

Noxological Competence as a Basis for Professional Activities of Bachelor of Education in the Field of Health and Safety

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ABSTRACT

The article deals with a currently relevant issue of training Bachelors of Education in the field of Health and Safety. It presents the results of the research conducted by the authors from 2008 to 2015 that disclose the particularities of Bachelor training in Health and Safety based on the modular and noxological approaches. The system of teachers training in the field of Health and Safety is considered from the perspective of the ideas of competence as the basis of professionalism that enables to organize a learner-centered educational process. In accordance with the logic of scientific research on the organization of the efficient educational process of Bachelors of Education training in the field of Health and Safety, a training package (teaching materials) was suggested (a combination of the content, forms, methods and training resources) aimed at forming the subject and profile-oriented competencies where the core role is performed by noxological knowledge. This is based on introducing the key concepts of "noxological competence" and "noxological activity" into scientific use.

KEYWORDS

Competence, teaching materials, noxological approach, Bachelor of Education in the field of Health and Safety, noxological activity

ARTICLE HISTORY

Received 12 August 2016
Revised 20 September 2016
Accepted 12 October 2016

Introduction

A man of the XXI century goes on living in two interdependent worlds – in the world of nature, which is consistently compressing and decreasing under influence of anthropogenic activity and in the world of social medium, people's community. Creating conditions for being, satisfying his needs, a man constantly influences the environment, causing by this its counterstand (physical, chemical, biological, social etc.). That is why we may state that any sphere of human life and activity is potentially dangerous.

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Achievement of science-technical progress, growth of population and decreasing of natural energy resources, worsening ecology- social situation in the world on the whole and in separate countries particularly- all this annual growth of tension in relations of a man with the created technosphere. Level of human activity increased so that every time with growing strength and speed change the environment and natural-social environment. Besides, daily increasing humankind's needs in more new resources in order to provide its everyday activity lead to further rising capacity. This in its turn leads to consumption that is more intensive and spending of natural raw material, increasing of different types of releases into biosphere, damage of natural system of co-operation of all flesh. Such tension definitely finds release in the shape of appearing dangers for all inhabitants of the planet. With increasing speed of life, every minute race for satisfaction of your needs satisfaction a man forgets about dangers awaiting for him during all his life. Such "lack of knowledge" a man tries to explain with the help of a simple axiom or a myth that "it cannot happen with me because it can never happen".

Educational field of Health and Safety, covering different spheres of human life, society and state, all their safety space has become integrative, synthetic study, developing on the cross-curriculum complex basis. Health and Safety is smoothly connected with the contents of all subjects, studied at all stages of constant education system. That's why contents of this education field depends on the condition of education system on the whole, conducted reorganization in it and processes in all fields of life in the country (Federal law from February 29, 2012 N 273-FZ "About Education in the Russian Federation").

In accordance with the logic of scientific research on the organization of an efficient educational process of Bachelors of Education training in the field of Health and Safety, a training package (teaching materials) was suggested (a combination of the content, forms, methods and training resources) aimed at forming the subject and profile-oriented competencies where the core role is performed by noxological knowledge. This is based on introducing the key concepts of "noxological competence" and "noxological activity" into scientific use.

The conducted study has enabled the authors to obtain the results that clearly confirm the efficiency of expanding the content of the subject-profile Bachelor training at the expense of noxological knowledge which is reflected in the Bachelors' noxological competence.

In the end, the study is summed up and the conclusion is drawn about the necessity of development and implementation in the university practice of Bachelor of Education training in Health and Safety the subject-profile content of a noxological nature aimed at forming the noxological competence.

The question about the impact of today's challenges, threats and environmental hazards on the subject-profile training content of a pedagogue in the field of Health and Safety remains controversial.

Under such circumstances, the task of training the younger generation in secure existence under the impact of the complex of challenges, threats and dangers on the environment requires new thinking in the training of highly qualified pedagogues who would have the appropriate competence.

Professional competence of Bachelors of Education in the field of Health and Safety manifests itself in solving their professional objectives during their professional activities. With regard to this, it is always important to consider the context in which the competence is revealed. As the practice shows, the competence can be manifested only in an organic unity with the values and attitudes of a man, i.e. on the assumption of

a deep personal interest in this type of activity. The most important feature of the competence is the activity type of generalized skills in conjunction with subject knowledge and skills in specific areas.

The state-of-the-art achievements in the field of competence-based approach in National and Foreign Pedagogy, as well as in the field of Theory and Methodology of Education and Upbringing (according to the profile of training) allows us to conclude that one of the tasks of modern educational process of Bachelor of Education training is to define competence specifying it in according to the future professional activities. In this connection, the problem of clarifying the essence of professional competence for Bachelor of Education in the field of Health and Safety by introducing in it a new, noxological, content has become urgent in science.

Materials and Methods

The concept of competence

The term "competencies" in the Russian language is derivative from the English word "to compete" which is translated as "to contest", "to challenge". In its turn, the word itself came from the Latin language many centuries ago (the verb "competere") and is still controversial. At present, a huge amount of studies in various fields of knowledge are dedicated to competencies, both in Russian and foreign theory and methodology. In general, the understanding of this term is as follows:

- competencies are a system of knowledge, abilities and skills, as well as the experience of independent activities and personal responsibility (The concept of modernization of Russian education for the period of up to 2010, 2002);

- competencies are an ability to apply knowledge, abilities and personal qualities to succeed in a specific area (Federal State Educational Standard of Higher Professional Education, 2007).

The English translation of this is "competency", with the plural "competencies".

Competence is a person's ability to act in accordance with a strictly defined work place, with the standards of work. The term is translated into English as "competence" and "competences", respectively (Whiddett & Hollyford, 2000; Whiddett & Hollyford, 2002; Whiddett & Hollyford, 2007; Perels et al., 2005).

It is believed that the first definition was proposed by the American behaviorist R. Boyatzis & E. Richard (1982) in 1982 in his work "The Competent Manager: A Model for Effective Performance". He considered competency as a very important characteristic of an individual, a certain trait or motive, or social role, or just a store of knowledge that he/she uses".

M. Armstrong (1995) in his work "Demystifying Competence" (1995) state that there are competences and competencies which in their turn differ from competence and competency. This distinction is very important. However, even since this terminology has been debatable and still generates scientific discussions.

J. Hedges (1996) makes a clearer distinction between these terms defining competence as something more sublime than competency as a characteristic of a person which enables the person to perform tasks at the highest level.

S. Whiddett and S. Hollyforde (2002) determine that a person's ability to act in accordance with the standards is competence while the personality's characteristics that enable the person to achieve results at work make up competency. Therefore, competency is a much broader concept, since it can be used in various situations while competence refers strictly to a specific place of work, to a standard of work.



Thus, the professional competence as a category of the education result stands for describing the integrated quality characteristics of a university graduate. Professional competence of employees is the formed basis of subject knowledge, abilities and skills of the fundamental and special ("profile") type as well as formed creative thinking (Kurz & Bartram, 2002). Consequently, the professionalism of a Bachelor of Education of the present days is determined by the degree of professional competence acquisition which is manifested in the ability to apply the acquired knowledge to solving professional pedagogical tasks in practice (Weinert, 2001).

Based on the structure of the required specialist's qualities, his thinking is grounded on a highly developed imagination and is a set of logical, visual, creative, theoretical, spatial and technical thinking. The content of higher professional education for the formation of professional competence is selected according to the principles of scientificity, systemacity, integrity, mobility, adaptability, variation, modularity and regionality (Smelser & Baltes, 2001).

Over the past decades, A.A. Verbitsky (2006), O.V. Shemet (2010) and their followers have developed a psycho-pedagogical theory, which plays an important role in the competency-based approach in higher education.

V.A. Kozyrev, N.F. Radionova & A.P. Tryapitsyna (2005) specify the professional competence of pedagogues as an integral characteristic which determines the ability of a specialist to solve professional problems and typical professional tasks under real-life conditions of professional activities. At the same time, they note that from the standpoint of competence-based approach competence is always manifested in activity, i.e. in solving professional problems. In this respect, the context in which the competence is manifested is crucial.

In studies by N.V. Kuzmina (2002) the concept of "professional competence of a pedagogue" is regarded as a characteristic of an individual which represents a cluster of pedagogue's abilities to structure the scientific and practical knowledge in a special way in order to solve the pedagogical problems efficiently while being the subject of pedagogical influence.

According to V.A. Bolotov (2001), competence is a way of existence of knowledge, skills and education contributing to personal self-realization, to students' finding their place in the world in consequence of which education appears as a highly motivated and truly personality-oriented recognition of a personality by the society and awareness of its own self significance.

This corresponds to the theory of the integration of education developed by A.I. Daniliuk (2000) and advanced by O.V. Shemet (2010). In accordance with this theory the structural unit of the competency-based education is not a separate academic subject, but educational environment, in which not only the specific subject matters are studied, but a particular scientific phenomenon or event recreated by a theoretical model (Shemet, 2010).

From Y.V. Tatur's (2004) perspective, competence is an integral personal characteristic which distinguishes person's desire and ability (readiness) to realize his potential (knowledge, skills, experience, personal qualities, etc.) to be successful in a particular field.

So, in the framework of the competence-based approach professional competence is considered as the willingness and ability of graduates to solve problems and challenges in specific subject areas as well as the opportunity to evaluate their performance on the basis of knowledge and skills independently and effectively.

Thus, we have identified the essential features of the concept of "competence":

1. Competence is understood as an integrative characteristic of a person qualities, the result of Bachelor's preparation to work in certain areas (competencies).
2. Competence is understood as an acquisition of certain knowledge, skills and experience to carry out activities in specific areas.
3. Competence is manifested in personality-oriented activities in specific professional situations.

From the above mentioned essential features the following characteristics which distinguish the competence from the traditional concepts - knowledge, skills, abilities and experience become apparent. They include: the integrative character of the competence; the correlation with the axiological characteristics of a person; communicative orientation and practice-oriented focus. In general, the most important feature of professional competence, in our opinion, is the activity-oriented character of the generalized skills in conjunction with the subject knowledge and abilities in specific areas of sciences. Meanwhile, professional competence is manifested in the ability to make choices on the assumption of an appropriate assessment of oneself in a particular situation.

Noxological Competence

Human actions are characterized by prediction of the events, estimation of the consequences of man's actions, the analysis of the hazards causes, and selection of the most effective variant of an action to ensure his safety. The man seeks to eliminate the causes of potential hazards in addition to the direct instinctive or reasonable resistance to the detected threats. As a result, the number of safety measures includes threat protection and prevention of the potential hazards by means of environmental modification.

Noxological competence is based on the key concept of "noxosphere" (from the Latin. nox - danger). It is a space where different dangers arise permanently or periodically (Poirier & Feder, 2001).

The market imposes on a Bachelor of Education in the field of Health and Safety a whole layer of new requirements that are not sufficiently taken into account or not taken into account at all in the training of level specialists: the requirements on the ability to identify hazards generated by various sources in the techno sphere; the ability to estimate the fields and the indicators of their negative impact on a man and his environment; readiness to choose methods of protection against hazards in relation to the area of their professional activities and ways of ensuring comfortable standard of living; the ability to identify the impact of anthropogenic factors and natural disasters on the industrial facilities and the environment in order to develop the methods for enhancing the reliability and stability of economic facilities, localization and liquidation of consequences of accidents and catastrophes; implementation of health and safety measures in enterprises and production; security and protection of the population and territories from dangerous and emergency situations of different character; the ability to choose the system of emergency prevention, protection of man and the environment in respect to the individual industries and enterprises based on the known methods and protection systems, etc., as well as training the skills of practical use of knowledge in the field of safety assurance in professional activities (Abramova & Boyarov, 2011).

Noxological competence as a result of the Bachelor's training in the field of Health and Safety is manifested in the willingness and ability of the individual to use in the professional activities the acquired complex of knowledge and skills to ensure safety in the area of professional activities, the nature of thinking in which safety issues are prioritized (Stankevich, 2006).



In addition, noxological competence determines the content of noxological activities of Health and Safety teachers in which we define the following directions to realize their knowledge, skills and competences:

- the ability to identify the sequence of hazard situations, as well as logical analysis of their causes and consequences in the organization of Health and Safety specialist's activities;

- the ability to carry out the identification of hazard priori or a posteriori using the direct and inverse methods (either before or after the occurrence of hazard; to study the causes of the latter with a view to anticipate or analyze its effects for identifying the causes);

- the implementation of hazards prevention as a set of measures to prevent exposure of hazards on the trainees;

- the introduction of the requirements of pedagogical valeology into the organization which trains specialists of education in the field of Health and Safety, to give the whole system of training recreational orientation and to study the impact of educational technology on the students' health, the formation of their valeological knowledge and skills.

These new requirements, as it turns out, are not rigidly connected with this or that course, they all have meta-subject nature and are characterized as universal ones.

Noxological Activities of a Bachelor

The analysis of the psychological and pedagogical literature has shown that activities are understood as a particular form of human activity aimed at rational conversion of the world. Activities are also called a special form of social activity of a man that occurred in his historical period of existence and ensures his normal existence and development as a modern, cultural and civilized man. Pedagogue's activities are a kind of professional activities aimed at carrying out the tasks related to the students' training and education. The structure of pedagogue's activities includes goals, motives, methods, cognitive processes, knowledge, skills, abilities, personality traits, etc.

In this respect, the professional activities of a pedagogue are such activities the specificity of which is in constant psychological and pedagogical influence on the students with account of their individual and age characteristics, needs, interests, hobbies, inner world and at the same time in the purposeful management of the learning process and the development of a personality.

According to FSES HPE, a Bachelor of Education in the field of Health and Safety must be prepared for the implementation of the following types of professional activities: pedagogical (educational and upbringing) and culturally educational.

Pedagogical activities are an implementation of an integral educational and upbringing process in accordance with the educational program of professional training of students: the formation of personal and professional qualities of students; the creation of favorable educational environment in the educational process of vocational training; the implementation of professional orientation of students and student-centered approach. Pedagogical activities have a continuous and systematic character.

Cultural and educational activities of a pedagogue in the field of Health and Safety in general consist in the ability of carrying out promotional and informational campaigns on human safety, healthy lifestyle, involving children and young people into physical training and sports.

Some specific activities such as on-job-training and technological activities as well as nature preserving activities in the professional activities of the pedagogue in the field of Health and Safety were identified by some scholars.

Thus, on-job-training and technological activities of a pedagogue in the field of Health and Safety as a specialist in the field of integrative scientific knowledge "Health and Safety" allows the bachelor to carry out professional activities at the expense of the invariant part of the FSES HPE including the courses of the subject-profile preparation.

Nature preserving activities are generally aimed at preserving and restoring the environment, managing natural resources, preventing the negative impact of economic and other activities on the environment and aimed at creating environmental awareness of students, organization of work to comply with the rules and norms of behavior of students in the natural environment, the development and the practical implementation of environmental protection measures.

The analysis of FSES HPE, of the subject content of the educational field of "Health and Safety", of the psychological and educational literature on the study, of the practice of pedagogues' training in the field of Health and Safety has allowed us to highlight another type of specific activities of a Bachelor of Education in the field of Health and Safety – the noxological activities.

Noxological activities are the ability to identify hazards generated by various sources in the system "man - nature - society - technosphere"; the ability to estimate the fields and the indicators of their negative impact on a man and his environment; readiness to choose methods of protection against hazards in relation to the area of their professional activities and ways of ensuring comfortable living conditions.

As for the organizational and pedagogical conditions for the formation of competencies, the activity essence of the very competence sets a methodological vector for the creation of these conditions, namely, the involvement of students in activities, which are adequate to the competencies formed, and providing a pedagogical support for those activities (Zimnyaia, 2006).

In addition, in the content of noxological activities of a pedagogue in the field of Health and Safety the following areas of implementation of their knowledge, skills and competences may be highlighted:

- identification of hazards, as well as logical analysis of their causes and consequences in the organization of the activities of the Bachelor of Education in the field of Health and Safety;
- performance of measures to prevent dangerous situations in the organization and conduction of the educational process in educational institutions;
- organization of health-improving events which generate the valeological knowledge and skills in everyday life of students.

Research Methods

At the time of the ascertaining experiment the monitoring of the educational process was being realized. To carry out the pedagogical experiment the following measuring materials were developed: questionnaires, test materials, monitoring tests, requirements cards of courses. We identified didactic units of the noxological content of compulsory subjects in the variable part of the modules "B3.V.GC - Professional" cycle which enabled to analyze students' readiness to study under the new educational conditions of FSES HPE.



For this purpose, at the ascertaining stage of the pedagogical experiment for complete and adequate reflection of the status of the test questions of experimental data and for improving their reliability, we used the following set of research methods: a) monitoring of the students and pedagogues at various laboratory and practical works and seminars and analysis of students' oral answers; b) analysis of current curricula "Pedagogical Education", profile "Education in the field of Health and Safety" courses of BEC (Basic Educational Curricula), as well as textbooks, teaching aids, study guides on the issues of Health and Safety; c) interviews and surveys of students and professors at the university; d) carrying out monitoring and verification (oral and written) works of students, followed by the feedback.

With regard to this, a particular attention was paid to studying the level of students' interest to improving the educational process in high school through the introduction of the requirements of the FSES HPE and the possibility of the individual educational schedules of learning.

The experiment covered Federal State Budget-Funded Educational Institution of Higher Professional Education "Sakhalin State University" (Yuzhno-Sakhalinsk, Russia) (Health and Safety Department) and "Herzen State Pedagogical University of Russia" (Saint-Petersburg, Russia) (Faculty of Health and Safety) and involved over 200 students within the period from 2008 to 2015.

The object of the experimental study was an educational process of Bachelors of Education in the field of Health and Safety.

An experimental study was conducted in several stages.

Results and Discussion

Within 2008-2010 academic years students were surveyed. The results of the survey allowed to define that students had given the low self-assessment to their knowledge in the field of professional training and even lower rate had been given to their subject-profiled readiness for organizing and conducting the educational process at school (see Table 1).

The evaluation of the level of knowledge formation in the field of Health and Safety was carried out on the basis of learning levels (McClelland, 1973; Sternberg & Kolligian, 1990) and levels of skills formation were selected as the criteria for evaluating the level of skills formation in the field of Health and Safety where C is the coefficient of completeness of the actions performed (operations): low - when the student performs a separate operation, the sequence of actions is chaotic and generally poorly understood ($C < 50\%$); average - when the student performs all required operations, but their sequence is inaccurately thought and the action is not accurately understood ($50\% < C < 70\%$); high - when the student performs all operations and their sequence is rational, actions are generally understood ($C > 70\%$).

Table 1. Results of Self-Assessment and Assessment of Students' Knowledge and Skills in the Field of Health and Safety at the Stage of Ascertaining Experiment

Levels of knowledge and skills development in the field of Health and Safety	Self-assessment results		Assessment results	
	Students quantity	%	Students quantity	%
Levels of knowledge development in the field of Health and Safety				
0-level - comprehension	12	5,56	25	11,57
1-level - recognition	45	20,83	62	28,70
2-level-reproduction	90	41,67	65	30,09
3-level - application	54	25,00	40	18,52

4-level - creativity	15	6,94	24	11,11
Levels of skills development in the field of Health and Safety				
Low: C<50%	25	11,57	53	24,54
Average: 50%<C<70%	133	61,57	118	54,63
High: C>70%	58	26,85	45	20,83

Following the logic of the pedagogical experiment, for the evaluation of knowledge, skills and competences the students used different methods of assessment in accordance with the identified criteria.

In the experimental groups the content of the federal component of the compulsory subjects and modules of the variable part of the cycle B3.V.GC. FSES HPE in "Teacher training" profile "Education in the field of Health and Safety" was studied in the same volume. A distinctive feature of the pilot training was to increase the noxological content of compulsory subjects of the modules of the variable part of the cycle B3.V.GC, nonlinear structure of the organization of the educational process with the possibility for students to select their individual educational schedules of learning. In the control groups the learning process was organized according to the traditional linear system.

The number of students in the group within different years was 20-25 people and 10-15 people in the subgroup. A group of students was assigned by codes: for the control groups - 1C, 2C 10C; for the experimental groups - 1E, 2E 10E. Further, for simplifying the calculations all the data obtained from the use of different experimental techniques were generalized, systematized and resulted in an overall value for control and experimental study groups, respectively "Group C" and "Group E".

Analysis of mastering the fundamental, professional, specialized / subject (noxological) knowledge and skills was based on the students' test results, their answers at colloquiums, assessments and examinations results during the study of the Federal component content and compulsory subjects content of modules of the variable part of the cycle B3.V.GC FSES HPE in "Teacher training" profile "Education in the field of Health and Safety" (See Table 2).

Table 2. Results of Self-Assessment and Assessment of Noxological Knowledge and Skills of the Bachelors According to the Study Results

Levels of noxological knowledge and skills development	Self-assessment results, %		Assessment results, %	
	C1	C2	C1	C2
Levels of knowledge development in the field of Health and Safety				
0-level - no answer	10,0	0,0	4,0	0,0
1-level - recognition	24,0	14,0	26,0	16,0
2-level - reproduction	45,0	56,0	54,0	54,0
3-level - productive	15,0	22,0	12,0	20,0
4-level - creative	6,0	8,0	4,0	10,0
Levels of skills development in the field of Health and Safety				
Low: C<50%	33,0	28,0	35,0	31,0
Average: 50%<C<70%	55,0	52,0	49,0	51,0
High: C>70%	12,0	20,0	16,0	18,0

In order to establish the reliability of the results of knowledge development in the subject area "Health and Safety" by bachelors in "Teacher training" profile "Education in the field of Health and Safety" we used a variety of mathematical statistics methods. The effectiveness of subject knowledge acquisition in the field of "Health and Safety" by



the bachelors of the control and experimental groups was assessed by using the following formulas:

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n}$$

n – the number of analyzed answers to questions;

\bar{X} – the arithmetical mean of the knowledge acquisition level;

X_i – the level of i -listener' knowledge acquisition;

D – variance which is calculated by the formula:

$$D = \frac{\sum_{i=1}^n (\bar{X} - X_i)^2}{n}$$

σ – mean square deviation. For its calculation we used the formula:

$$\sigma = \sqrt{D}$$

In order to confirm the stability of training in experimental and control groups, we determined the coefficient of variation (V) calculated by the formula:

$$V = \frac{\sigma}{\bar{X}} \cdot 100$$

Within 2011-2015 academic years the general scientific and professional knowledge acquisition by bachelors was tested and assessed (the Federal component of the "B1 – Humanitarian, Social & Economic cycle", "B2 – Mathematical and Science cycle" & "B3 – Professional cycle" of the FSES HPE) which is the "platform" for the competence formation defining the professional activities in the field of education.

Summary results of efficiency of students' acquisition of the general scientific and professional (psychological, pedagogical and methodological) knowledge of the noxological orientation are presented in the materials of Table 3.

Table 3. Results of Formation by the Students the General Scientific and Professional Knowledge of Noxological Orientation

The content of the FSES HPE in "Teacher training" profile "Education in the field of Health and Safety"	Indicators of the noxological subject knowledge acquisition	2011-2012 academic year	2012-2013 academic year	2014-2015 academic year	2014-2015 academic year
Cycles	Average grade \bar{X}	3,50	3,63	3,94	4,06
B.1 - Humanitarian, Social & Economic cycle	Distribution of ratings (%):				
	5	12,5	12,5	25	18,75
B.2 - Mathematical and Science cycle	4	37,5	37,5	43,75	68,75
	3	37,5	50	31,25	12,5
	2	12,5	0	0	0

The estimates variance (D)	0,800	0,517	0,596	0,329
Mean square deviation (σ)	0,894	0,719	0,772	0,574
Coefficient of variation (V)	0,25555 (25,6 %)	0,19829 (19,6 %)	0,19604 (19,6 %)	0,14123 (14,1 %)

As can be seen from the materials presented in Table 3 the results of formation of subject noxological knowledge with the students are much higher after the pilot training than before it ($\bar{X}_{2014-2015} > \bar{X}_{2013-2014} > \bar{X}_{2012-2013} > \bar{X}_{2011-2012}$), and less stable until the implementation of the experimental method in the training of Bachelors of Education in the field of Health and Safety ($V_{2011-2012} > V_{2012-2013} > V_{2013-2014} > V_{2014-2015}$).

Thus, within 2011-2015 academic years we tested and assessed the bachelors' acquisition of professional (teaching) and subject-profile knowledge (the variable part of the professional cycle which is compulsory for students studying "B3.V.GC.1 – The law basics of Health and Safety", "B3.V.GC.2 – Security threat in different spheres of life" & "B3.V.GC.3 – Health-safety aspects" FSES HPE) that determines the readiness of the future teacher to carry out not only pedagogical and cultural-educational, but also noxological activities in the professional field.

Conclusion

The modern complex of challenges, threats and hazards for the individual, society and the state determines the necessity to revise the rank of society's needs with a strong priority for the development of the education system. These factors require the integration of educational institutions into a single entity to create a single educational space in Russia in the field of Health and Safety. Under these conditions, higher pedagogical education in the field of Health and Safety should be the core of a complex system of the state order execution for training of specialists capable to solve the professional tasks for the formation of the world outlook safety culture with the population in dangerous and emergency situations of natural, technogenic and social type.

Therefore, education in the field of Health and Safety, the safety culture of a man and society become essential conditions for transition of the modern civilization to the model of its sustainable development.

The proposed diagnostic tools used for assessing the efficiency of training Bachelors of Education in Health and Safety including a system of criteria and indicators allow to assess the dynamics of noxological knowledge, abilities and competences development of the future teachers in the field of Health and Safety.

During the experimental study, the need for developing the subject-profile noxological content aimed at forming noxological competence and implementing it into higher education institutions practice of training Bachelors of Education in Health and Safety was proved.

The improvement of bachelors training level was the result of creating the conditions aimed at student's determining as the subject of the choice of his individual educational schedule; determining the educational content of bachelor's training and the use of optimal educational technologies in the process of experimental training.

The results obtained in the experimental study allow admitting that implementing the noxological component into the educational and upbringing process is a promising



direction for theory and practice development of Bachelors of Education training in the field of Health and Safety.

Conflict of Interest: The authors declare that they have no conflict of interest.

This article does not contain any studies with human participants or animals performed by any of the authors.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

- Abramova, S. V., & Boyarov, E. N. (2011). Evaluation of formation of professional competences in students. *Psychology of teaching*, N 3, 68–78.
- Armstrong, M. (1995). Demystifying Competence. *Human Resources*, 11(12), 49-50.
- Bolotov, V. A. (2001). *Pedagogical Education in Russia in Terms of Social Changes: Principles, Technologies*. Volgograd, Russia: Peremena, 290 p.
- Daniliuk, A. Ia. (2000). *Theory of Educational Integration*. Rostov-on-Don: Publishing house of RPU, 225 p.
- Federal law from February 29, 2012 N 273-FZ "About Education in the Russian Federation". Direct access: <http://base.garant.ru/70291362/>
- Boyatzis, R. & Richard, E. (1982). *The Competent Manager: A Model for effective performance*. New York: John Wiley and Sons, 352 p.
- Federal State Educational Standard of Higher Professional Education. (2007). Direct access: <http://www.edu.ru/db/portal/spe/3v.htm>
- Hedges, J. (1996). *Adopting a competency approach*. New York: In Brief Plus, 425 p.
- Kozyrev, V. A., Radionova, N. F. & Tryapitsina, A. P. (2005). *Competency-based approach in pedagogical education*. St. Petersburg, Russia: A.I. Herzen RSPU, 392 p.
- Kurz, R., & Bartram, D. (2002). *Competency and individual performance: Modeling the world of work*. Direct access: <http://dx.doi.org/10.1002/9780470696736.ch10>
- Kuzmina, N. V. (2002). The concept of "pedagogical system" and the criteria for its assessment. In N. V. Kuzmina (Eds.). *Methods of the system-based pedagogical research*. Moscow: Public education, 411 p.
- McClelland, D. (1973). Testing for competence rather than for intelligence. *American Psychologist*, 28, 1-14.
- Perels, F., Gürtler, T. & Schmitz, B. (2005). Training of self-regulatory and problem-solving competence. *Learning and Instruction*, 15 (2), 123-139.
- Poirier, D., & Feder, K. (2001). *Dangerous places: health, safety, and archaeology*. Westport, Conn: Bergin & Garvey, 249 p.
- Shemet, O. V. (2010). Spatial Organization of Competency-based Higher Vocational Education. *Pedagogics*, 6, 47-52.
- Smelser, N. J., Baltes, P. (2001). *International encyclopedia of the social & behavioral sciences*. Amsterdam; New York: Elsevier, 16099 p.
- Stankevich, P. V. (2006) *Theory and practice of training Bachelor in the system of multi-level science education*. St. Petersburg: TESSA, 164 p.
- Sternberg, R., & Kolligian, J. (1990). *Competence considered*. New Haven: Yale University Press, 315-362.
- Tatur, Y. V. (2004). Competence in the structure of the specialists' training quality model. *Higher education today*, 3, 23-26.



- The concept of modernization of Russian education for the period of up to 2010. (2002). Direct access: http://www.edu.ru/db/mo/Data/d_02/393.html
- Verbitsky, A. A. (2006). The Contextual Learning in Competency-based Approach. *Higher education in Russia*, N 11, 70-84.
- Weinert, F. E. (2001). Concept of competence : a conceptual clarification. In : D. S. Rychen and L. H. Salganik (Eds) *Defining and Selecting key Competencies*. Gottingen : Hogrefe, 45-66.
- Whiddett, S., Hollyford, S. (2000). *The Competences Handbook*. CIPD House, 228 p.
- Whiddett, S., Hollyford, S. (2007). Competences. In: *Chartered Institute of Personnel and Development*. London, p. 42.
- Whiddett, S. & Hollyford, S. (2002). *A practical guide to competencies: how to enhance individual and organisational performance*. London: Chartered Institute of Personnel and Development, 144 p.
- Zimnyaya, I. A. (2006). Competency-based Approach. What is its Place in the System of Modern Approaches to Educational Problems? (Theoretical and Methodological Aspect). *Higher Education Today*, 8, 21-26.