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# РАЗВИТИЕ ИНСТРУМЕНТАРИЯ ТЕХНОЛОГИЙ ТЕСТИРОВАНИЯ, ПРИМЕНЯЕМЫХ ДЛЯ КОНТРОЛЯ УРОВНЯ ЗНАНИЙ ОБУЧАЕМЫХ В РАМКАХ МНОГОФУНКЦИОНАЛЬНОГО ОБРАЗОВАТЕЛЬНОГО ТЕХНОЛОГИЧЕСКОГО КОМПЛЕКСА

*Аннотация: основная цель данной статьи заключается в представлении содержания ряда современных инновационных технологий контроля уровня знаний обучаемых, используемых в рамках многофункционального образовательного технологического комплекса. Для ее достижения была решена задача обоснования преимуществ применения инструментария технологий тестирования и контроля уровня знаний обучаемых при подготовке квалифицированных специалистов. Кроме того, в статье показаны практические особенности применения технологий тестирования для контроля уровня знаний обучаемых на примере создания фонда оценочных средств по образовательной дисциплине «Информатика», которая является составной частью МОТК по направлению «Менеджер-программист информационных систем», с использованием рейтингового подхода и многобалльных измерительных шкал. Полученные результаты могут применяться в практической деятельности образовательных учреждений для контроля уровня знаний обучаемых при подготовке квалифицированных специалистов.*

*Ключевые слова: уровень знаний, контроль, инструментарий, технологии тестирования, рейтинг, измерительные шкалы.*

# DEVELOPMENT OF TOOLS FOR TESTING TECHNOLOGIES APPLIED FOR MONITORING KNOWLEDGE LEVEL OF THE TRAINEES EDUCATED WITHIN MULTIFUNCTIONAL TECHNOLOGICAL EDUCATIONAL SYSTEM

*Abstract: the main purpose of this article is to present the contents of a number of modern innovative technologies for monitoring students' level of knowledge. To achieve it, the task of justifying the advantages of using the testing technology tools to control students' level of knowledge solved. In addition, the article shows the practical features of the use of testing technologies to monitor students' level of knowledge by creating an evaluation fund for educational discipline «Computer Science», which is an integral part of multifunctional educational technological complex in the «Manager-programmer of information systems», using a rating approach and multipoint measurement scales. The results are usable in practice of educational institutions work to control students' level of knowledge during the qualified specialist's preparation.*

*Keywords: level of knowledge, control, tools, testing technologies, rating, measuring scales.*

*Introduction*

Implementation of modern Federal State Educational Standards (FSES) implies a change in approaches to control student's level of knowledge during the preparation of qualified specialists. This, in turn, leads to the necessity to introduce new types, forms, methods and means of controlling the level of knowledge during the educational process. Rapid development of modern computer technologies creates necessary conditions for the development of electronic innovative systems for monitoring student's level of knowledge in the framework of modern educational technologies (MET) and electronic educational resources (EER). In practice, they combined into multifunctional educational technological complexes (METC) in the areas of qualified specialists training.

Today, quite a lot of various systems and technologies with the functionality to implement it used as innovative systems for monitoring student's level of knowledge. The essence of some of them briefly presented in this paper. However, the topics of our research related to the development of new approaches to the formation and practical application of student testing methods, which today are the most technologically advanced forms of controlling student's level of knowledge [2]. Testing ensures the effectiveness of all types of monitoring student's level of knowledge, and also allows timely identify the compliance of professional competencies learned by the students' with the requirements of specific educational disciplines within the teaching and methodic complexes (TMC) united in multifunctional educational technology complexes in qualified specialists training areas. In addition, the test results are not only illustrative and informative, but also easily interpreted by using different scales to translate the answers to the test questions into specific assessments of students' knowledge.

The relevance of this article topic is that testing allows us to obtain more information about student's level of knowledge and the mastery degree of professional competencies, as well as timely identify gaps in their preparation [5].

*Test systems – description of research methods*

Today, not only testing methods and technologies used as innovative knowledge control systems, but also various modular and rating knowledge level control systems, various systems for monitoring the quality of students' mastery of professional competencies, as well as various approaches to build an individual student portfolio [3, p. 139; 4, p. 47]. They developed in the framework of modern modular educational technologies (MET) and electronic educational resources (EER), which combined into multifunctional educational technology complexes (MOTC) in the areas of qualified specialists training.

The main purpose of modular educational technologies in the students' knowledge control systems usage is to conduct systematic testing of their knowledge in the context of topics and sections of educational disciplines. Their practical application contributes to the creation of the necessary conditions for students' to practice their education regularly throughout the entire period of their studies at the university.

Rating systems, which control students' level of knowledge devoid many of the shortcomings of traditional control systems, since they based on obtaining rating assessments of the level of knowledge and provide a differentiated approach to each student. Because of its usage, formed the trainees' rating, which is a certain numerical sequence of values, expressed in one of the multi-point measurement scales. The rating is an integral characteristic to control student's level of knowledge in a particular educational discipline in the context of its themes and sections throughout the entire period of their training at the university.

Improving the effectiveness of students' knowledge control when using rating systems ensured by the fact that they allow:

– monitor the current student's level of knowledge of and create significant incentives to enhance their independent knowledge acquisition throughout the entire period of their training in the university;

– obtain more objective and accurate data to control student's level of knowledge through the usage of multi-point measurement scales in the assessment;

– create prerequisites for differentiation of trainees according to their level of knowledge, which is crucial in the conditions of transition to a multi-level learning system;

– receive detailed information to control the student's level of knowledge and the degree of mastering professional competencies by each of them within the framework of a particular educational discipline.

The system of forming an individual portfolio of students' considered as an alternative system to control their level of knowledge. Usage of this system allows to solve individual problems in a student-oriented educational process, namely: it monitors changes in student's level of knowledge and records its growth or decline over a certain period of time; creates additional incentives for learning and specifies its goals; ensures the continuity of the learning process as the range of skills, abilities and professional competencies acquired by students' throughout the entire period of their studying period.

Usage of various monitoring systems in the educational process allows to regularly checking the level of students' knowledge and the quality of their professional competence mastering. As a rule, in monitoring systems a certain set of monitoring and diagnosing activities combined, which separated in time depending on the topics and sections of the studied educational disciplines. The composition of these activities in each monitoring system may be different, but they are all due to the goal setting of the educational process from the students' perspective. They provide control of the level of knowledge and its adjustment, as well as the dynamics of students' mastering professional competencies. Thus, usage of various monitoring systems in the educational process allows not only to monitor the level of students' knowledge, but also to regularly monitor the quality of their professional competencies learning.

Since the topic of our research related to the usage of testing systems to control student's level of knowledge within the framework of modular educational technologies and electronic educational resources, the following discussion will focus on the practical features of this process.

*Experimental results*

Practical features of improving the testing technology tools used to control the level of knowledge of trainees shown based on educational complexes for the computer science discipline developed by ANO CPE Institute of International Standards of Accounting and Management in the discipline «Computer Science» [1], which is an integral part of multifunctional educational technological complexes in the direction of «Programmer-manager information systems». As part of this educational and methodical complex, a fund of appraisal tools formed to control the level of knowledge. The basis of its functioning is the usage of innovative testing technology with the formation of differentiated assessments and taking into account the forms of control used. Because of the application of the of appraisal funds, a consolidated rating of the level of students' knowledge in a separate discipline is formed.

Depending on the topics and sections of the educational discipline, a set of general cultural competencies (CC), general professional competencies (GPC) and pro-

fessional competencies (PC) are subjects to control. The process of studying the discipline aimed at the formation of the following set of competencies:

1) ability to self-organization and self-education (CC);

2) ability to solve standard professional tasks based on informational culture communication technologies and taking into account the basic requirements of information security (GPC);

3) ability to collect, analyze and process data necessary for solving professional tasks (GPC);

4) ability to select tools for economic data processing in accordance with the task, analyzing the results of calculations and justifying the findings (GPC);

5) ability to collect and analyze the source data needed to calculate the economic and socio-economic indicators characterizing the activities of business entities (PC);

6) ability to use domestic and foreign sources of information to collect the necessary data, analyze it and prepare informational surveys and / or analytical reports (PC);

7) ability to use modern technology and IT solutions to solve analytical and research problems (PC);

8) ability to use hardware and software and IT solutions to solve communication problems (PC) [1, p. 38].

As part of the main forms of control student's level of knowledge and their assimilation of the necessary set of competencies in the testing system are used:

– for classroom training – assessment test surveys and laboratory work;

– for self-study – homework;

– for intermediate control – midterm certification;

– for final control – final certification.

For the performance of each type of control tasks, the student receives an appropriate assessment. Monitoring student's level of knowledge and their mastering the necessary set of competencies in the testing system conducted in the context of the topics and sections of the educational discipline. At the same time, limitary maximum marks of assessment established in accordance with one or another form of control of

student's level of knowledge. Thus, for evaluation test polls, the maximum evaluation score was set at 2 points; for laboratory work, a floating maximum rating score was set at 2 to 3 points, depending on the complexity of each work; for intermediate assessment, a maximum assessment score was set in the amount of 11 (eleven) points, for the final attestation the maximum estimated point of 32 (thirty two) points is set, for homework the maximum assessment point is set at the rate of 2 points. At the same time, for each topic in one section, at least one control event provided. Most often, no more than three control measures performed on one topic. The scores obtained by the trainees during the execution of all control measures then summed up in order to get a final grade of their knowledge.

Carrying out midterm (intermediate) certification is in the form of a computerized online test based on lectures. Herewith each student receives 20 questions, selected at random from 68 questions. The time allowed for conducting the online-test of the midterm (intermediate) certification – 30 minutes.

The final attestation (exam) also held in the form of a computerized online test based on lecture materials. In addition, each student receives 16 questions, selected at random from 203 questions. Time allowed for the online test of the final certification (exam) – 32 minutes.

The final attestation (exam) may include a practical part, for which maximum established grade is 12 points. Usually it represented by a number of practical tasks on the topics of educational discipline sections. Therefore, if there are 4 topics in the discipline, then the maximum score for each of them cannot exceed 3 points in general case. Although there are exceptions, when one of the topics assigned with a maximum score of 4 points, but at the same time another topic set to a maximum score of 2 points.

*The discussion of the results*

Thus, to control the level of knowledge of students at ANO CPE Institute of International Standards of Accounting and Management in the discipline «Computer Science», which is an integral part of multifunctional educational technological complexes in the «Manager-programmer of information systems», an innovative testing

system applied. Based on the results of its usage, a rating of performance indicators formed, reflecting the level of knowledge of the students. The usage of innovative testing system allows systematically monitoring student's level of knowledge, determining the degree of assimilation of the necessary set of professional competencies, as well as quickly manage the educational process.

*Conclusions and recommendations*

Pedagogical practice shows that in modern education systems conducting a systematic control of student's level of knowledge is one of the basic components of the organization of the educational process. To carry out such a control, all components of modern pedagogical technologies should have the corresponding functional capabilities of its implementation. Forms, methods and tools of testing control of student's level of knowledge should have sufficient flexibility and increased variability. The presence of such functional capabilities of organizing students' knowledge control contributes to an increase in the degree of individualization of the educational process. Therefore, conducting a systematic monitoring of students' knowledge through the development of testing technology tools considered as one of the promising areas of educational process management.

*Gratitude*

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