Information Support System for Assessment the Level of Competency Formation

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Abstract. The urgency of the problem of developing methods and tools of information support for assessment the level of competency formation is substantiated. A review of the scientific works of domestic and foreign researchers in the field of the competency-based approach in education is given. The expediency of using knowledge control systems and evaluation the level of competency formation in electronic interdisciplinary educational and methodological complexes (EIEMC), which are combination of educational materials, educational and methodical documentation, electronic educational resources and additional information resources in interrelated disciplines, is substantiated. A model of the EIEMC design process is presented. The concept of the information support system for accounting for current academic performance and evaluation the level of formation of students' competencies is outlined. The analysis of domestic and foreign systems of accounting for current academic performance is implemented. The author's model of the information database is presented, which is the basis of the information support system for assessment the level of competency formation. The implementation of the system contributes to the accumulation of structured information about the achievements of each student during the entire period of study, allows you to track the history of the formation of competencies, identify problematic issues and develop individual corrective actions.

Keywords: level of competency formation; information support system; information database model.

1 Information Support System of Knowledge Control As Part of E-learning Course

The problem of developing methods and tools of information support for assessment the level of formation of students' competencies in the system of higher professional education has become urgent since the adoption of the third generation federal state educational standards, in which the requirements for the development of the main educational programs for training a specialist are represented by a competency system -

integrated personal characteristics, expressed in the ability of graduates to apply the acquired knowledge, skills in solving practical problems. The discussion of the contents of concepts and criteria for evaluation the achievement of professional competence and its constituent competencies is the subject of research by both domestic and foreign scientists ([1], [4] etc.).

Competency-based education is "defined as an outcome-based approach to education that incorporates modes of instructional delivery and assessment efforts designed to evaluate mastery of learning by students through their demonstration of the knowledge, attitudes, values, skills, and behaviors required for the degree sought" [1, p. 99]. Military educators ([2], [3] etc.) pay substantial attention to the issues of measuring professional abilities, developing indicators to achieve various competencies, including in the context of the formation of the information culture of future military specialists, which considers as "a part of the general culture and the basis of the system of competencies, which ensure optimal informational activity aimed at meeting informational needs with using informational and communication technologies" [3, p. 939].

Researchers, emphasizing the complexity of measuring the level of competencies (personal, social, activity), believe that "existing solutions, comparing the assessment of competence with the assessment of a person's general culture, his upbringing allow optimistically solving this problem - a problem associated with improving the quality of education in the general context of his humanization and the definition of a new paradigm for the outcome of education " [4, p. 41]. The methodology for measuring professional abilities should include the selection rules and the development of a list of control tasks, the successful solution of which can be considered as behavioral indicators of the formation of assimilation levels, expressed in order of increasing difficulty (subjective complexity) of the tasks to be solved, as well as the justification of a "measurement procedure that ensures objectivity and reliability identification of selected behavioral indicators" [2, c. 26].

Since the formation of competencies, as a rule, is impossible within the framework of mastering one particular discipline, at the first stage of the professional ability measurement procedure, it is necessary to identify chains of system-related disciplines of the curriculum aimed at the formation of certain competencies, to design electronic interdisciplinary educational and methodical complexes on their basis, using the capabilities of modern information technology. In accordance with the established requirements, electronic educational and methodological complexes, in addition to educational and methodological documentation (discipline curriculums, thematic plans, etc.) and the main content, should include electronic educational resources (EEM) - training programs, computer simulators, etc., additional electronic information resources (EIR), including links to external digital libraries, as well as a knowledge control system [3].
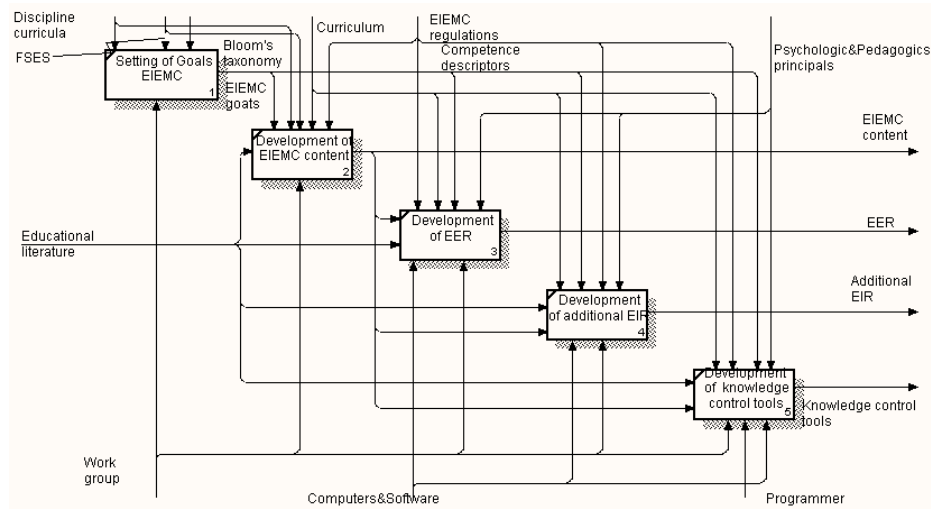
Fig. 1. Decomposition of the design process EIEMC.

Further, it is required to identify specific sections and topics within which certain competencies are formed, related terms and skills of students that are developed through the consistent learning of educational material in interrelated disciplines. At this stage, it is necessary to create a fund of assessment tools for the interdisciplinary complex, which includes both repeated test tasks and tasks with a progressing level of complexity to track the dynamics of behavioral indicators of levels of assimilation.

2 Conceptual Model of Information Support System for Assessment the Level of Knowledge and Competencies

To perform the functions of assessment the level of formation of competencies, preserving the history of periodic controls of knowledge and developing individual corrective actions for each student, a concept has been developed for a system of information support for recording the current academic performance of cadets. Its essence is that tests on individual topics of previous disciplines are repeated when studying subsequent interrelated disciplines, the history of the results of testing of each student should be stored in an information database, analytical reports should reflect the level of competencies and problematic topics and serve as the basis for developing an individual learning plan.

There are a number of ready-made software solutions that implement the functions of accounting academic performance. Among them are the software systems Diary.ru, Electronic Student Diary, 1C: Education (Russia), which allow you to keep an electronic journal and an electronic diary, an electronic portfolio of the student and form an individual educational trajectory of the student, MyEDiary, Student eDiary (Australia), which track study progress, PlanBook (USA) creates standards-based performance reports etc.

However, for the full implementation of the function of evaluation the level of competency formation, it is necessary to develop a system based on an information database and an application that processes test reports presented in the form of files of various formats and stores information in a database for further generalization and analysis. To implement the concept, the relational database model in IDEF1X notation was developed [4].
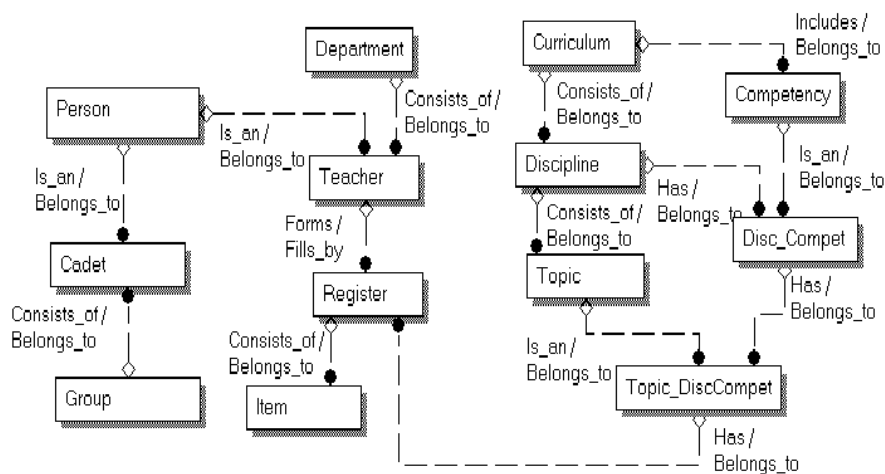

Fig. 2. Conceptual database model in IDEF1X notation.

Database table Register is intended to save the test results of Cadets of a certain Group by an individual Teacher on a specific Topic of the selected Discipline and contains information about the dates of testing and the assessments received. Information about asked questions of knowledge control, answers received and the correctness of the answer (yes / no) is stored in the table Items. Tests should include questions and tasks to assess not only the cognitive (knowledge) component of competencies, but also the motivational aspect, the experience of manifesting abilities in a variety of standard and non-standard situations (skills), attitude to the content of competencies, emotional and volitional regulation of the process and result manifestations of competence.

The organization of the database allows you to accumulate information to track the dynamics of current academic performance and the level of achievement of competencies by cadets when studying interrelated disciplines, as well as interact with users through the application, which is an integral part of the information support system.

3 Conclusions

Thus, the implementation of the information support system for cadets' current academic performance based on a relational database contributes to the accumulation of structured information about the achievements of each cadet during the entire training

period, allows you to track the history of the formation of the competencies established by the Federal State Educational Standards, to identify problematic issues and develop individual corrective actions for each student. The use of the system is advisable as part of electronic interdisciplinary educational and methodological complexes in interrelated disciplines aimed at the formation of certain competencies.

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