

ABSTRACT

The thesis is presented in 99 pages. It contains 2 appendixes and bibliography of 110 references. Twenty-six figures and 4 tables are given in the thesis.

Topic relevance. Due to the rapid development of information technology, more and more attention is paid to their usage in the educational process, to increase its efficiency through the use of information and education, in particular e-learning systems.

Electronic learning is based on constructed ontologies of a certain subject area. Ontology-based systems have undergone great development. May be noted a small number of Ukrainian-language ontologies compared to English-language ones. The use of ontologically-guided systems in education is a promising area of research, since they can automate the work of educational workers related to the generation of educational content, improve the quality of knowledge assessment through means of constructing test tasks, analyzing responses to them, etc.

The analysis of ontological engineering with the prospect of its use in electronic learning showed the expediency of developing a new motive for an ontologically controlled distance learning system. The technology usage for automating the creation of content of computer training systems and the justification of its use in teaching methods and the integration of these tools in the learning process were considered.

Thesis connection to scientific programs, plans, and topics. The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute.”

Research goal and objectives. The goal of this thesis is to develop an ontology-controlled engine for e-learning systems.

To accomplish this goal, the following objectives were reached:

- analyze the existing methods of presenting educational content to e-learning systems;
- analyze the concepts of development of an ontology-based engine of e-learning systems;

- develop a module for dynamic content exchange;
- develop a model for determining the individual trajectory of student training;
- develop modules for creating and processing educational content;
- carry out experimental research in the educational process of a group of students.

Object of research is technologies of constructing ontology models of object description and processes of subject areas, models and educational content management systems, methods of control and evaluation of student learning, web-development technologies.

Subject of research is ontology-controlled information systems, a software engine for e-learning systems that allows to manage educational content, form a student model, and conduct an analysis of student outcomes based on the ontological approach.

Methods of research. To solve the task, the following methods were used: theory of sets (for the formalization of tasks in the domain); theory of data and knowledge bases (for designing information sources of an ontology-based information system); methods of algorithm theory and programming (for software implementation of developed algorithms); methods of probability theory and mathematical statistics (for perform experiments).

Scientific contribution consists of the following:

- the concept of the ontology-controlled information system for e-learning and distance education improved, which links educational content among themselves;
- the concept of the content ontology of educational disciplines is improved, on the basis of which the developed software engine works.

Practical value of obtained results.

The proposed implementation of an ontology-controlled engine and methods for managing the ontology of academic discipline and learning content management can be used to improve existing systems of computer training and distance education in higher education institutions. The practical significance of the results of work is confirmed by references on the application of the results of work in the educational process of the Applied Mathematics Department of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute.”

Approbation of the thesis results. Basic ideas and results of the research were presented at the 10th scientific conference for undergraduates and graduates “Applied Mathematics and Computing” 2018

Publications. Thesis results are published in 1 scientific work: in 1 paper in proceedings of scientific conference.

Keywords: e-learning, ontology, SCORM ontology-controlled e-learning system, ontology of educational discipline, web-oriented information system.