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The development of information competences for environmental monitoring in students of Ukrainian universities

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Abstract

In the article the organizational and pedagogical conditions of information competences formation for future specialists in ecology while studying the course "Environmental Monitoring" is substantiated. The scheme of students information competence formation is developed. The importance of tutor preparation to competences approach and attraction of students to creation of environmental monitoring databases is showed.

Key words: organizational and pedagogical conditions, information competences, training course, environmental monitoring system.

Introduction

In 2010 the Law of Ukraine "On main principles (strategy) of the State Environmental Policy of Ukraine till 2020" came into force, establishing objectives for the promotion of information centers development, creation of nationwide automated information system for ensuring access to environmental information and the instrument for implementing environmental policy is national environmental monitoring and control in the field of environmental protection and environmental safety. Accordingly, it is important to prepare specialists in ecology with information competencies, providing ability to work across departmental and scientific institutions and manage efficiently natural processes, implement practical recommendations and measures on prevention of negative changes in the environment and ensuring the proper functioning of natural and technological systems, preservation of health and gene pool of the nation.

Main part

Based on interpretations of scholars the concept of environmental monitoring has been compiled and systematized by G. Bilyavsky based on the analysis of works by Y. Izrael, V. Medvedev, V. Laktimova, A. Bondar, A. Tarariko, E. Varlamov, M. Ashyhmina, M. Klimenko, A. Vozniuk. Theoretical grounds, presented in modern higher education while teaching the subject "Environmental monitoring", are reflected in the works by M. Klimenko, V. Bogolyubov, A. Prischepa, V. Isayenko etc. Theoretical and methodological issues of environmental education as one of the basic components of education for sustainable development are discussed in details in the works by M. Argunova, G.A. Bilyavsky, N.S. Kasimov, N.M. Ridey, Y.L. Mazurov, A.P. Meshchaninov, N.A. Poustovit, T.V. Saenko, S.M. Stepanenko, B.C. Tykunova, S.M. Shmal and others.

Common problems of forming system of professional competences development, as well as the development and implementation of competence approach in higher education standards are covered in the works by Ya.Ya. Bolyubash, V.M. Bocharov, O.A. Bulavenko V.V. Kostyhina, K.M. Levkovsky, M.L. Nyushenkova, N.M. Ridey, V.P. Solomin, N.I. Tymoshenko and others.

In 2006, the European Parliament and Council framework guideline has outlined key competences for lifelong learning that contribute to adaptation of all strata of citizens to global social challenges, one of which is computer literacy, which involves the use and critical evaluation ITS, their application in work, leisure and communication [Ridey 2011]. Future environmental experts should be provided with information competences, especially in the study of environmental monitoring.

The purpose of the article is to study the organizational and pedagogical conditions of information competences formation in teaching the course "Environmental Monitoring".

We have identified the following organizational and pedagogical conditions of information competences formation in teaching the course "Environmental Monitoring":

I) combination of classroom theory and applied training in industrial, institutional, research practical training and training in the future workplace.

During theoretical and practical classroom training students will be provided with the following competencies: basic knowledge of science and modern information technologies; the ability to create databases and use online resources; master the methods of processing environmental information and the ability to assess the condition of natural objects based on monitoring results; acquire practical skills to obtain and visualize information on the current status of the various environment components. These knowledge and skills future environmental specialists will be used during their industrial and pre-diploma practice in re-

search institutions. As a result, information competencies will be formed in students enabling them to solve successfully tasks during training at the workplace (Figure 1).

II) Formation of course content "Environmental monitoring" by teachers, scientists from research institutions, government employees, future employers and other interested parties in common.

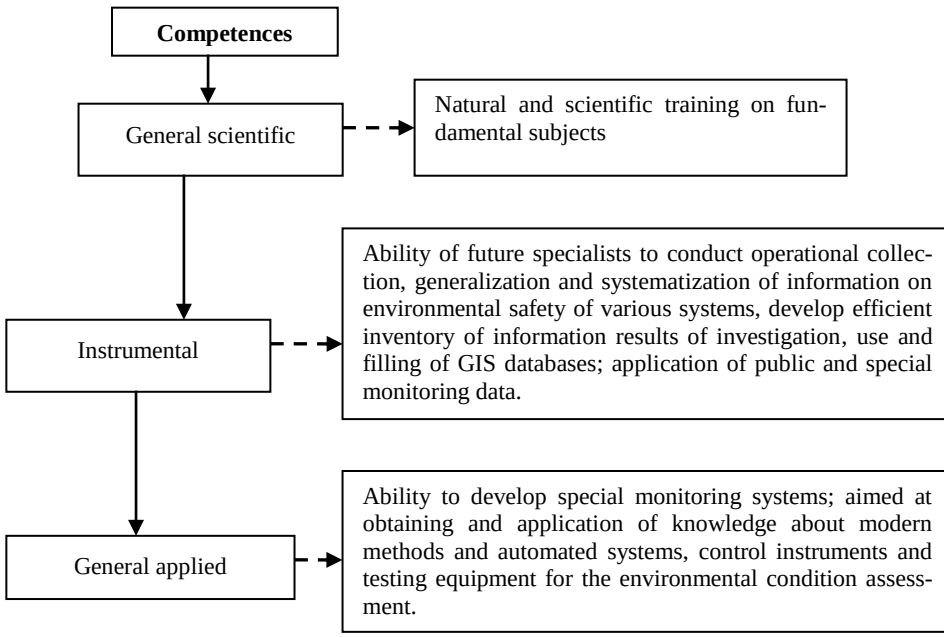

Figure 1. Structural and logical chain of infomation competencies formation in future environmental experts during the training course "Environmental Monitoring"

All subjects of environmental monitoring system (public and academic institutions) must be actively involved in the formation of training course content that will facilitate the implementation of scientific achievements in environmental monitoring training for the formation of relevant environmental competencies during classroom lectures, laboratory classes and during self-study of the subject "Environmental Monitoring". In this process the professional competence of a tutor, who is constantly self-developiong via research activities, is of primary importance. It is necessary to distinguish the following stages of preparation of the teacher to the competence approach:

1 – study of fundamental scientific and methodological sources and modern textbooks on environmental monitoring, study research, developments, methods of research institutions, as well as updates of legal provision for the training course;

2 – the development or improvement of content and provision (scientific methodological and information-analytical) of training programs, identify new interdisciplinary connections between science and knowledge;

3 – apply modern training instruments (multimedia, interactive, mobile, etc.) in theoretical and practical training, including international and domestic standards, research methods, methods of environmental objects condition evaluation and determination of pressure indices on the environment, introduce information resources for obtaining current environmental monitoring data (Table. 1), etc.

4 – development of training manuals, textbooks and their scientific and methodological support by leading scientific, teaching staff of Ukraine and the world;

5 – scientific validation of research results at conferences, seminars, round tables to implement academic mobility;

6 – training in leading scientific institutes of Ukraine and the world.

Table 1. Information resources on environmental monitoring

#	Subjects of environmental monitoring system	Access
1.	State Statistics Service of Ukraine	http://www.ukrstat.gov.ua/
2.	Ministry of Ecology and Natural Resources	http://www.menr.gov.ua/
3.	State Water Resources Agency of Ukraine	http://www.scwm.gov.ua/
	Ministry of Agrarian Policy and Food of Ukraine	http://www.minagro.gov.ua/
4.	Ukraine State Service of Geodesy, Cartography and Cadastre	http://www.land.gov.ua/
5.	State Agency of Forest Resources of Ukraine	http:// www.dklg.kmu.gov.ua/
6.	State Service of Geology and Mineral Resources of Ukraine	http://www.geo.gov.ua/
7.	State Emergency Service of Ukraine	http://www.mns.gov.ua/
8.	State Sanitary and Epidemiological Service of Ukraine	http://www.dsesu.gov.ua/
9.	State Agency for Management of Exclusion Zone	http:// www.dazv.gov.ua/
10.	Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine	http:// www.minregion.gov.ua/
11.	Ministry of Social Policy of Ukraine	http://www.mlsp.gov.ua/
12.	Ukrainian Center of Land and Resource Management	http://www.ulrmc.org.ua/

While studying the theoretical materials on the subject “Environmental monitoring” the tutor must use using multimedia information system at lectures – technical facilities, which includes multimedia projector, multimedia board, laptops, webcams, speakers etc. Another compulsory element of multimedia lectures structure is the compliance with its efficient algorithm, which includes

information delivery (preparation of students to active learning); interactive material perception (visual presentation of educational material – drawings, diagrams, videos, etc.); activation of abilities and skills (generalization of educational material); knowledge diagnostics (entrance, intermediate and final control of knowledge). During the lectures you can use Internet technology such as online conferences. In addition to presenting training material by the tutor, specialists in environmental monitoring, representatives of environmental monitoring subjects, authorities dealing with environmental monitoring, environmental monitoring program developers, researchers and scientists could be involved into the process of teaching the lectures.

III) Formation of databases for environmental monitoring: the state, sectoral, regional, local by joint efforts of teachers and scientists for the development of teaching and methodological provision of educational process.

It can be argued that in Ukraine that completeness and accuracy of the environmental information, obtained in the process of environmental monitoring and provided to the govermental and non-govermental authorities, do not always meet public needs and demands. This includes information on the state of natural resources, their environmental and economic assessment, the impact of technogenic pressure on the components of environment and quality of life.

Since the environmental monitoring systems of various departments are developed at different information platforms with various software, the scholars and teachers have no access to their data. Therefore the intensity of research in the field of monitoring and the introduction of modern research results on environment study in the training of future environmental experts.

However, in order to form students' information competences it is important to introduce creative tasks, namely the development of environmental monitoring system for the “homeland”. Thus, they make the selection of diagnostic methods for environment components parameters testing in the developed system, diagnostics hardware, laboratory conditions for the study. For the development of monitoring system they will use the initial information (statistical reports), information base for the creation of personal description of the research object territory (ecological and geographical description).

Conclusions

Thus, the future expert-ecologist must address new scientific environmental problems for the provision of environmental measures, natural resources management and environmental safety, implement optimum environment management decisions aimed at elimination of negative changes in the environment, and optimization of the environment quality indicators, in accordance with international standards of environmental management. Therefore, the formation of in-

formation competences of future specialists in ecology requires systematic fulfillment of administrative and pedagogical conditions that must be considered in the training course “Environmental Monitoring”.

Literature

Bordiuh N.S. (2015), *Selection of Technical Instruments in Training the Course “Environmental Monitoring” for Future Ecologists*.

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