Під час дослідження розроблено структурно-функціональну модель формування професійних компетентностей у системі післядипломної освіти та визначено її основні компоненти (цільовий, методологічний, аналітичний, прогностичний, адаптивний, комунікативний, мотиваційно-гностичний, інноваційний). Дана модель є узагальненою системою зі системною моделлю вимагає відповідних управлінських рішень щодо подальших дій командного та викладацького складу вищих військових навчальних закладів України направленіх на отримання позитивного результату в процесі надання якісних освітніх послуг в системі вищої професійної освіти.

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1. Introduction

Requirements of the modern society motivate specialists to the continuous self-improvement and development of professional competences that condition their demand for different forms of adult education. It concerns also specialists of the ecological direction, because there takes place the fast renovation of modern scientific knowledge in the ecological branch, especially as to the methodology of organization and realization of environmental monitoring in the context of the sustainable development strategy. So, it is necessary to elaborate a model of professional competences formation in ecological specialists at different stages of the National qualification frame in the system of higher and postgraduate education.

2. Literary review

We used elements of pedagogical modeling at constructing the model. Pedagogy investigated theoretical aspects of modeling [1, 2], use of modeling methods at higher school [3]. The method of pedagogical modeling is widely used for studying processes and phenomena, properties of objects, establishing dependencies between all components of the learning-cognitive activity [4, 5].

Modeling is a base of the system analysis of the studied problem, because it is possible to study the educational process completely and to separate all components of it [6]. Other authors think that this approach helps to prevent negative scenarios due to prognostication of the development of separate processes in the system [7].

The literature widely elucidates the problem of postgraduate ecological education of teachers [8], formation of the ecological competence in schoolchildren [9], problem of ecological education and upbringing in future specialists [10].

The problem of the professional competences development in environmental monitoring in the system of postgraduate education is left beyond scientists’ attention. So, there is a necessity in investigating the content and methodological support of training ecological specialists in the system of postgraduate education and elaboration of a structural-functional model of their professional development.

3. Aim and tasks of the research

The aim of the research – is to define components of the structural-functional model of the development of professional competences in environmental monitoring in ecological specialists.

The following tasks were set for attaining this aim:
1) To elaborate the structural-functional model of the development of professional competences in environmental monitoring;
2) to determine organizational-pedagogical conditions of the professional competences development in specialists of the nature protection branch;
3) to characterize main stages and structural components of the model.

4. Peculiarities of the structural-functional model of the professional competences development in environmental monitoring

Modeling of the system of formation of professional competences in ecological specialists is conditioned by the complexity and numerous aspects of the system, separation of main components in it, establishment of the whole totality of interconnections, investigation of characteristics of both separate elements and system as a whole, obtaining of new scientific-pedagogical and methodological knowledge as to organization and functioning of this system.

The structural-functional model of the professional competences development in environmental monitoring in ecological specialists is a generalized system with a system-innovative approach to improving theoretical knowledge and practical skills in the field of environmental monitoring, especially monitoring of stability and development of systems (fig. 1).

The aim component is system-creating, because all system components are directed on attaining the aim, namely development of professional competences in ecological specialists according to demands of labor and social market for improving their professional activity. Tasks of the professional development of nature protection specialists in the system of postgraduate education are: to develop professional competences in environmental monitoring; to separate personal-professional qualities to motivate to self-development and self-improvement in the professional activity during the whole life.

The structural-functional model is complex, because it contains the main stages of the professional competences development in environmental monitoring in the system of post-graduate education – improvement of professional competences at improving the qualification, probation, retraining nature protection specialists, especially at studying the special course “Monitoring of sustainable development” with the nature protection and nature resource, theoretical methodological, analytical-prognosticating background and also acquiring scientific degrees.
The success of realization of the model in the system of postgraduate education is determined by organizational-pedagogical conditions:

1) improvement of the content component of the professional development of ecological specialists;
2) complex combination of different forms of organization in the studying process for developing professional competences;
3) creation of innovative-educational space of environmental monitoring in the system of postgraduate education.
Specialists of the nature protection branch that work by different qualifications (state, expert-control, inspection, departmental, scientific and educational, social institutions, production, nature protecting, enterprises, institutions, public organizations) have already acquired practical experience and improve their professional competences in the system of post-graduate education.

5. Research results and their discussion

The elaborated model is internally-organized and functional-activity, and contains main components: purpose, conceptual, content, operational-activity, control-regulative, resulting-diagnostic.

1. Purpose – determines the practical directionality of ecological specialists’ activity in environmental monitoring.

The purpose component is directed on training, retraining and qualification improvement of ecological specialists in environmental monitoring and provides conditions for personal self-realization, revelation of talents and inclinations, formation of professional competences, especially, ability to solving complicated ecological situations by non-standard and operative methods, to professional mobility. This component is system-creating, because all other ones of the model are directed on attaining the aim – training of a competent, mobile, competitive specialist with personal and professional values, deep theoretical-fundamental and professional-practical knowledge, skills and abilities, able to solve complicated ecological problems. For forming the aim, the modern labor market was analyzed, the low professional activity and motivation to the work among specialists-ecologists was revealed.

The main aim of the system of postgraduate education is to form the motivation to self-education, self-development and self-improvement in ecological specialists that in further determines the method of improving professional competences in environmental monitoring.

2. Conceptual – determines theoretical-methodological approaches (personal-activity, synergetic, system, integration) and scientific-pedagogical principles of study that provide the effectiveness of improving professional competences in environmental monitoring in ecological specialists.

3. Content – content and components of training of ecological specialists up to the development of professional competences as a base of the complex program elaboration.

The content component provides acquiring base special (professional) and scientific knowledge in environmental monitoring, on which base general scientific, fundamental, assessing, applying, system-modeling competences and also ability to self-development and self-improvement are formed in specialists. We separated components of training a specialist in environmental monitoring: special and professional (informational, graphic, professional-motivational, gnostic, communicative-adaptive), scientific and research (methodological, analytic, prognostic), laboratory and practical (methodical, organizational, activity) that mutually add each other and are closely connected.


The use of methods, forms and means depending on an educational level help to master theoretical-practical and scientific research knowledge, to improve abilities and skills to self-education and self-development, use of the system approach in the professional activity, striving for acquiring theoretical-fundamental and analytical-prognostic knowledge. The system of postgraduate education contains explaining-illustrative, practical, information, problem-solving, control studying methods; Forms – lectures and laboratory activities, self-education, excursions, trainings, conferences, webinars, brain storm, discussions; means - multimedia technologies, e-technologies, GIS-technologies, laboratory equipment, laboratory of quality of environmental components, learning-methodical and normative-legal support.

5. Control-regulative – teacher’s control over set studying tasks, self-control over correctness of making tasks at all stages of professional competences formation and realizes the direct influence on all components of the model of the studying system of environmental monitoring. This component is directed on diagnosing the ecological specialists’ readiness to the professional activity in environmental monitoring, inspection and correction of mastering of elements of the content component.

6. Resulting-diagnostic – assessment of the effectiveness of functioning of the model at the expanse of checking formation levels of educational competences. The main criteria of the resulting-diagnostic component are cognitive (quality, content and volume of acquired knowledge); activity-practical (formed abilities and skills that specialists are able to use and develop in the practical sphere); motivational-value (motivation to self-studying, self-development, self-improvement, acquiring of personal-professional qualities); information-technological.

As a result nature protection specialists’ ability to planning the activity of nature protection structures, improvement of the system managing of environment protection, assessment and analysis of ecological impacts, elaboration of recommendations as to raising the ecological efficiency of enterprises and economies, practical elaboration of systems of socio-economic-ecological monitoring, saving of the biodiversity development, analysis and prognostication of ecological problems develop.

The elaborated structural-functional model is a system that reflects the content filling of training ecological specialists, main scientific-methodological statements (principles, phenomena, processes) that may be corrected, corresponding to concrete requirements of the professional activity of specialists-ecologists and also to the future development in the spheres of education and ecology.

6. Conclusions

1. The structural-functional model of the professional competences development of environmental monitoring in ecological specialists is realized through the purpose, conceptual, content, operational-activity, control-regulating, resulting-diagnostic components and connections between them.

2. It was established, that this model structures and improves formation stages of professional compe-
tences in ecological specialists, determines organizational-pedagogic conditions of this process.

3. There was studied the method of formation professional competences of environmental monitoring in the system of postgraduate education through studying principles, content filling, methods, forms and studying means, diagnostics of knowledge, abilities and skills that in the final result will form a high-qualified specialist, able to solve complicated ecological problems in the professional activity.

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Natalia Bordiug, PhD, Associate Professor, Department of Environmental Safety and Natural Resources Management, Zhytomyr National Agroecological University, Staryi bd., 7, Zhytomyr, Ukraine, 10008
E-mail: natali-21@ukr.net

Nataliia Ridei, Doctor of Pedagogical Sciences, Professor, Department of Adult Education, National Pedagogical Dragomanov University, Pirogova str., 9, Kyiv, Ukraine, 01601
E-mail: nataliia.ridei@gmail.com