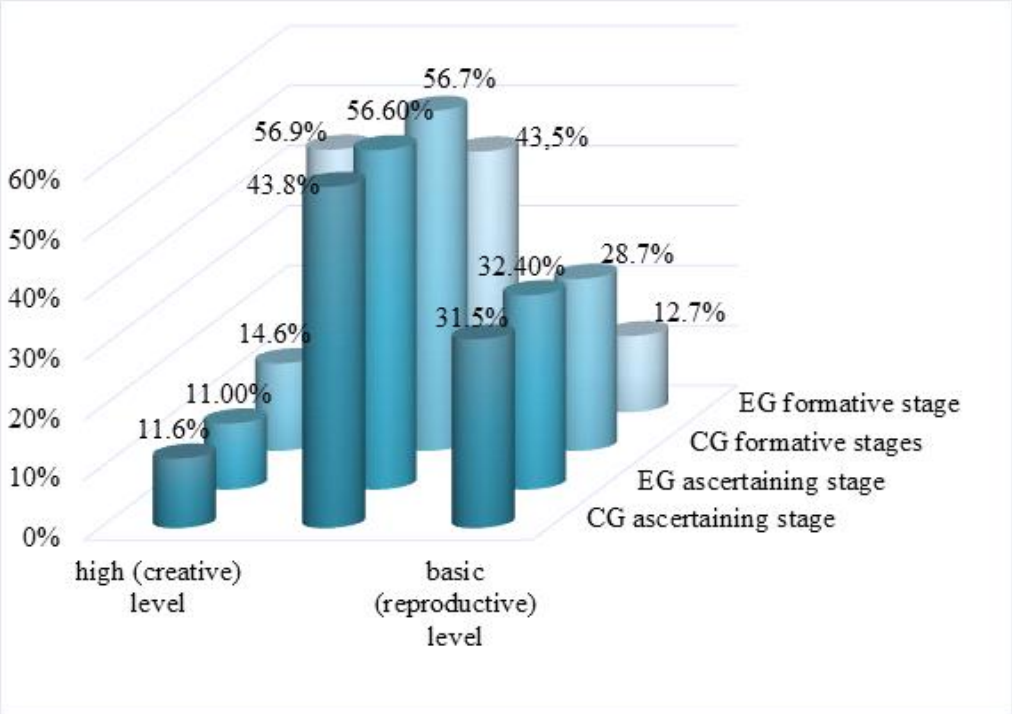

Conclusion

The pedagogical experiment on the problem of formation of CSPA of future occupational safety and health was implemented, during which the real state of formation of CSPA in future safety engineers was determined according to the motivational and value criterion. Experimental verification of the effectiveness of the pedagogical system of CSPA formation in future safety engineers showed that there was a significant increase in the levels of CSPA formation according to the motivational and value criterion. The use of innovative technologies, distance learning systems, training technologies, cases contribute to the formation and development of important motivational and value orientations of future occupational safety engineers (value of their own health and healthy lifestyle; awareness of the value of human life in the work process; positive attitude to the legislative and regulatory requirements on labor safety; expressed interest in the rational organization of the workplace and work space), which form the foundation for sustainable development of applicants, for

the formation of a person with a safe mindset and conscious attitude to their own safety and the safety of the whole team, a high level of responsibility.

The results of the analysis of the levels of formation of CSPA of future occupational safety engineers in CG and EG, which were obtained in the process of ascertaining and forming stages of the experiment, testify to the effectiveness of the proposed author's measures and give grounds to assert the effectiveness of the developed pedagogical system of formation of CSPA of future occupational safety and health engineers in higher education institutions.

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