The Social Sciences 12 (11): 2034-2039, 2017
ISSN: 1818-5800

Environmental Competence of the Future Mining Engineer in the Process of the Training

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Abstract: A holistic solution to the problem of formation of ecological competence of the future engineer requires the definition of its content, structure, place in the system of professional competences, levels of forming and criteria of measurement, the rationale for the selection and development of a technique of use of information, communication and learning technologies that promote formation of ecological competence. The study is of interest to environmental competence of future mining engineer as personal education, characterized by acquired in the process of professional preparation professionally oriented environmental knowledge (cognitive criterion), learned the ways of securing environmentally safe mining works (praxiological criterion) in the interests of sustainable development (axiological criterion) and is formed by the qualities of socially responsible environmental behavior (social-behavioral criterion) and consists of the following components: understanding and perception of ethical norms of behaviour towards other people and towards nature (the principles of bioethics); ecological literacy; possession of basic information on the ecology necessary for usage in professional activity the ability to use scientific laws and methods in evaluating the environment to participate in environmental works to carry out ecological analysis of activities in the area industrial activities to develop action plans for the reduction of the anthropogenic impact on the environment; ability to ensure environmentally balanced activities, possession of methods of rational and integrated development georesource potential of the subsoil.

Key words: Environmental competence, education, ecological literacy, future mining engineer, georesource, ability

INTRODUCTION

The main regulatory document, defining the legal and organizational principles of Mining Engineers Profile of mining operations, providing emergency protection of mining enterprises, institutions and organizations is the Mining Law of Ukraine in 1999. The law regulates preparation for carrying out of mining works and mining, exploitation of mining enterprises, emergency protection and safety of mining operations in particularly environmental safety of mining operations, especially working conditions in the mining industry, cessation of activity of mining enterprises and others. Article 7 of the Mining Law of Ukraine defines the following principles of state policy in the mining industry: state regulation of activity of mining relations subjects in the mining industry:

- Safe operation of mining enterprises
- Rational use of mineral resources

Development and improvement of the technical level of mining industries:

- Creation of conditions for new construction, reconstruction and improvement of the technical level of mining
- Increasing of the environmental safety of mining enterprises
- Promotion of competitive relations on the market of mineral resources
- Compliance with state standards and regulations by all subjects of mining relations
- Providing training of highly qualified personnel for the mining industries

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- Creating conditions for prospective scientific research in the field of mining relations
- State support for mining enterprises
- Protecting the rights and interests of workers of mining enterprises

Hasna (2012) considers the function of sustainable development as a model of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only by modern but also future generations. Thus, the state policy in the mining industry is aimed at the sustainable development of mining industry, science and education.

Despite the artificial equality of the components of sustainable society development they are not commensurate: in the report of the 1987 world Commission on environment and development of "our common future" (WCED, 1987) among the topics of sustainable development (population and human resources, food security, species and ecosystems, energy, industry and urban development) is environmental development (environment, sustainable use of non-renewable resources, etc.) as a component of the system.

Thus, the main environmental requirements in the field of mining, prevention from harmful impact of mining operations and ensuring environmental safety during mining operations is not only the subject of separate articles of the Mining Law of Ukraine but according to discussed in Section 1.2 standards are mandatory components of training environmentally competent mining engineer (Hryshchenko, 2015; Golik *et al*., 2015).

MATERIALS AND METHODS

The study is carried out in "Kryvyi Rih National University" according to the plan of joint research laboratory using cloud technologies in education process of "Kryvyi Rih National University" and the Institute of Information Technologies within the research project "adaptive system of individual teaching for mining engineers based on the integrated structure of artificial intelligence "a digital tutor" (Hryshchenko and Morkun, 2015). The researcher analyzes sources devoted to investigating the problems of ecological competence formation and usage of geoinformation technology in the teaching future mining engineers (Morkun *et al*., 2014). This research also improves the system of competence among future mining engineers gives its theoretical explanation and represents geoinformation technology means used in education process (Golik *et al*., 2015).

RESULTS AND DISCUSSION

Bibik defines competence as "alienation from the subject, a predetermined social norm (requirement) for training necessary for quality productive activity in a certain area that is socially prescribed result". It is in this way as a pre-assigned requirement was identified each competency of a mining engineer in Section 1.2. However, "the result of the attainment of competence is a competence which is in contrast to competence involves personality characteristics, attitude to the subject of activity. Competence can be derived as real requirements to... mastering knowledge, ways of activity, experience of relations from a particular field of knowledge, qualities of personality that acts in society" (Gagarin, 2011).

Thus, structurally a competence is personal education, formation of which can be defined as using the acquired knowledge (cognitive criterion), learned ways of working (praxiological criterion), attitude towards them (axiological criterion) and formed social quality (socio-behavioral criterion).

Interpretation of ecological competence: Gagarin (2011) a person's ability to integrate environmental knowledge and skills, methods of their use in various types of practical activity, willingness of a person to implement eco-friendly activities, their experience on the protection of the natural world and solution of environmental problems.

Pistunova (2006) personal characteristic including knowledge about the natural environment as important values the impact and standards of human interaction with the environment; ability to creatively solve educational, environmental problems; experience of participation in practical activities to protect and improve the environment; environmentally significant personal qualities (humanity, empathy, thrift, responsibility for the results of their environmental activities).

Romeiko (2000) integrative characteristics of personality including ecological knowledge, ecological outlook, ecological thinking, individual experience, personal qualities and practical skills, ensuring an eco friendly activity of a specialist.

Sahlebnyi and Dzjatkovska the ability to carry and comprehensively apply study skills and subject knowledge to the design and organization of ecologically safe activities (actions, behavior) in the educational (model) socially problematic environmental situations in sustainable development, human health and safety.

Glushkova (2011) integrative education which includes components such as ecological core of a personality (neoformation of the personality spheres in conjunction with the generated ecologically important personality traits) in interaction with environmental, communicative, psychological, pedagogical, social and methodological competences of a teacher and represents their synthesis and indissoluble unity.

Makarova (2011) formation of a complex system that consists of cognitive, motivational and professional-activity components. Ermakov a meaningful

mastery of theoretical knowledge, skills, ways of making decisions, moral norms, values, traditions, necessary for the practical implementation of environmentally friendly activity.

Litvinova (2013) a complex of interrelated components: cognitive (volume, strength and awareness of social-ecological knowledge about the nature and methods of environmental activities), motivational-value (expression of value judgments about the nature and environmental activities), practical activity (the acquisition of environmental action skills and environmental).

Alekseev the integral formation that includes environmental values and their corresponding motivation to activities, ecological literacy (education) and own experience of using the literacy to address specific problems (environmental, social-ecological, cultural, household, etc.).

Gruzdeva complete personal formation which is determined through human value orientations and formed as a result of their activities in the environment accordingly to natural laws and socially responsible behavior that contributes to personal fulfillment in all areas of life without imbalance in the system "nature society".

Budnik and Budnik achievement of a certain level of professional knowledge and culture, providing the opportunity to solve the most urgent tasks related to the harmonization of relations between society and environment.

Ryabov (2012) perceived ability and readiness for productive environmental activities aimed at improving the state of the environment in the process of diagnose, resolving and preventing environmental problems

Shulpina (2001) professional-personal characteristics based on the integration of knowledge, skills in the field of ecology and moral attitude to nature through willingness to choose, apply and create technology that meet the requirements of the moral and environmental imperatives

Nasurova (2011) integrated property of the person including professional knowledge, skills and functional qualities of a practical orientation characterized by the degree of involvement in a meta-system "nature man society" and the qualities required for the implementation of environmentally friendly activities, organized in the unity of cognitive, content-informational, reflexive-active and motivational-value components

Galieva (2011) an integrative quality of personality that determines their ability to interact in the system "nature man society" in accordance with the acquired environmental knowledge, skills, beliefs, motives, values, ecologically important personal qualities and practical experience in environmental activities and effective use of a range of program-technological means, united in a technological chain that provides collection, storage, processing, presentation and dissemination of environmental information.

Nefedova (2012) an integral characteristic of personality including humanitarian-oriented values, motives, knowledge, skills and ways of implementation of social and productive activities serving the ideological basis of formation personal experience of environmentally responsible behavior and coevolutional interaction with natural reality.

Tomakov (2007) individual characteristic, expressed in the unity of motives, theoretical knowledge, practical skills for the implementation of all types of their professional activities that meet the requirements of production, ensure the safety of human life and environmental protection.

Makojedova (2007) personal quality formation which is a unity of ecological orientation of the individual and the experience of nature-oriented activities as its subject.

Chopenko (2009) an integrative quality of personality that determines their ability to interact in the system "man society-nature" in accordance with the acquired environmental knowledge, skills, beliefs, motives, values, ecologically important personal qualities and practical experience of environmental activities.

Glazachova (2009) the integral feature of eco-oriented individual presented through motivational value, cognitive, active-behavioral, emotional-volitional and reflexive components.

Zhdanova (2009) integrated characteristics of teacher's professionalism in the field of environmental education, reflected in their readiness for effective ecological and pedagogical activities.

Bazarov (2009) person's ability to integrate environmental knowledge and skills, methods of their use in various types of practical activities, the willingness of a person to implement eco-friendly activities, their experience in the protection of the natural world and solution of environmental problems.

Petruchina (2006) professional-personal characteristics of a future teacher including motivational, cognitive and technological competence and providing an ability to create and apply technology favorable to health.

Sharonova (2006) combination of ecological knowledge, skills and experience necessary for transformative environmental activities and personal qualities that form the basis for forming ecocentric type of ecological consciousness. Oliynyk (2005) the integrated

result of educational activity of students, formed primarily due to the acquisition of content objects in the environmental field and gaining experience in the use of ecological knowledge in the study of the special subjects and professional cycles.

Tytarenko (2007) ability to apply ecological knowledge and experience in professional and life situations, guided by the priority of environmental values and non-pragmatic motivation of interaction with the environment based on awareness of personal involvement in environmental issues and responsibility for the environmental impact of their professional and everyday activities.

Gurenkova (2009) component of professional competence, characterized by formation of professional and personal qualities (motivated by a desire of self-improvement, an ability to determine the effect and systematically see the consequences of professional activities on the natural environment), professional activity behavior (conscious decision making in conditions of professional activity, ensuring the safety of people and environment; ability for professional reflection) and the presence of moral values and priorities (readiness for empathy, tolerance, responsibility).

Khripunova (2009) an integrated personality education which reflects the unity of theoretical and practical readiness to effectively implement environmentally oriented professional activities (to control environmentally safe operation of industrial facilities to conduct engineering protection of the environment, to liquidate environmental emergency situations of technogenic and natural origin).

CONCLUSION

The results of the analysis show that the main key words that different researchers refer to environmental competence are as follows. In relation to the subject activity: “person”, “personality”, “personal”, “education”, “characteristics”, “ability”, “willingness”, “quality”, “behavior”, “society”; In relation to the object of activity: “value”, “moral nature”, “environment”, “nature”, “natural”, “preservation”; in relation to the content and nature of the activity: “environmental”, “professional”, “practical”, “experience”, “ability”, “skill”, “use”, “knowledge”, “cognitive”, “system”, “provide”, “significant”.

Due to the fact that, by definition of DeSeCo specialists, environmental sustainability (ecological sustainability) is the basis of the key competences of the individual associated with success in society (the definition and selection of key competencies), consideration of environmental competency is advantageously carried out at three levels: on the general level of ecological culture and environmental awareness (Alekseev, Gagarin) on a social-professional level of environmental literacy (D.S. Ermakov, Zhdanova, Sahlebnyi) on the special professional level of environmental competence (Bazarov, Budnik, Budnik, Shulpina).

Under environmental culture after (Gagarin, 2011) we understand the integrative quality of the individual that reflects the psychological, theoretical and practical readiness of a person to take responsibility for the environment, a person’s ability to use their environmental knowledge and skills in practice; environmental culture describes the features of consciousness, behavior and human activity in interaction with nature.

The basis of ecological culture is the ecological consciousness of the personality namely a system of ideas about the natural world, personal (subjective) attitude to the natural world, technology interaction with the natural world and ethical (value) attitude to the natural world (Gagarin, 2011).

Formation of ecological competence requires the introduction of environmental knowledge and environmental activities in the value system of the individual. Sovgira points out that “in this case, the sequence of the main elements will be: knowledge of the environmental problems of the surrounding world (knowledge, perception (feeling)); observations of causal connections in the outside world (contemplation, attention, personal experience, memory, imagination); emotions, thinking (transformation of images and ideas that are fixed into memory, qualitative shifts in the structure of consciousness (concepts, judgments, conclusions), the creation of individual “picture of the world”); belief (ordered views on nature, society and their interaction, ecological and environmental motives and needs of the individual to act according to their inner positions, views); activities (implementation of theoretical and practical environmental work and environmental work)”.

This interpretation of ecological culture contains ecological competence which in turn is part of environmental education: ecological literacy (the development of knowledge and skills)¬environmental education (complemented by the experience of creative application of acquired knowledge and skills and experience emotional and value attitude to reality)¬environmental competence¬ecological culture. Based on the interrelation between the concepts of “environmental competence”, “environmental awareness”, “ecological culture”, Gagarin highlights the following functions of

ecological competence: ideological, methodological, environmental, value-based, predictive, social, cultural and professional (Gagarin, 2011). The ideological function reflects the level of formation of axiological and cultural, prognostic and methodological functions is a reflection of the high level of development of environmental, social and professional.

The analysis provides the ability to determine environmental competence of future mining engineer as personal education, characterized by acquired in the process of professional preparation professionally oriented environmental knowledge (cognitive criterion), learned the ways of securing environmentally safe mining works (praxiological criterion) in the interests of sustainable development (axiological criterion) and is formed by the qualities of socially responsible environmental behavior (social-behavioral criterion) and consists of the following components: understanding and perception of ethical norms of behaviour towards other people and towards nature (the principles of bioethics); ecological literacy; possession of basic information on the ecology necessary for usage in professional activity; the ability to use scientific laws and methods in evaluating the environment, to participate in environmental works, to carry out ecological analysis of activities in the area industrial activities, to develop action plans for the reduction of the anthropogenic impact on the environment; ability to ensure environmentally balanced activities, possession of methods of rational and integrated development georesource potential of the subsoil.

REFERENCES

Bazarov, E.L., 2009. Development of environmental competence of future specialists abstract. Ph.D Thesis, Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia.

Chopenko, L.S., 2008. Formation of ecological competence of students 8-11 grades in teaching Geography. Ph.D Thesis, I.Yakovlev CHSPU, Cheboksary, Russia.

Gagarin, ?.V., 2011. Environmental competencies of a personality, psychological and acmeologie research: Monograph. Ph.D Thesis, Peoples' Friendship University of Russia, Moscow, Russia.

Galieva, G.M., 2011. Formation of ecological competence of students in learning of science subjects on the basis of information technologies. Ph.D Thesis, Tatar State Humanitarian-Pedagogical University, Moscow, Russia.

Glazachova, A.O., 2009. Formation of ecological competence of future designers in professional training. Ph.D Thesis, Moscow University for the Humanities, Moscow, Russia.

Glushkova, L.S., 2011. Model of formation of ecological competence of E future teacher. Gen. Prof. Educ., 3: 3-7.

Golik, V., V. Komashchenko and V. Morkun, 2015. Innovative technologies of metal extraction from the ore processing mill tailings and their integrated use. Metallurgical Mining Ind., 3: 49-52.

Gurenkova, O.V., 2009. Formation of environmental competence of future specialists of water transport in the conditions of credit-modular training system. Ph.D Thesis, National Academy of Educational Sciences of Ukraine, Ukraine.

Hasna, A.M., 2012. Dimensions of sustainability. J. Eng. Sustain. Community Dev.: Energy Environ. Health, 1:47-57.

Hryshchenko, S. and Morkun, V., 2015. Using gis-technology in role-play as an effective means of ecological competence formation among the future engineers. Metall. Min. Ind., 4: 139-142.

Hryshchenko, S., 2015. Modern approaches in the study of engineering students. Ph.D Thesis, Kryvyi Rih National University, Kryvyi Rih, Ukraine.

Khripunova, A.L., 2009. Formation of environmental competence of future engineers of civil protection. Ph.D Thesis, H.S. Skovoroda Kharkiv National PedagogicalUniversity, Kharkiv, Ukraine.

Litvinova, O.A., 2013. Formation of ecological competence of younger students in extracurricular activities. Ph.DThesis, Saratov State University, Saratov, Russia.

Makarova, E.A., 2011. Methodology of formation of ecological competence of future teachers: Collaboration technologies. Ph.D Thesis, Humanitarian Leadership Academy, Kenya.

Makojedova, A.O., 2007. Formation of ecological competence of students in environmentally oriented activity of the gymnasium. Ph.D Thesis, Smolensk State University, Smolensk, Russia.

Morkun, V., S. Semerikov and S. Hryshchenko, 2014. Environmental competency of future mining engineers. Metall. Min. Ind., 4: 4-7.

Nasurova, N.V., 2011. Formation of ecological competence of managers in the process of professional training in higher school. Ph.D Thesis, Mari State University,Yoshkar-Ola, Russia.

Nefedova, Z.U., 2012. Formation of ecological competence of pupils in advanced education. Ph.D Thesis, Orenburg state University, Orenburg, Russia.

Oliynyk, N.Y., 2005. Formation of ecological competence of students of hydrometeorological educational institutions in teaching information. Ph.D Thesis, Ukrainian Engineer-Pedagogical Academy, Kharkiv, Ukraine.

Petruchina, I.V., 2006. Formation of ecological competence of a future teacher of physical education and life safety. Ph.D Thesis, Chelyabinsk State Pedagogical University, Chelyabinsk, Russia.

Pistunova, L.E., 2006. Formation of ecological competence of university students. Ph.D Thesis, Kemerovo state University, Kemerovo, Russia.

Romeiko, N.V., 2000. Scientific and pedagogical bases of designing the content of advanced post-graduate environmental education. Ph.D Thesis, Tyumen state University, Tyumen, Russia.

Ryabov, A.M., 2012. Pedagogical conditions of formation of ecological competence of pupils. Ph.D Thesis, Moscow State University of Culture and Arts, Khimki, Russia.

Sharonova, Y.?., 2006. Pedagogical conditions of formation of ecological competence of rural students in the system of additional education. Ph.D Thesis,Ulyanovsk State University, Ulyanovsk, Russia.

Shulpina, E.A., 2001. Pedagogical conditions of formation of ecological competence of university students (on the example of disciplines of the specialty Geography). Ph.D Thesis, Chelyabinsk State University, Chelyabinsk, Russia.

Tomakov, V.I., 2007. Theoretical bases of formation of ecological competence of a future engineer. Ph.D Thesis, Yelets State University, Yelets, Russia.

Tytarenko, L.M., 2007. Formation of ecological competence students Biological specialty university. Ph.D Thesis, Pedagogical Academy of Sciences of Ukraine, Ukraine.

WCED, 1987. Report of the world commission on environment and development: Our common future. World Commission on Environment and Development (WCED). http://www.un- documents. net/our-common-future.pdf.

Zhdanova, S.O., 2009. Formation of ecological competence of preschool educational institutions in the process of professional development. Ph.D Thesis, Shuya State Pedagogical University, Russia.