DEVELOPING EXPERT SYSTEMS TO EVALUATE AN EFFECTIVENESS OF APPLICATION OF INFORMATION TECHNOLOGIES FOR TEACHING UNIVERSITY-LEVEL COURSES IN ECOLOGY

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Ecology is currently booming. Ecological knowledge is expanding exponentially. One of the most important criteria to evaluate the quality of teaching of current students in ecology is their ability and desire to improve and quickly acquire new knowledge and skills. An essential quality of the educational process is its adaptability to new requirements of the labor market. The development of the educational process should precede the development of the labor market for at least the time required for training the specialists of new type.

Training of specialists is based primarily on defining the choice of criteria of assessment of trainees' professional level. Educational standard sets the desired values for these criteria whereas testing system determines the actual performance achieved over time. Training uses resources determining both quality of education and its costs. Therefore, an educational routine can be designed to address either getting the best possible quality of training the specialists using limited available resources or achieving the required quality with minimal resources. The first scenario may be illustrated by preparation of an athlete to set up a world record. The second case represents training a quality worker for performing some specific operation at a plant. Training ecologists refers rather to the first scenario than the second. Training requirements are constantly changing. Resources needed for the educational process are steadily increasing. In these circumstances, an evaluation of the effectiveness of learning technologies is very important.

The quality of education can be determined by the model methods using established algorithms to compute numeric values of evaluating criteria or by the expert methods using qualified experts to determine the choice and relative importance of evaluating criteria. Mismatch between the model and expert estimates is a basis for the modernization of the educational process. Constantly changing requirements for specialists-ecologists result in an increasing importance of an expert evaluation of the effectiveness of the educational technologies used for training ecologists at universities.

Currently, ecologists and environmental managers have to deal independently with large amounts of poorly structured information. This fact points out need in their competence in information technologies (IT) and, consequently, need in using IT as the most important resource for their training.

We propose assessing of the effectiveness of educational technologies with the help of expert systems. Expert systems are designed to facilitate tasks in different fields. Typically, the problem area is complex enough that a simpler traditional algorithm cannot provide a proper solution. The foundation of a successful expert system depends on a series of technical procedures and development that may be designed by technicians and related experts. As such, expert systems do not typically provide a definitive answer, but provide probabilistic recommendations [1, 2].

In our case, expert evaluation of educational technologies, including IT, may require involvement of various experts from different geographical locations. Thus, to ensure the quality of expert evaluation of educational technologies used at the Department of Ecology at Saratov State Technical University, we are developing the computer-aided information system allowing us to make a comparative evaluation of several objects resulting in establishing a priority sequence of evaluated objects. Objects to be evaluated in the course of an expertise can be compared in a pair-wise manner (better - worse), or they can be assigned numeric weights, or else they can be placed in a quality-level sequence. Evaluation is to be carried out in the following order:

1. First, experts evaluate each other. Each expert receives a weight reflecting his or her competence level. This stage results in a prioritized sequence of experts.

2. Experts evaluate the relevance of criteria used for evaluation of the objects of an expertise. The stage results in a prioritized sequence of their quality levels. Creating this series takes into account weights of experts.

3. Experts evaluate the objects of expertise. This creates priority series for each quality of the object.

4. The program automatically creates the final priority series of evaluated objects taking into account weights of the experts and relative weights of evaluating criteria.

We are developing the software allowing, through a meeting in a computer class, to obtain the results of expert evaluations immediately. It also makes possible expert evaluation to be conducted via the Internet. In the latter case, the resulting score is formed gradually as experts answer the questions.

References

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