

## Students' Environmental Competence Formation as a Pedagogical Problem

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### ABSTRACT

Environmentally conscious and preparation of competent professionals' in higher education system in Kazakhstan is a priority. The need for more effective environmental competence formation for students actualizes the problem of development and scientific substantiation of the theoretical model of students' environmental competence, methods of their formation, and diagnostics. To achieve this goal, we used a range of methods that are relevant to the problem - analysis, modeling, experiment and synthesis. The developed model of environmental competence is the main competence of future specialists of any profile and reflects the dialectical relationship of the characteristics and functions of environmental competence. It is shown that an environmentally competent individual is willing and able to act competently in situations that threaten life, safety or nature. Structural analysis of environmental competence model revealed the peculiarities of its formation, as well as to develop knowledge about it. The results allowed developing assessment and diagnosis system of students' environmental competence formation. System's application in the course of the experiment showed that 77% of the participants have the environmental competence formed at a low level, which confirmed the need in the author's methodology implementation. This article describes the stages of the author's methodology and provides methodological recommendations for students' environmental competence formation. It is concluded that students' environmental competence formation must direct the pedagogical efforts not so much on the individual components formation of environmental competence as on functional and structural relationships' formation and development between them.

### KEYWORDS

Competency; environmental competence;  
university; environmental education;  
teaching methods.

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## Introduction

Currently, there is no more important problem than the harmonious relationship between man and nature. In connection with the complex environmental situation in the region and the world, the Republic of Kazakhstan

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is committed to environmental growth in production of goods and services, actively promoting the principles of "green economy" (The concept of environmental education in 2003; RK Environmental Code in 2007; EE Program 2010). There are "Green Bridge" partnership program developed and the Global energy-environmental strategy, which is reflected in the outcome document "RIO+20".

The international community fully supports the initiatives of the Republic of Kazakhstan. In 2017, Astana will take the World Exhibition EXPO-2017, the main theme of which – "Energy of the Future" – will allow to develop and distribute a global transition idea of "green" economy from the very center of the Eurasian continent (Transition Concept of the Republic of Kazakhstan to Sustainable Development in 2007-2024).

The transition to a "green" economy will be carried out by highly educated people with moral and physical potential (Nesterova 2010; Erdyneeva & Kadashnikova 2009; Bubela 2012). The education system should prepare young people to environmental issues, to bring the principle of responsibility for their health. There is no doubt that the environmental education effectiveness and upbringing of younger generation are some of the conditions for sustainable development of the country. In the case of the university, the quality and the focus of training should be on the environmental competence formation.

We cannot say that the work in this direction is not carried out. The higher educational institutions of the Republic Kazakhstan study the discipline "Ecology", carry out educational activities on environmental protection, youth is attached to a healthy lifestyle. Much attention is paid to ecologization in education. Ecologization in education in the general sense is a feature trend of environmental ideas' penetration, concepts and principles in various disciplines (Wals et al, 2014; Zsóka et al 2013; Bologna Declaration 1999). The domestic and world pedagogy has accumulated considerable experience, knowledge, methodology, theory and practice of ecologization in individual disciplines. There is published scientific and methodical literature that allows introducing the elements of environmental knowledge into the curricula.

Environmental education is able to generate not only a certain set of skills and rules of behavior in relation to the environment, but also to develop students' culture (West, 2015). In this connection, there is a "ecologization " of the culture, which means relations' optimization and harmonization between man and nature. Environmental education can change the whole system of consumer mentality, worldview and education (Boulet et al., 2015).

Literature analysis, colleagues' experience and our own experience has shown that the problem of students' environmental competence formation is still far from being solved (Alekseev, 2006; Lopatin 2009; Nekhoroshkov 2016). Thus, it is suggested to master environmental knowledge, but it is difficult realized in professional practice. The functioning of all educational process' components following environmental safety is not guaranteed, including the issues of comprehensive relations, humanitarian, and special training. Statements of university professors on the connection of environmental education and human

behavior in the environment are ambiguous because the ecological culture of society has not been formed. In the teaching environment, there is a failure to understand that one of the main factors reducing occupational hazards is moral qualities' formation of future specialists. Trends in environmental education development lag behind the global trends in higher education development and the use of competency approach is limited to the technical side. There is an alarmingly steady growth of young people smoking, unhealthy diet etc. (Frantz & Mayer 2014; Nesterov in 2010; Tomac 2007). We can conclude that there is a contradiction: modern university graduates received sufficient training, have a certain amount of environmental knowledge, but are not able to control their own life activity in the context of their social and natural environment safety.

Environmental education is harmoniously embedded in the educational system of developed countries. States of the European Union are aimed at improving the environment and seek to prepare young professionals, who take a responsible attitude to the environment and environmental problems' preservation (Wals et al, 2014.; Frantz & Mayer 2014). Developing countries emphasize the increase in industrial potential and often neglect environmental problems. In connection with this situation, the Republic of Kazakhstan reformed the system of environmental education, which is the first step in improving the environment.

Despite the fact that all students are trained in the field related to nature and environment, they must be prepared to forecasting, to solve ongoing or suddenly arising problematic situations, such as environmental and technological disasters, health and safety issues that pose a threat to life, health etc. Consequently, environmental expertise is necessary and important to be formed in students of all areas of training, since if it is formed at a sufficient level, it will describe the ability of a specialist of any profile to apply knowledge and make concrete actions that will help to find a way out of the problem situation. We can say that the students' environmental competence formation is a strategically important task of higher education. Therefore, students' environmental competence formation is a priority of university education policy.

### **Aim of the Study**

Theoretical substantiation and diagnostic systems' development of university students' environmental competence formation.

### **Research questions**

What is included in students' environmental competence?

### **Method**

1) *Theoretical methods*: literature analysis, regulatory and program-methodical documents' analysis on the research topic and problem; informational monitoring on different aspects of the research presented in the Internet; modeling, planning, forecasting, comparison, factor analysis, synthesis, generalization, classification, formulation of conclusions;

2) *empirical methods*: observation, questionnaire, survey, interview, method of expert evaluations, statistical methods and others.



*Feasibility demonstration of the chosen approaches:* personal-developmental approach allows considering students' personality, his originality, uniqueness in the center of educational process. Activity approach provides maximum disclosure of the potential under the activities; competence-based approach focuses on the results of training and education, when, as the main result is considered not the amount of knowledge learned, but person's ability to act in various situations (Ponomarenko et al., 2016).

### Data, Analysis, and Results

Literature analysis revealed a variety of scientific approaches to the definition of the concept, nature and models of students' ecological competence, as well as highlight its main features.

World educational practice shows that the concept of "competence" serves as the centerpiece, as it has an integrative nature; it brings together the knowledge and the intellectual and skill component (Zsóka et al., 2013). It is emphasized that the ideology interpreting content of education formed from "results" (so-called "standard output") laid in the concept of competence-based approach. This is reflected in the various international regulations and standards of education (Bologna Declaration 1999). In this connection, it is necessary to ensure the National Qualifications System to international standards, the requirements of which involve the willingness of graduates to secure professional activity.

Students' environmental competence is the recognition of the ability and willingness to independent environmental conservation activities on reproduction of life, environment practical improvement in the process of identifying, solving and preventing environmental problems. Accordingly, students' environmental competence formation, according to the author, is aimed at the development of theoretical knowledge, practical skills, environmental values, acquisition of environmental meanings in personally and socially relevant educational environmental activities and gaining on that basis experience of solving environmental problems. Following the functional point of view, the environmental competence *is one of the main* competences (Liefländer et al., 2013).

The scope of environmental competence display and formation in the field of education includes the environmental performance objectives. Much attention is paid to the comparison of the key, basic and special professional competence, their place and role in the implementation of the sustainable development concept (Kopnina, 2012). *The versatility* of professional's environmental competence is because today any professional activity is considered following the impact on nature and ecosystem, environmental change and environmental management requirements, disposal and recycling (Kudryavtsev, Stedman & Krasny 2012).

Students' environmental competence as a character trait has *systemic and integrative* features. Students' environmental competence describes the ability of the individual to solve problems of different levels arising in the situations of life and professional activities, "formed on the basis of values and motives,

knowledge, training and experience, individual characteristics, tendencies and needs" (Alekseev, 2006).

Nelyubina E.G. extends the idea of ecological competence of future teachers, including not only basic knowledge of natural sciences, ecology and environmental education, the ability to Environmental preservation, but also a "recognition of the special value of life as such, environmental benefits and human health" (Nelyubina 2005).

The results of a comparative analysis of the concepts of *environmental culture* and *environmental competence* are of particular interest. Thus, Nesterov A.A. comes to the conclusion that *the environmental culture* is a more general methodological category, because it is a personal trait, regardless of age, education and profession. On the contrary, the environmental competence of the future teacher reflects the level of professionalism, quality of training, and thus, presupposes the mastery of environmental culture (Nesterova, 2010). In other words, the author proves the fact that the environmental competence is a professional competence.

Some researchers agree with this point of view, they follow inclusively functional approach to the definition of environmental competence. For example, Lopatina T.P. suggests environmental competence is "an inherent component of the high level of professionalism, regardless of professional orientation, including the knowledge allowing to suggest the matters of professional activity, taking into account the environmental aspect, as well as personality traits that enable a specialist to carry out professional activities following the environmental viability" (Lopatin, 2009).

Environmental competence of a specialist is a set of defined algorithms of environmental performance and conditions of these algorithms' implementation in practice; ecological competence is a trait transformed and assigned through individual experience (Kudryavtsev, Stedman & Krasny, 2012).

Due to the nature of our study, we paid special attention to scientific works in the field of environmental competence formation of future technical specialists. According to Tokmakov V.I., environmental competence of an engineer is "his personality trait expressed in theoretical knowledge, practical training, ability and willingness to conduct all types of professional activity that match the production and labor protection requirements, provide the necessary level of health, safety of human life and ecological safety of the environment "(Tomac 2007).

In the context of ensuring the health and safety, environmental competence formation is characterized by the increasing role of cognitive, motivational, behavioral and regulatory areas of personality. The invariant features of environmental competence of the future engineer are professionally personal traits and possession of moral values. The author assigns motives and aspirations for continuous self-improvement to traits, as well as the ability of system vision of consequences of professional activities of humans and the environment, the ability to ensure the safety of life and propensity for professional reflection. By moral values, Popov V.M. refers the willingness of



empathy, tolerance and responsibility. According to the author, the environmental competence manifests itself "as a synthesis of intellectual and science components (cognitive and activity, including general knowledge and skills), personal characteristics (values, abilities, traits, willingness to engage in any activity etc.) and experience allowing a person to use his potential to carry out complex activities, promptly and successfully adapt to a constantly changing society and professional activity" (Popov, 2006).

Environmental competence is multidisciplinary, integrated and socio-cultural in nature. Environmental competence structure is an integration of abilities, attitudes and creativity experience, and at the same time, "a specific combination of various abilities of the subject of activities that forms the basis of professional behavior aimed at solving environmental problems". Environmental competence, according to the authors, is associated with "self-organizing, active, creative subjects, capable of unexpected decisions in difficult environmental conditions" (Erdyneeva & Kadashnikova, 2009).

According to Bubela O.V., environmental competence is a kind of "person's ability based on knowledge, experience, values and habits, something that rise the ability, the action to resolve any environmental problem " (Bubela 2012). In turn, the union of two ideas – the unity of a professional identity formation as an active subject of life and the relationship of practical, intellectual, spiritual comprehension of the world by mastering the environmental culture, suggests that in modern conditions the environmental competence is immanent (intrinsic) trait of any specialist (Nesterova, 2010).

Thus, the literature review allowed stating the following: *there is no unified approach* to the structure and nature definition of the environmental competence of the future specialist. However, despite certain differences, *there is a unity* in the main characteristics' designation of environmental competence as an immanent trait of a specialist in any field of professional activity.

Comparative analysis results have enabled us to form an expanded view of the peculiarities of environmental competence of the future specialist:

- the main role and a socio-cultural character;
  - universality and integrity;
  - systematicity and interdisciplinary;
- willingness and ability of the person to correctly predict, to act competently in situations that threaten life, safety and environment.

In turn, it is possible to refine the presentation of the content, structure and develop a model of environmental competence of the future specialist.

Zhdanova S.A. identified three components in a model of environmental competence of the specialist of education. Value-motivational component includes competence in the field of philosophy, associated with the value perceptions, the ability to see and understand the world around us, to be guided in it and be aware of their role and mission. Information-environmental component includes possession, research, analysis and selection of required information, its transformation, preservation and transfer. Finally, a subject-methodical component involves ways and algorithms of actions, methods of

solving educational and cognitive tasks, goal-setting, planning, analysis, reflection, self-esteem (Zhdanov, 2009).

Lopatina T.P. offers an environmental competence separate block of human values. This approach impresses every teacher, who considers education as a priority in his or her professional activities. According to Lopatina T.P. students' environmental competence model of natural-mathematics should be holistic and include: the value of health (compliance with a healthy lifestyle); sense orientation (the value of life, environmental values); integration (environmental approach as the basis of a holistic worldview of modern man); citizenship (the rights in the field of environmental protection duties) and responsibility; self-improvement, self-development, reflection (search for the meaning of life); development of professional environmental orientations (mastering environmental culture); social partnership; identification and solution of environmental problems, environmental projects' development and implementation (planning, design, modeling, forecasting, application of new information technologies) (Lopatin, 2009).

However, we believe that an idea about the main characteristics and functionality is a basic principle of environmental competence of the future specialist. Gagarin A.V. described the functions of environmental competence (ideological, methodological, environmental, value, predictive, social, cultural, professional) most fully. Particular attention is drawn to the social function, which determines the dependence of environmental activities on social factors, accelerating the processes of socialization (Gagarin, 2011).

Thus, we have developed a *model of students' environmental competence as a main competence of future specialist of any profile* based on the outlined above theoretical assumptions, comparative literature analysis results and the results of our own research that reflects dialectical relationship of characteristics and functions of environmental competence (Table 1). Environmental competence is a socio-cultural, systemic, universal, integrative and interdisciplinary in nature; environmentally competent person willing and is able to accurately predict or to promptly and competently act in situations that threaten life, safety and environment.

**Table 1.** Model of students' environmental competence

Functions	Characterization
ideological, methodological environmental, professional	interdisciplinary, systematicity, integrity willingness and ability of the person to correctly predict, to act competently in situations that threaten life, safety and environment.
axiological	versatility, socio-cultural character
predictive	interdisciplinary, systematicity
social, cultural	socio-cultural character

The main principle of modeling is in the possibility of reflection, formation and diagnosis of environmental competence in intellectual, emotional, creative





and regulatory processes, as well as the links of functioning. Links data are particularly important because analysis and diagnostics ensure the sustainability of the model and its identity under various external and internal changes.

Structural model analysis creates opportunities for methods and evaluation system development of environmental competence formation. Thus, the analysis and evaluation of the environmental situation helps students to identify their values and meanings; self-actualization creates the conditions for their own value system's reflection by which students are guided in choosing a line of behavior in the course of solving environmental problems. Goal setting allows relating socially and environmentally based purpose of action in this situation, as well as varying degrees of emotion to express attitude to it, which eliminates the contradiction with the generally accepted values and norms. University graduates should make the transition from thinking and understanding of natural phenomena to social action, the moral act. Passive or active person as the subject of environmental behavior is closely related to the human awareness of environmental situation, personal importance of environmental issues. Human contact with nature, his health is always accompanied by anxiety. This dictates the need to assess the environment state of the place of residence, work, leisure etc.

The dialectical principle of students' environmental competence model is manifested in the fact that all components of the model are interrelated, complement and reinforce each other. For example, socio-cultural character of the ecological competence allowed to combine two of its function – social and cultural; on the other hand, environmental and professional functions combined position that environmentally competent professional should be willing and able to correctly predict, to act competently in situations that threaten life, safety and environment.

The dialectical principle of the model manifests itself in its opposite characteristics – it is both simple and complex, is the perfect character and at the same time, as close as possible to the original. The similarity between the developed model and the original appears in the likeness of the structures, and that, this similarity allows to transfer the acquired knowledge to the original.

It should be understood that the combination of social and cultural functions of ecological competence, as well as environmental and professional, does not mean a mechanical merger. We expect a synergistic effect resulting in the both sides (social and cultural, environmental, and professional) in their dialectical unity updating repeatedly increased value. In the future, this difference of the author's model developed up to the present, is taken as a basis for this main competence formation in students of all areas of training.

The conclusion that can be drawn based on the structural model analysis lies in the fact that students' environmental competence formation must direct the pedagogical efforts not so much on the individual components formation of environmental competence as on functional and structural relationships'



formation and development between them. This will ensure the integrity and systematicity.

Thus, our developed model, as well as its structural analysis, revealed the features of environmental competence formation, allowed to develop and to improve the knowledge of it. Obtained results have allowed to develop a system of assessment that consists of thirteen indicators which appear at low, average and high levels. The concept and the nature of environmental competence opening its particular units of measurement (integrated, determined in terms of individual components) helped to define diagnosis methodology, by which we considered the results of experimental work (Table 2).

**Table 2.** Diagnosis methodology of students' environmental competence formation

<b>Indicator</b>	<b>Diagnosis method</b>
<i>availability of motives and needs</i>	survey, expert evaluation method, interview, monitoring, self-assessment, documentation analysis
<i>availability of knowledge about the environmental competence</i>	survey, rankings, socio-ecological situations' analysis
<i>availability of regulatory environmental awareness</i>	parallel testing, frontal survey, bisection method
<i>ability to solve environmental problems</i>	review work, employment analysis, formal time study
<i>severity of emotional perception of nature</i>	monitoring, interview, analysis of educational assessment results, questionnaires, expert evaluation method
<i>environmental competence implementation in educational and scientific activities</i>	Reports' analysis of department activity, advisors' reports, monitoring, analysis of students' script
<i>degree of emotional attitude to environmental problems</i>	monitoring, interview, expert evaluation method
<i>manifestation of will in dealing with environmental problems</i>	monitoring, self- assessment, mutual assessment, expert evaluation method, text analysis
<i>formedness of ethic environmental position</i>	monitoring, self- assessment, mutual assessment, expert evaluation method, text analysis, scaling
<i>attitude to environmental competence manifestations</i>	monitoring, self- assessment, expert evaluation method
<i>attitude to environmental activities, healthy lifestyle</i>	testing, interview, questionnaires, expert evaluation method, monitoring
<i>participation in environmental activities</i>	monitoring, reports' analysis on educational work, mutual assessment, expert evaluation method
<i>attitude to introspection</i>	questionnaires, interview, self- assessment, monitoring

The ascertaining stage of the experiment, the purpose of which was to measure the baseline of students' environmental competence, to study the teachers' attitude to the problem and their readiness for environmental competence formation, was attended by 156 students and 19 teachers. Assessment and diagnostic methods (see Table 2) revealed that students'



environmental competence is formed mainly at the low level (about 77%) average level – about 23%, high environmental competence was not detected. In addition, classification review results and relationship analysis convinced that teachers are not prepared to the organization of work on students' environmental competence formation.

Accordingly, students' environmental competence formation require the review of principles and rules of study in the universities, as well as developed methodology of students' environmental competence formation.

Competence-based approach methodology requires a significant transformation of the traditional role of the teacher. Teacher understanding and accepting the aim of his professional activities as *the focus on the competent specialist formation* must constantly work on himself. It is a multi-vector direction of personality development. If such work is systematic and focused, the teacher will gradually create around himself an environment conducive to cooperative, collective intellectual and personal growth. In such circumstances, none of the participants of educational process will remain indifferent to the educational activity, since *any learning activity acquires the character of research and creativity*. Now, competent specialist formation is a direct result of education, and knowledge is not a result, but a means. The purpose of training activities, in this case is the assimilation of theoretical foundation, ways of action, which enable a person to carry out a whole series of actions of this class, not one training action.

Environmental competence formation is unthinkable under an authoritarian management style of education. Accordingly, the main form of employment becomes a dialogue, educational cooperation. The teacher is an organizer of dialogic interaction, when the attention is paid to the self-control development. In this case, each participant of the educational process will create the possibility of active research and creative activity.

Another important aspect of modern environmental education is the development and introduction of modern methodologies, techniques and learning technologies, as well as the creation of textbooks and teaching materials. It should be noted that there is an importance of new management principles and international standards usage in environmental management and quality management.

With a view to students' environmental competence formation, it is appropriate to:

- 1) create a new educational environment in the universities that offers multiple divergent, personal and professional professionals' development that is sensitive to the changing world, ready to face any unexpected situations and able to answer them by positive innovation activities, taking into account the interests, opportunities, aspirations and expectations;

- 2) change the content and methodology of educational process to make the laws of nature and society studied by taking into account the educational opportunities and student requests, with attention transferred from the problem of acquiring knowledge to the formation of future experts' system thinking;

3) stimulate sustained and systematic cooperation of students with teachers, in which most of the students will take the scientific schools, research, intellectual and moral self-development, linguistic and communicative competences' improvement, ability formation to a transformational, informative and organizational activities.

Environmental education must be a synthesis of three vectors: general training needed for professionals of any field; additional training in a particular specialty; specialists' training capable of solving interdisciplinary problems with environmental content. Accordingly, the work on students' environmental competence formation consists of three main areas:

1. environmental orientation formation (main directions' representation of the general cultural attitude towards nature in practical, valuable and sensitive areas);

2. environmental professional competence formation (duty, ability and willingness to make practical decisions following environmental safety);

3. environmental responsibility formation (integral value that allows a person to live in harmony with nature, other people and himself).

Substantiation is that university graduates, as independent professionals entering into working life must have:

— the idea that natural resources are not infinite, and therefore, any production technology should aim at a minimum consumption of materials and energy;

— knowledge of the laws of nature, an understanding of natural phenomena relationship, the ability to anticipate and assess the impact of interference in the natural course of events;

— environmental outlook, which refers to the consciousness of the priority solutions of environmental problems under any project implementation (advanced technologies' development or improvement, creation of machines and mechanisms, any economic initiative);

— the belief that any solution must pass an environmental assessment to be translated into practice without harming the environment.

The teacher cannot afford to generate students' environmental competence only with his own subject. We believe that not only the discipline "Ecology", but also other disciplines studied at the universities, should take part in solving actual problems of environmental competence formation. Physics, chemistry, biology and other disciplines are required to work together to solve this problem, which today has been transformed from a methodological into practical.

## Discussion and Conclusion

As an option, we offer the author's method of university students' environmental competence formation.

*Preparatory stage* focuses on teacher training in environmental competence formation and solves the following main tasks: teacher training, their motivation



and interest in the problem, adoption of theoretical knowledge and practical skills.

It is planned to carry out scientific-methodical seminars (including the use of information and communication technologies), attending open sessions, exhibitions on courseware, introduction of goals, objectives and features of environmental competence formation (in areas of training), environmental aspects' identification of natural sciences held for students of specific professions, informational distribution and promotion of methodical and edifying character, recommendations for teachers.

To achieve the goal, it is proposed to use programs of seminars, reports, manuals, guidelines, regulatory and legal documents, scientific and methodological literature, Internet resources (in areas of training), records of attendance etc. It is expected that the preparatory stage will make the faculty member ready for students' environmental competence formation (depending on the discipline, specialty and direction of specialist training).

*Design stage* focuses on health-educational environment and determining the nature of environmental competence formation. This stage is supposed to solve the following problems: strategic environment elements' planning and design, as well as the activities and events, didactic and methodological instruments' development, various information materials.

For this purpose, there is planned a research, design and planning of all forms of educational process, taking into account environmental aspects, materials' development, training and methodological support, demonstrating the importance of environmental competence in a particular profession. Design stage involves means such as employment records, plans, reports, recommendations, textbooks, teaching materials, and teaching aids. It is expected that the design stage will conduct the project that will be in compliance with goals and objectives of an educational environment studies, projects of employment and working patterns of teaching materials.

*Motivational stage* aims to prepare students for environmental competence formation (EC), actualization of professional self-determination problem. The main objective of the stage is the conviction of students in need of EC formation, its relationship with the future profession, health etc. Therefore, there is planned further professional self-actualization, attitude formation to study the profession, identify its relationship with the environment; attracting the attention of students to health problems, motivation of environmental responsibility formation; support for students in EC formation.

In this context, the following sources can be used: manual, online resources, educational materials, training and methodical literature etc. At the end of the stage, there are expected highly motivated students to EC formation, including the aspect of professional development.

*Transformational stage* is aimed at large-scale transformation of educational process in order to better EC formation and solves the following tasks: health protection technologies introduction in educational process, developed materials and plans, tools, forms and methods of EC forming.

In this connection, there is planned to prepare and conduct activities with the release of environmental aspects under the subject, solving vocational environmental-orientated situations, saturation of educational environment with elements forming the EC in all areas of future specialists' training.

Accordingly, the following instruments are used: educational-methodical, didactic, information materials, visual aids, plans, reports, protocols etc. As the results, there is expected transformation of all of the educational process in order to better EC formation.

*Synergetic stage* aims at integrating subject activities in EC formation. This goal is achieved through the following objectives: promotion of EC formation to the profession by means of interest and knowledge about it; stimulation and motivation of a healthy lifestyle; improving students' attitudes, mainstreaming environmental education at all levels and stages.

Therefore, it is planned to ensure coherence of faculty member to work on EC formation, accounting seminars' preparation and realization, meetings of students with representatives of various professions, relationship clarification of profession with the environment, the need in purposeful EC formation, updating health topics at all levels, saturation of the educational process with health elements, natural science departments' cooperation.

Implementation of these plans require the work program of academic department, reports on practice and placement, career guidance programs, brochures, medical statistics, reports on students' sports activities etc. As a result, there is expected a powerful effect by the synergistic interaction of subjects of EC formation.

*Innovatively creative stage* aims to maximize the use of obtained at the prior stage. There are the following tasks: to develop students' interest in a specific profession to personal traits necessary to master it, including environmental expertise; reduce the number of students, who have addiction to alcohol and smoking; to involve as many students as possible to sports and recreation, creative, research-related environmental performance.

In the course of innovatively creative stage, it is planned to further study students' professional aspirations, their professional interests' development, incentives and motivation of a healthy lifestyle (HLS), demonstrating the relationship of human health, his professionalism and environmental education, creative use of educational and information materials, role-playing games, competitions, to encourage and support students' creativity in SIW implementation.

It is logical to predict the feasibility of using the following instruments: employment analysis sheet, minutes of meetings of departments, promotion of HLS recommendations etc. As a result, there are expected meaningful procedural and personal-developmental conditions and factors of EC formation, its more efficient formation.

*Analytical stage* is aimed at improving and correcting the EC formation method. There are the following tasks: progress analysis and conclusions' formulation; lesson plans' correction, as well as working curricula,



methodological instrumentarium, health saving technologies. It is planned to conduct the diagnostic sections, data collection and analysis, report preparation, holding meetings of teachers of natural science departments – participants in the experiment, as well as attendance, analysis, discussion, processing of training and methodological support of EC formation.

For this purpose, there can be used instruments such as video lessons and activities, computer programs, presentations, Internet resources, a variety of documents based on students' educational activities, records, reports, analytical information etc. As a result, there is expected a correction of EC formation method.

*Control stage* aims to assess the effectiveness of improved EC formation method and has the following tasks: improved system and EC formation method implementation and testing.

At this stage, there is planned implementation of teachers' full-scale coordinated in EC formation, followed by a systematic diagnosis and feedback (the introduction of an improved system and EC formation method to study the dynamics EC formation in the experiment, conclusions' formulation), and the preparation and realization of final scientific and methodological conference.

In this connection, it is advisable to use the following: teachers' plans and reports, diagnostic tools, students' writing, creative and review works, attendance records etc. (Bubela, 2012; Gagarin, 2011). According to the results of the control stage, there is expected to receive the conclusion about the effectiveness of EC formation methods.

The presented method is only one of the variants of students' environmental competence formation. The next step is experimental testing of this methodology. We hope that the results will meet our expectations, and environmental competence formation of future specialists will be at a higher level.

### **Implications and Recommendations**

Students' environmental competence formation leads not only to improving the quality of their professionalism, but improves their relationship with nature, the world around, other people, society as a whole, brings up a healthy lifestyle, the basic system of values and culture. University graduates with environmental competence are able to provide ecological properties of goods, to develop and implement alternative energy sources, to ensure the environmental safety of goods and services.

The results will have a significant impact on the development of pedagogy and didactics in the universities.

The developed model of environmental competencies that reflects the ways and means of its effective formation in the universities will expand the idea of professional knowledge and skills, professional, personal, and moral traits of a specialist.

The social effect is that the environmental competence formation will make the specialist ready not only to do their job professionally, but at the same time, to respect the principles of ecology and humanity.

There is deepen and expand methodological knowledge and professionalism of the universities in environmental competence formation of a specialist.

Improvement of environmental education system, the expansion of axiological space for more efficient formation of basic personality values.

These research results can be used by all concerned parties, educators and education institutions.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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