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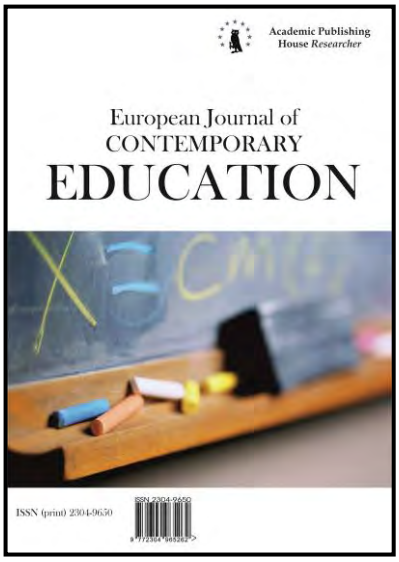

Research of Educational Results of Subject-Profile Training of Bachelor's Education in the Field of Life Safety

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Abstract

This article is devoted to the presentation of the results of four years experimental' work in the form of analysis of subject-profile training of bachelors of education in the field of life safety. The presented experience is based on the results obtained during the design and implementation of curricula 2015, 2016, 2017 and 2018 in the practice of implementing the main professional program of training Bachelors in Security education Life at the Faculty of Life Safe, Herzen State Pedagogical University of Russia.

The theoretical part is presented in the form of justification of the methodological basis for the development of subject-profile training through the following approaches to the organization of training of future teachers in the field of life safety: systemic, culturology, anthropological, integrative, synergetic, axiological, environmental.

The practical part of the description of the experiment includes: the essence and content of the design, which is presented in the form of substation modules subject-profile training of future teachers of life safety fundamentals and presented in the form of an annual analysis of the educational results of bachelors of education in the field of life safety for each educational module (Basics of military service, Human social security, Protection of the person in emergency situations, Safety of Life in the Technosphere, Fundamentals of medico-valeological knowledge, Fundamentals of psychological safety in emergency situations, Environmental safety).

The article presents the results of the annual analysis of the educational results of each academic year (stage) of subject-specific training, which was accompanied by the diagnosis of educational results. In constructing the analysis of educational results, the authors provided the following methods: – testing (parametric quantitative statistics, reflecting the level of theoretical knowledge of students in the subject-profile training); – solving a situational problem (reflects the ability of students to act in specified dangerous and emergency situations of various types);

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– professional task for the construction of the educational process (reflects the ability to apply subject-specific knowledge of safety in the design of pedagogical activities).

The diagnostic results (2015, 2016, 2017 and 2018) are presented in a comparative table indicating the results obtained for each module according to the traditional state system of points from 3 to 5 points.

Keywords: higher pedagogical education, subject-profile training, the field of life safety, State Educational Standards Higher Professional Education.

1. Introduction

The theory and practice of development of higher pedagogical education in the field of life safety allows possible to speak about the multidimensional the phenomenon of life safety (Stankevich et al., 2017). Spiking as an integral subject area of knowledge, life safety is global in nature and needs constant transformation of scientific knowledge, including the system of subject-profile training of Bachelors of education in the field of life safety.

At the present time it becomes obvious that at the present stage of development of higher pedagogical education in the field of life safety there is a problem related to necessity of constant updating of the content part Subject-profile training of bachelors. According to S. Abramova, the orientation of higher pedagogical education in the field of life safety lags behind the requirements of the national security of Russia due to the fact that human activity is caused by the constant appearance of new dangers and threats (Abramova, 2014). At the same time, it becomes obvious that the emergence of new dangers and threats requires the development of new, more advanced methods and mechanisms for the protection of man, the natural environment, and, as a result, leads to an adjustment of the subject-specific content of bachelor education in life safety.

The genesis of higher pedagogical education in the field of life safety allows to assert that the essential role in the construction of basic professional educational programs has been made by State Educational Standards of Higher Professional Education (SES HPE) and Federal State Educational Standards of Higher Education (FSES HPE and FSES HE). Education in the field of life safety is no exception. The Federal State Educational Standard of Higher Education of the third generation 3 + (hereinafter FSES HE 3 +) (Aver'yanov, 1985) is of fundamental importance for the construction of the structure and content of the curricula.

Table 1. Standardization of higher pedagogical education in the field of life safety from the beginnings to the present day

Year	Standards of higher pedagogical education in the field of life safety
before 1994	Not exist
1995	SES HPE 030400 – specialist degree (physical and preliminary military training)
2000	SES HPE 033300 – specialist degree (health and Life Safety)
2005	SES HPE 033300 – specialist degree (health and Life Safety)
2005	SES HPE 540100 – bachelor's and master's degree (natural Science education): 540107 profile «Health and Life Safety», 540107 M
2009	FSES HPE 050100 – Pedagogical education B (bachelor level)
2010	FSES HPE 050100 – Pedagogical education M (master's degree level)
2011	FSES HPE 050100 – Pedagogical education B
2015	FSES HE 44.03.01, 44.04.01, 44.06.01 Pedagogical education (3+) (bachelor, master and postgraduate levels)
2016	FSES HE 44.03.05 Pedagogical education (3+) (bachelor level)
2018	FSES HE 44.03.01, 44.03.05, 44.03.01 Pedagogical education (3++) (bachelor and master levels)

Implementation of the FSES HE 3 + in educational practice of training Bachelors of Education was the beginning of experimental work on the development of subject-profile training of bachelors (direction 44.03.01 Pedagogical Education, Orientation (Profile) "Education in the field of Life safety"), implemented in the period from 2015 to 2018.

2. Materials and methods

The following theoretical and empirical methods were used to solve the problems of the study:

Theoretical methods: analysis of psycho-pedagogical, educational and methodical literature on the problem of research; analysis of normative-legal documentation and local normative-legal documents of the University; studying and generalization of pedagogical experience of construction and realization of educational plans and the basic professional educational programs of the educational field of life safety; modeling and design of curricula and basic professional educational programs; comparison; generalization.

Empirical methods: observation, questioning, pedagogical experiment.

Pearson's chi-square test is used for statistical data analysis.

The presented experience is justified by the results obtained during the design and implementation of curricula in 2015, 2016, 2017 and 2018 in the practice of the main professional program training of bachelors of education in the field of life safety at the faculty of life safety at Herzen State Pedagogical University of Russia. The experience in the implementation of the subject-profile training in 2017 was the most satisfying to the needs of the developers, therefore it is presented in the most detail as a reference for the FSES HE 3 + and was re-proposed for implementation when recruiting entrants in the next year.

The number of students under the bachelor's program (focus (profile) "Education in the field of life safety") was 1025 people (of which 268 students in 2015, 276 in 2016 and 481 in 2017/2018). For realization of disciplines (modules) and practice of subject-profile preparation on the basis of 2 groups of students, it is necessary to involve 34 scientific-pedagogical workers at 3.7 rates, including on part-time and on the base of civil law contract in order to attract highly specialized specialists to improve the quality of education in the field of life safety.

To compare the volumes allocated for the implementation of subject-profile training of bachelors (presented in credit units), we give a description of the data from the relevant curricula.

Table 2. Number of credits allocated for the study of subject-profile training modules in 2015–2018

Modules/years and number of credits	2015	2016	2017, 2018
Basics of military service	7	7	9
Human social security	18	20	21
Protection of the person in emergency situations	15	16	15
Safety of life in the Technosphere	14	14	15
Fundamentals of medical-valeological knowledge	17	17	24
Fundamentals of psychological safety in emergency situations	10	10	12
Environmental safety	-	-	15

3. Discussion and results

The concept of higher pedagogical education in the field of life safety, the most important components of which (apart from psycho-pedagogical and methodical preparation) are understanding the reasons and solutions to the key problems and dangers of the modern world, ability to see and analyze components of the Technosphere systems, possibilities and mechanisms of their interaction. In this regard, the development of subject-profile training is impossible on the one hand – without reliance on the rich heritage of the past, and on the other – without taking into account modern directions of education in the field of life safety, innovative processes in the world and domestic pedagogy and psychology, as well as without taking into account the methodological foundations and approaches to the content and organization of the learning process in a modern University.

As a methodological basis for the development of subject-profile training we considered the following approaches: systemic, culturology, anthropological, integrative, synergetic, axiological, environmental (Abramova, 2014; Aver'yanov, 1985; Afanas'ev, 1980; Blauberg, 1975; Federal'nyi gosudarstvennyi obrazovatel'nyi standart; Gaisina, 2002; Gundyreva, Gundyrev, 2007; Mikhailov, 2003; Novikov, 2005; Solomin i dr., 2011).

The system approach acts as one of the fundamental approaches in the pedagogical theory and practice of teaching. Studied and described in detail by V.G. Afanasyev, A.I. Averyanov, I.V. Blauberg, V.I. Sadovsky, E.G. Yudin, etc. With regard to the problem of determining the content of subject-profile training in the field of life safety, it is expressed by the relationship and interdependence of man, nature and society in the co-adaptive and co-evolutionary relationships between them (Afanas'ev, 1980; Blauberg, 1975; Federal'nyi gosudarstvennyi obrazovatel'nyi standart; Gaisina, 2002; Gundyreva, Gundyrev, 2007; Zagvyazinskii, 2008).

The cultural approach is focused on the preservation and development of the continuity of the values of safety culture and health of the person. According to the concept of cultural approach to the formation of the content of education (M.N. Skinkin, I.J. Lerner, V.V. Kraevsky) the source of formation of the content of education is culture, that is the most important form of socio-cultural experience (Mikhailov, 2003; Novikov, 2005).

The anthropological approach binds together a complex of extensive knowledge about man (anthropology, humanitarian geography, biology, ecology, etc.), orients the education system to the knowledge of the natural and sociocultural factors of its development in systemic interaction with nature, society and one's own "I." O.V. Cherkasova emphasizes that the anthropological approach will allow us to look at the problem of human education in the complex (Solomin i dr., 2011).

The idea of integrative approach is reflected in all the content of the subject area of life safety, which is a highly integrated area of knowledge, and therefore in the development of curricula of the main professional Educational programs on similar training profiles (Federal'nyi gosudarstvennyi obrazovatel'nyi standart). Education in the field of life safety, implemented on the basis of this approach, is part of global education, based on interdisciplinary content, involves the integration of natural science and humanitarian areas of knowledge.

Synergetic approach allows us to study the fundamental properties of the system of the external world that allows to form the conceptual basis of integration of various scientific knowledge about safety and health protection around fundamentally new Methodology of cognition this forms the worldview and new ideas about the complex of dangers to man and society in conditions of instability on the planet, their causes and necessary security measures.

The axiological approach considers values as the most important component of material and spiritual culture of the person, implies its active activity position, humane attitude to life, health as values of higher order. Without this approach, it is impossible to create a culture of human security in which the need for security is fundamental, since it is impossible to realize both biological and social needs of the person (Cherkasova, 2019).

The noxological approach includes a set of principles, scientific concepts, methods of study, description, design, forecasting, transformation of objects of danger in order to take protective measures necessary to ensure the safety of man, society and nature (Yudin, 1978).

The ecological approach acts as one of the fundamental ones in shaping the bachelor's curriculum, and educating a person with an understanding of the material and spiritual values of nature as the basis of life on Earth, having personal experience in protecting the natural environment, and the need for careful communication with nature is a fundamental task of education at all levels.

Thus, it should be noted that as the basic approaches of formation of the educational plan of preparation of bachelors on a profile "Education in the field of life safety", we considered differentiation of all types of disciplinary and interdisciplinary training.

The structure of the variative part of disciplines consists of modules aimed at forming competencies for solving a group of tasks of professional activity. We consider it necessary to briefly present their content with an indication of the overall labor intensity, forms of control and the competencies that are being formed (according to the Federal State Educational Standard of Higher Education of the third generation 3 +).

Module 1 "Basics of military service" combines disciplines that focus on the study of topical issues related to the organizational and legal aspects of state defense and preparing young people for military service. Much attention is paid to practice-oriented issues of organization and training of young people in the field of state defense.

Table 3. Content of module 1 "Basics of military service"

№	Name of disciplines	Credit unit/hour	Forms of control	Competences
1.	Organizational and legal bases of preparation for military service	4/144	exam	GC-7; PC-3,6
2.	Basics of State Defense	3/108	exam	GC-2; PC-3,6
3.	Workshop on the basics of military service/Workshop on military sports games	2/72	credit	GC-2; PC-3,5
	Total	**9/324**		

Elective disciplines are highlighted in italics
Notes: PC – professional competencies
GC – general cultural competencies

Module 2 "Human social security" is focused on the study of modern problems of security of the person, society and the State and the most relevant aspects of behavior and culture of human security in society in the context of EMERGENCIES Social character. In the process of studying the module, students gain knowledge on various aspects of social security in the state.

Table 4. Content of module 2 "Human social security"

№	Name of disciplines	Credit unit/hour	Forms of control	Competences
1.	Emergency situations of social character and protection against them	4/144	exam	GC-7; PC-2,6
2.	Protection and preservation of cultural heritage	3/108	exam	PC-3
3.	Bases of counteraction to terrorism	3/108	exam	GC-7; PC-6
4.	Social security of the individual, society and state	2/72	credit	GPC-1; PC-3,5
5.	Culture of human security/Culture of safe behavior in society	2/72	credit	GC-9; PC-3
6.	Legal support of life safety/Organization providing life safety	5/180	exam	GC-7; PC-6
7.	Environika/ Anthropological risk factors	2/72	credit	GPC-1; PC-2,4
	Total	**21/756**		

Elective disciplines are highlighted in italics
Notes: PC – professional competencies
GPC – General professional competencies
GC – general cultural competencies

Module 3 "Protection of the person in emergency situations" unites disciplines which are focused on formation of competences in the field of protection of the person from emergency situations of various character. As a result of mastering the disciplines of this module, students acquire practical skills in the use of federal and regional life safety programs in their future professional activities.

Table 5. Content of module 3 "Protection of the person in emergency situations"

№	Name of disciplines	Credit unit /hour	Forms of control	Competences
1.	Fire safety	2/72	credit	PC-6,7
2.	Conceptual fundamentals of life safety	5/180	exam	GC-9; PC-4
3.	Federal and regional programs for life safety	5/180	exam	GC-7; PC-6
4.	Civil defense	3/108	credit	GC-2; PC-3,6
	Total	**15/1080**		

Notes: PC – professional competencies
GPC – General professional competencies

Module 4 "Safety of Life in the Technosphere" unites disciplines which are oriented on formation of competences in the field of safety in the Technosphere in conditions of increasing technogenic, natural and anthropogenic loading. The module examines the main problems of the modern world (demographic, food, energy, environmental, etc.), emergency situations of natural and technogenic character.

Table 6. Content of module 4 "Safety of Life in the Technosphere"

№	Name of disciplines	Credit unit /hour	Forms of control	Competences
1.	Emergency situations of natural character and protection against them	5/180	exam	GPC-6 PC-1,6
2.	Emergency situations of technogenic character and protection from them	4/144	diff. credit coursework	GC-9; PC-6,7
3.	Global problems of Mankind	3/108	exam	PC-3,6
4.	Noksology	3/108	exam	GC-9; PC-4
	Total	**15/540**		

Notes: PC – professional competencies
GPC – General professional competencies

Module 5 "Fundamentals of medico-valeological knowledge" is focused on the formation of professional competencies in the field of health-saving technologies and study of issues of healthy lifestyles of children and teenagers. This module is focused on the acquisition of practical-oriented knowledge and skills on the main aspects of medical-valeological education and social medicine. Introduces the peculiarities of age anatomy, physiology and hygiene of schoolchildren.

Table 7. Content of module 5 "Fundamentals of medico-valeological knowledge"

№	Name of disciplines	Credit unit /hour	Forms of control	Competences
1	Age anatomy, physiology and hygiene	5/180	exam	GPC-2; PC-2
2	Basic medical knowledge	4/144	Exam	GC-9; PC-1
3	Fundamentals of a healthy lifestyle	2/72	credit coursework	GPC-6; PC-6
4	Emergency Medicine	2/72	Credit	GC-6; PC -1
5	Social medicine	2/72	Credit	GC-5; PC -3
6	Psychophysiology of students /Workshop on the basics of medical knowledge	3/108	Credit	GPC-6; PC-2/ GPC-3; PC-11
7	Basics of medical and valeological education of children and adolescents/Basics of Pediatrics	3/108	Exam	GPC-6; PC-5/ GPC-2; PC-5
8	Human reproductive health/Fundamentals of spiritual and moral education of children and teenagers	3/108	Credit	GPC-5; PC-3
	Total	**24/864**		

Elective disciplines are highlighted in italics
Notes: PC – professional competencies
GPC – General professional competencies

Module 6 "Fundamentals of psychological safety in emergency situations" combines disciplines that are focused on the development and improvement of competencies for solving professional problems related to psychological safety of a person in the conditions of manifestation of various kinds of dangers.

Table 8. Content of module 6 "Fundamentals of psychological safety in emergency situations"

№	Name of disciplines	Credit unit/hour	Forms of control	Competences
1.	Fundamentals of psychological security and training in confronting a crisis influence	4/144	diff. credit	PC-2,6
2.	Psychological stability in emergency situations	2/72	diff. credit	PC-2,6
3.	Basis of psychological knowledge/ Fundamentals of victim behavior	3/108	exam	PC-5,6
4.	Fundamentals of research activity/Modern methods and technologies of diagnostics	3/108	diff. credit	PC-11,12/ PC-2,11
	Total	**12/432**		

Elective disciplines are highlighted in italics
Notes: PC – professional competencies

Module 7 "Environmental safety" is focused on the study of the main trends in the field of ecology and environmental management, biological, physical and geological phenomena and processes that form the modern image of the planet, as well as the study of geoecological threats and hazards, catastrophes in the historical context of planetary development.

Table 9. Content of module 7 "Environmental safety"

№	Name of disciplines	Credit unit/hour	Forms of control	Competences
1.	Biology with the basics of ecology	3/108	Exam	GC-3; PC-4,6
2.	Basics of nature management	3/108	diff. credit	GC-3; PC-4,6
3.	Global ecology	3/108	Exam	GC-9; PC-4,6
4.	Physical fundamentals of natural and technogenic phenomena/Physical fundamentals of safety	3/108	diff. credit	GC-3; PC-4
5.	Geo ecological catastrophes in the history of the Earth / Historical Geoecology	3/108	diff. credit	GC-9; PC-2,6
	Total	**15/540**		

Elective disciplines are highlighted in italics
Notes: PC – professional competencies
GC – general cultural competencies

The end of each academic year (stage) of subject-profile training was accompanied by diagnostics of educational results. In order to diagnose students in the study of the curriculum in the direction (profile) "Education in the field of life safety", we have provided the following methods:

- testing (parametric quantitative statistics, reflecting the level of theoretical knowledge of students in the subject-profile training);
- solving a situational problem (reflects the ability of students to act in specified dangerous and emergency situations of various types);
- professional task for the construction of the educational process (reflects the ability to apply subject-specific knowledge of safety in the design of pedagogical activities).

The diagnostic results of students (2015, 2016, 2017/2018) are presented in a comparative table indicating the results obtained for each module according to the traditional state system of points from 3 to 5 points. The research took into account the results of certification of 40 students of each year of study (a total of 120 people), grades were recorded for each type of assignment in each module.

Table 10. Comparative table of educational results

	2015			2016			2017/2018		
	Test	Situational problem	Professional task	Test	Situational problem	Professional task	Test	Situational problem	Professional task
Module 1	3,9	4,2	4,3	4,1	4,4	4,3	4,2*	4,4*	4,5*
Module 2	4,3	4,4	4,2	4,2	4,5	4,3	4,4*	4,5*	4,3*
Module 3	4,1	4,3	4,2	4,4	4,4	4,5	4,6*	4,7*	4,5*
Module 4	4,3	4,2	4,3	4,4	4,5	4,3	4,5*	4,5*	4,4*

Module 5	4,1	4,3	4,3	4,3	4,2	4,4	4,4 *	4,3*	4,5*
Module 6	4,5	4,3	4,5	4,7	4,4	4,5	-	-	-
Module 7	4,3	4,4	4,3	4,5	4,5	4,4	4,5 *	4,5*	4,4*

"*" – partially implemented
"-" – the module has not been studied yet

Because the traditional state system of five-point assessment gives data in a rank scale with a large number of equal ranks in one group of subjects, this leads to the impossibility of using the method of checking the statistical significance of the positive dynamics of the level of knowledge of students by traditional, in this case methods ANOVA and Kruskal — Wallis ANOVA.

Based on this, we decided to assess the significance of changes using the $\chi 2$ – Pearson's chi-square test. To do this, our data has been converted into tables of the correlation of indicators of the results of certification and the year of study of students (Table 11).

Table 11. The frequency of joint occurrence of the results of certification and the year of study of students

	Satisfactory	Good	Excellent
2015 academic year	$Nsat_{;15}$	$Ngood_{;15}$	$N_{exl;15}$
2016 academic year	$Nsat_{;16}$	$Ngood_{;16}$	$Nexl_{;16}$
2017/2018 academic year	$Nsat_{;17}$	$Ngood_{;17}$	$Nexl_{;17}$

Here: 2015 academic year, 2016 academic year, 2017/2018 academic year, – indicators of the factor trait of training in different content programs; Satisfactory, Good, Exellent – nominative expression of the effective attribute (the traditional state system of five-point assessment), and Nsat;15, Ngood;15, etc. – the frequency of joint occurrence of the corresponding values of two correlated indicators.

For example:

1 training module, test task

	Satisfactory	Good	Excellent
2015 academic year	14	18	8
2016 academic year	7	21	12
2017/2018 academic year	6	21	13

In other words, in 2015, 14 students received a grade of "3"/satisfactory, 18 students – "4"/good, 8 – "5"/excellent (average score was 3.9 points), etc.

Thus, we have compiled 21 pairing tables for each module and type of assignments (7 modules for three types of tasks), and it is not appropriate to cite them in the article. Next, the χ^2 – Pearson's chi-square test was calculated for each tables, which allows us to assess the statistical significance of differences in the success of educational programs in different years. The results of the calculation are presented in the summary Table 12.

Table 12. The results of the calculation

		χ^2-Pearson	p-level	Degrees of freedom
Module 1	Test	5,7	0,21	4
	Situational task	11,3	0,02	4
	Professional task	4,63	0,32	4

Module 2	Test	3,28	0,51	4
	Situational task	5,32	0,63	4
	Professional task	8,08	0,08	4
Module 3	Test	8,31	0,08	4
	Situational task	10,01	0,03	4
	Professional task	15,9	0,004	4
Module 4	Test	3,01	0,52	4
	Situational task	9,04	0,06	4
	Professional task	7,39	0,11	4
Module 5	Test	7,21	0,12	4
	Situational task	5,44	0,24	4
	Professional task	9,23	0,05	4
Module 6	Test	3,11*	0,21*	2*
	Situational task	2,80*	0,24*	2*
	Professional task	6,36	0,04	2*
Module 7	Test	4,92	0,29	4
	Situational task	5,30	0,23	4
	Professional task	14,6	0,006	4

* data for two years of research in 2015 and 2016, since module 6 was not passed in 2017/2018

4. Conclusion

Based on the results, it can be concluded that the greatest change in the level of material assimilation at a statistically significant level and at the level of trends occurred precisely when assessing knowledge by the method of situational and professional tasks.

Therefore, it can be argued that updating of the subject-profile training of bachelors of education in the field of life safety in the direction of strengthening the practice-oriented approach allows to improve the quality level of subject-profile training of future teachers.

5. Acknowledgements

The results of the research showed that updating the subject-profile training of bachelors of education in the field of life safety is a necessary measure to maintain the quality of education due to the specifics and rapid changes in the subject area of life safety knowledge. The transformation of the content of the subject-profile training of bachelors of education in the field of life safety indicates that at the present time it is necessary to transfer professional guidelines from the training of the classical teacher " Basics of life Safety" towards the training of a teacher-researcher who is able to carry out a wide range of not only pedagogical but also research tasks in the field of life safety education (this is due to the necessary inclusion of the modules "Additional education", "Training and research"). As evidenced by the approbation of the basic professional educational program, the presented content of the subject-profile preparation, allows to assume that the bachelor of education, studying in the direction (profile) "Education in the field of life safety" will be prepared to solve professional tasks of methodological, research, pedagogical profile, to the formation and development of active culture in students of a safe and healthy lifestyle.

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