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Requirements for Professional Competence Formation of Environmentalists in the Society Transition to Sustainable Development

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Abstract

This article is dedicated to reasoning of requirements formation for professional competence system of future environmentalists in the society transition to sustainable development. It is proposed to form professional competence based on the analysis of production functions of future environmentalist. It is taken into account the need to ensure professional mobility of graduates. It is examined different variants of implementation of the education elements for sustainable development into formal education system.

Keywords: education system, sustainable development, professional competence, production functions

Introduction

The New Law of Ukraine on higher education has stepped up the work of university collectives to develop new educational programs (*Закон України*…). This law provides much more independence to universities in developing curricula and programs. New educational programs more aimed at obtaining final study results, i.e. on formation of a particular set of competency. We believe that the today's young expert to be in demand and be mobile must also have key competences in the field of sustainable development.

Analysis of teaching materials

Methodical recommendations for the development of educational programs include "a list of graduate's *competencies*" and "normative content of training ... formulated in terms of studying results" (*Методичні рекомендації*…; Захарченко, Луговий, Рашкевич, Таланова, 2014). Studying results are characterized by a set of acquired competences (*integral,* general and professional competences). Normative content of training of future specialists is determined by the list of general and specific (professional) competencies.

The European experience in developing of educational programs involves the use of European Credit Transfer System (ECTS) for provision the required workload for students and for their future mobility (Проект Тюнінг…).

For specification of the nature and scope of the notion of "readiness of future ecologists for professionally oriented activity" it is appropriate to design the structure of professional competence as plural relationships between its elements. This structuring of professional activity provides an opportunity to introduce professional competence as a system of comparatively simple characteristics (competencies) (Рибніков, 2008).

Thus the "readiness for professional activity" more fully disclosed within acmeological approach. This can be seen as a "personality-oriented objective and subjective characteristics – the level of self development of the professional... and is motivated ..." to the professional activity via "awareness of personal and social significance" (Рибніков, 2008).

Discussion

At formation of environmental education in agricultural universities preparing students should be directed precisely at the formation of ecologically experienced personality and its readiness for professional activity based on knowledge integration of agricultural and environmental content. The system of formation of professional competence of future ecologists in agricultural universities is seen as a multidimensional phenomenon that reflects a combination in meaning and objectives of individual subsystems. The achievement of the purposes of environmental education through a complex of agricultural subjects considered by us as a set of interrelated professional and environmental knowledge in a single system of educational material.

As far as the readiness of the future specialist to the profession determines his professional competence, and the last is determined by the ability via his knowledge and skills (learned competence) to enforce standards prescribed function, it was tasked to determine the relationship between these functions. For this it was analyzed ***components of professional competence***, which include:

1. ***Basic competencies*** – *knowledge* for future professional role and *skills* based on social-personal and general-scientific competencies that is a key to successful formation of professional skills and professional mobility.

2. ***Key competences*** – include knowledge and skills that provide possibility to carry out professional activities. They are formed on the basis of instrumental and specially-professional competences. Mastering of key competencies is necessary for successful implementation of future specialist duties.

It is known that the model of any specialist activity needs additional studies of its production functions and typical tasks (Рибніков, 2011). There is a set of production functions in the content of education for degrees of Bachelor and

Master enshrined in the standards of higher education of Ukraine for specialty "Ecology", namely:

1. ***Technical production function: ES Bachelor*** – performance of observations of the geosphere status (Освітньо-кваліфікаційна характеристика магістра…); ***ES Master*** – conformity assessment of technologic processes with environmental regulations; determination of the efficiency of environmental equipment and technologies; logistics of reducing the impact of production factors on the life and health of workers; the ability to assess compliance of technologic processes with principles of balanced use of natural resources, etc. (Освітньо-кваліфікаційна характеристика і освітньо-професійна програма…).

2. ***Research production function: ES Bachelor*** – evaluation of the geosphere status; study findings and suggestions for improving the ecological state of ecosystems based on geological and geomorphological data and using data monitoring observations (Освітньо-кваліфікаційна характеристика магістра…, p. 24–25); ***ES Master*** – performance of the scientific research, analysis and systematization of scientific, technical, economic and industrial information, evaluation of the impact of technology and production facilities on the environment; the ability to choose the criteria and calculate integral indices and on their basis to assess the level of anthropogenic load and environmental impact, and to assess the condition that can arise from emergency situations of natural and man-made disasters, etc. (Освітньо-кваліфікаційна характеристика і освітньо-професійна програма…, p. 34–37).

3. ***Organizational production function: ES Bachelor*** – application of knowledge on the basics of safety and health at work; ensure of compliance with environmental requirements for entities (Освітньо-кваліфікаційна характеристика магістра…, p. 25–26); ***ES Master*** – organization of the enterprise industry to resolve environmental problems; organization of environmental monitoring, auditing and management in enterprises; organization of people, land and production protection under conditions of industrial accidents and situations; preparation and participation in the organization of environmental projects of international cooperation; the ability to shape environmental policies of the enterprise, etc. (Освітньо-кваліфікаційна характеристика і освітньо-професійна програма…, p. 38–41).

4. ***Designing production function: ES Bachelor:*** *the ability* to develop draft standards for maximum allowable discharges, emissions and loads; *the ability* to draw up action plans for projects of damaged ecosystems restoring; *the ability* to prove the feasibility of establishing protected areas and territories and their level of conservation (Освітньо-кваліфікаційна характеристика магістра…, p. 26–27); ***ES Master:*** *the ability* to develop project documentation; *theability* to use cleaning system emissions, discharges and waste management; *the ability* to perform environmental and economic assessment of the effectiveness of design

solutions; *the ability* to develop recommendations for optimal use of natural resources, etc. (Освітньо-кваліфікаційна характеристика і освітньо-професійна програма…, p. 37–38).

5. ***Management production function: ES Bachelor***: *the ability* to develop recommendations for optimizing the environment; *the ability* to apply economic mechanisms for nature use and analyze the state of technological safety; *the ability* to calculate cost-effectiveness of environmental pollution protection measures, to determine the fees for environmental pollution and their compensation, etc. (Освітньо-кваліфікаційна характеристика магістра…, p. 36–37); ***ES Master:*** *theability* to fulfill current environmental and strategic planning activities; *theability* to develop plans and programs for balanced natural resources use; *the ability* to shape policy environmental safety; *the ability* to identify local and regional indicators of sustainable development, etc. (Освітньо-кваліфікаційна характеристика і освітньо-професійна програма…, p. 56–57).

6. ***Prognostic production function: ES Bachelor***: *the ability* to forecasting the geological environment, soil, water and air status; *the ability* to predict dangerous processes; *the ability* to identify the role of planetary factors in the formation of the state of a particular ecosystem (Освітньо-кваліфікаційна характеристика магістра…, p. 30); ***ES Master:*** *the ability* to predicting changes in ecological parameters of the environment; *the ability* to prognosticate hazardous situations and elimination of their consequences; *the capacity* for strategic planning of the transition to sustainable development; *the ability* to perform projections of the production impact on the air, aquatic ecosystems, soil cover, the geological environment, biota; *the ability* to assess radiation, chemical, biological situation and the consequences of natural and man-made disasters; *the ability* to perform economic calculations relating to the liquidation of consequences of emergency situations; *the ability* to develop prognostication of socio-economic development of society, taking into account environmental constraints; *the ability* to analyze the provisions of environmental policy to minimize the negative impact on the environment; ability to planning and prognostication different processes in environmental security branch for protection and restoration of the environment (Освітньо-кваліфікаційна характеристика і освітньо--професійна програма…, p. 54).

7. ***Control production function: ES Bachelor:*** *the ability* to perform production control of geological environment, air and water state; *the ability* to monitor program performance monitoring of individual components of the environment, etc. (Освітньо-кваліфікаційна характеристика магістра…, p. 30); ***ES Master:*** *the ability* to monitor the compliance of environmental legislation requirements by industry enterprises and efficiency of nature protection methods and technologies; *the ability* to determine physical and chemical characteristics of the emissions, discharges and waste; *the ability* to calculate the actual parameters

of the environment status; *the ability* to carry out the interpretation of the data and submit them to the authorities and the public (Освітньо-кваліфікаційна характеристика і освітньо-професійна програма…, p. 45–47).

8. ***Technological production function: ES Master:*** *the ability* to choose the engineering methods of environment protection; *the ability* to search technical, technological and organizational solutions; *the ability* to improve environmental protection technologies; *the analysis* of material and energy balance of industrial enterprises (Освітньо-кваліфікаційна характеристика магістра…, p. 44–45).

In the content of education the predominance of social-industrial and social-household tasks of activities over professionally oriented tasks is necessary for the better adapt of the future professionals (Освітньо-кваліфікаційна характеристика магістра…, p. 65). This fact will contribute to the growth of professional mobility of future environmentalists.

We offer to professional competencies of ecologist include the following:

– the ability to enforce environmental laws, government and industry standards and regulations,
– the ability to consider environmental laws, principles and rules,
– the ability to make better decisions with increasing requirements to the quality of life or resource and environmental constraints,
– the ability to facilitate the implementation of the provisions of environmental policy at all levels to promote the transition of society to sustainable development (national, regional and local levels),
– the ability to be socially responsible for the results of professional activity,
– the ability to optimize the use of natural resources.

Considered above eight production functions are inherent to any professional activity of specialists in ecology. Therefore, they are seen most appropriate to form objective and professional competences.

It is difficult do not to agree with the recommendations of experts UNECE that "competence should be the basis of viewing of documents containing curriculum. (…) It is necessary to review textbooks and other educational materials in terms of whether they reflect educational approaches, arising from the content of competence" (Совет Европы…, 1996, p. 7).

This means that the model of professional competence of future specialists (Master in Ecology and Master-educator in Ecology, in particular) should foresee the development of appropriate training and methodological support of education system for sustainable development.

There are formed two ways of implementation of education elements for sustainable development in the formal education system. The first way is the continuing of the "greening" of traditional academic disciplines. To do this the educational elements that are consistent with the principles of education for sus-

tainable development are inserted into the module of the traditional disciplines. The second way – is the implementation of specialized disciplines into the structural and logical scheme of the learning process for implementation of the education content for sustainable development at all levels of specialist grade training. In the modern conditions of education reform in Ukraine the second way is simpler, but less real because it requires the introduction of new disciplines in the teaching process.

Most universities in Ukraine go the first way by introducing into the teaching modules of separate disciplines the elements of ecology, sustainable natural resources and other components of education for sustainable development.

Some universities try to move to the second way, implementing a subject "Sustainable Development Strategy" at all directions of the master level. For preparation of environmental experts the new educational curriculum for education grades Bachelor, Specialist and Master were developed. These plans consist of standard, selective and special disciplines, including modules to create competences in the field of sustainable development. So a Bachelor preparation may include additional study of such subjects as "Development strategies for sustainable development of people settlements", "Local action plan for environment protection", "Monitoring of sustainable development indicators".

Considering the past experience of the learning material within courses and curricula, we investigated pedagogical conditions of future specialist's formation to professionally oriented activity. While investigation the optimization of training content was envisaged by developing structural logic schemes of the educational process (Боголюбов, 1999).

The formation model of professional competence of is developed on the base of professiogram of Master and with relevant elements of the qualifying characteristics. The implementation of this model can be made on the system of continuous professional oriented dual stage training (Рідей, 2011).

The methodological basis for professional competence formation of Master ecologist is introducing in the educational process subject (disciplinary) competencies developed on the basis of competence-active approach. Thus in each discipline the appropriate general and professional competences are considered.

It should be noted that the formation of professional competence should provide "vertical mobility of the specialist…" of any direction and specialty (Хом'юк, 2012). The acquiring of knowledge and skills should also be directed to improving the formation of professional competence system It simultaneously will contribute to intellectual and cultural development of the individual, the formation of its total mobility as a result of development of the ability to respond quickly to requests time (i.e. the ability to self-education and self-improvement).

Discussion

There are practically formed two ways of implementation of education elements for sustainable development in the formal education system. The first way is the continuation of the "ecologisation" of traditional disciplines by embedding into the module courses the educational elements that correspond to the principles of education for sustainable development. The second way – is the implementation of structural and logical scheme of the educational process at all levels of multistage training of specialists, specialized disciplines to implement the content of education for sustainable development.

Major professional competence of environmental experts include the ability to:

- ensure compliance with environmental laws, government and industry standards and regulations,
- consider environmental laws, principles and rules,
- make better decisions with increasing requirements to the quality of life or resource and environmental constraints,
- contribute to the implementation of the provisions of environmental policy on all levels of society to promote the transition to sustainable development (national, regional and local levels),
- be socially responsible for the results of professional activity,
- carry out optimization of natural resources.

Bachelor training may provide additional study of subjects such as "Development strategies for sustainable development of human settlements", "Local Action Plan for Environment", "Monitoring of indicators of sustainable development".

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