Information and communication technology in the professional activity of higher school teachers

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Abstract. In modern education, the competence approach is becoming increasingly popular, it involves the implementation of educational programs aimed at developing the ability of an individual to independently apply the knowledge and skills acquired in their professional activities in a certain context. One of the priorities for the development of the modern information society is the Informatization of education – the process of improving the educational process through the introduction of information and communication technologies. Information and communication technologies allow to implement interactive communication of all participants of the educational process with each other, as well as provide students with educational materials and educational information stored on various information devices.

1. Introduction
The introduction of information and communication technologies (ICT) in the educational process is particularly important in the context of the coronavirus pandemic. The Ministry of Science and Higher Education recommended universities organize distance learning for the prevention of coronavirus – the corresponding order was signed by Minister Valery Falkov. Educational institutions should «provide students with programs using electronic and distance learning technologies», the document says.

The usage of modern information technologies allows to optimize learning process. In addition, it is widely used to control the degree of material assimilation by students during the study of the discipline and control the level of competence formation after the completion of the study of the discipline [1].

A simple and effective way to control students’ knowledge is computer testing. Computer testing is a tool that allows teachers to objectively test the knowledge of many students with minimal time [2].

2. Main part
Theoretical and practical materials are not enough for computer testing. It is necessary to enter a test complex that will include all the questions. There are many tool environments for creating computer tests. The article compares three platforms that are most widely used in Kazan National Research Technological University (KNITU):

- Software package for distance education Moodle.
- Instrumental system for designing pedagogical software DOCENS, created at the Department of methodology of engineering at KNITU.
- EasyQuizzy is a freely distributed tool environment.
The choice of these platforms is based on the fact that they allow to use the main features that are necessary for creating computer tests in various disciplines and are available to teachers of KNITU.

2.1. **DOCENS tool system for teaching purposes**

The DOCENS tool system for teaching purposes was created at the Department of engineering methodology of KNITU to teach students of the professional retraining program «Higher school pedagogy» the basics of designing interactive pedagogical software [3]. Docens (lat.) – training.

Using DOCENS technology, you can create pedagogical software that allows you to diagnose errors in the learning process and, depending on this, direct the further activities of the student, organize a dialogue in the process of correcting errors and provide step-by-step control at each logically completed stage of the student's activity.

The DOCENS structure includes two main modules – «Teacher» and «Student», as well as a number of auxiliary modules, such as «Forming a statement». The «Teacher» module allows you to design different types of frames: informational, managing and controlling.

2.2. **Software complex Moodle for distance education**

Currently, Universities widely use the free web application Moodle, which provides an opportunity to create effective sites for online learning and allows teachers to solve various pedagogical tasks [4]. Moodle (modular object-oriented dynamic learning environment) is a free learning management system focused on organizing interaction between teachers and students, suitable for organizing distance courses, as well as supporting traditional face-to-face learning.

Martin Dougiamas came up with the idea of creating a learning support platform using information technology in 1999 after a long experience in the administration of a commercial WebCT platform at a University in Australia. Moodle was conceived as a tool for expanding teaching opportunities. However, the structure of Moodle and the principles embedded in this platform were so successful that Moodle won the recognition of the world community. Currently, the Moodle system is used for training by the largest universities in the world.

The Moodle system has extensive tools for creating tests, conducting training and control testing. Moodle provides many features that make it easier to process tests. It is possible to set the rating scale when the teacher adjusts test tasks after students pass the test. There is a mechanism for semi-automatic recalculation of results.

Moodle has a flexible system for configuring tests, which each teacher uses in accordance with their specific tasks. In Moodle, it is possible to set the choice of a question from this category randomly when setting up tests. As a result, the student gets a different set of questions in each test attempt. This reduces the possibility of cheating and contributes to a more objective assessment of students' knowledge. The more questions there are in the category from which a random selection is made, the less likely those who try to replace the study of the subject by memorizing the answers to the test questions.

2.3. **Tool environment easyQuizzy (http://easyquizzy.ru)**

The EasyQuizzy program is designed for creating a test, entering and editing questions and answer options. EasyQuizzy is a generator and editor of knowledge that are independent files.exe. The created test files can then be run on any computer running Windows without installing additional programs.

All tests are an independent program that you just need to copy to any computer and run to start testing. Easyquizzy is an extremely convenient, easy-to-use program. The program interface is clear, simple drag-and-drop of the object in the test form allows you to add graphics and formulas. Knowledge tests created with Easyquizzy are successfully used in daily rapid testing in practical classes. It is possible to combine three types of questions in tests: single choice of the correct answer from the list of suggested ones, multiple choice, or entering the answer using the keyboard. Each question or answer can contain text, drawings, formulas, diagrams, and so on. Tests can be protected from editing by unauthorized users.
You can configure the program to show all the test questions or a certain number of them in any order. Answers can also be offered in the order used when creating the test, or in any order. You can set a time limit for each test, as well as keep the results window on the screen for a certain period. You can also generate a detailed report for each test session.

3. Conclusions

Computer testing is the most effective form of control, verification and self-verification of students' knowledge. Therefore, it is important that the process of organizing computer testing has a well-designed and implemented information support system – it should be convenient for both the Creator and the ordinary user [5]. Table 1 shows the results of a comparative analysis of three platforms by criteria:

- administration and processing of test results;
- forming the test;
- inserting objects in the test;
- configuring test parameters.

| Comparison criterion                                      | Moodle | DOCENS | EasyQuizzy |
|-----------------------------------------------------------|--------|--------|------------|
| Administration and processing of test results             | +      | -      | -          |
| Registration/ identification by password                  | +      | -      | -          |
| Maintaining the test Protocol                             | +      | +      | +          |
| Maintaining statistics                                    | +      | -      | -          |
| Ability to work via the Internet                          | +      | -      | -          |
| The formation of the test                                 | +      | -      | +          |
| Importing tests from text and table files                 | +      | -      | +          |
| Exporting tests to text editors                           | +      | -      | +          |
| Partitioning of test items into groups (sections)         | +      | -      | -          |
| Number of question types                                  | 17     | 6      | 3          |
| Setting the weight characteristic of the test task       | +      | -      | +          |
| Text formatting                                           | +      | -      | +          |
| Inserting objects in the test                             | +      | -      | -          |
| Graphic format                                            | +      | +      | +          |
| Audio format                                               | +      | -      | -          |
| Video format                                              | +      | -      | -          |
| Animation support                                         | -      | +      | -          |
| Using the formula editor                                  | +      | -      | +          |
| Inserting characters                                      | +      | -      | +          |
| Inserting tables                                          | +      | -      | -          |
| Inserting charts                                          | +      | -      | -          |
| Configuring test parameters                               | +      | -      | -          |
| Limit the test date                                       | +      | -      | -          |
| The limitation of testing time                            | +      | -      | +          |
| Limit the number of tests                                 | +      | -      | -          |
| Mixing of the test tasks                                  | +      | -      | +          |
| Random selection of test tasks from the test database     | +      | -      | +          |
| Ability to set the rating scale                           | +      | -      | +          |

As a result of the analysis, it can be concluded that not all the programs considered have a sufficiently wide range of tools for developing and conducting computer testing.
As shown by a detailed analysis of the presented tool environments, the most acceptable environment for creating computer tests is the Moodle system, which meets most of the criteria for developing computer tests. In addition, the advantages of Moodle include the fact that in comparison with DOCENS and EasyQuizzy it is the most accessible and convenient to use. So, the Moodle software package:

- can be used without purchasing a license;
- compatible with all operating systems and monitor formats;
- there are no restrictions on the number of users working in the program at the same time.

The usage of electronic resources is a new level of organization of the educational process. Integration of interactive technologies into educational process, as well as automatization of access to information of different type can improve the efficiency and quality of the educational process that meets the requirements of new generation of the Federal State Educational Standards of Higher Education [6]. Traditional specialist training is replaced by training aimed at training specialists of dual competence: on the one hand, they are rigidly connected with the profession, ready to solve professional problems theoretically and practically, and on the other hand, they are capable of self-education on the basis of information and communication technologies.

Therefore, in the new generation of educational standards, the requirements for the results of mastering the training program are established through the system of formation of universal, general and professional competencies. A competence is a set of knowledge and skills required to perform certain work functions [7-10]. Professional competence is a set of knowledge, skills and abilities that are combined for a specific professional function. Information technologies are the basis for the formation of General professional competencies of a modern specialist of any profile. Their use is a necessary condition for improving the effectiveness of education, developing more effective approaches to learning, and improving teaching methods.

Thus, the main goal of the modern education system is to improve the system of training personnel who are able not only to understand the possibilities of ICT, but also to use them, adapting them to the implementation of practical tasks, solving specialized problems that arise in various fields of human activity. A using the Moodle system for educational purposes allows flexible and timely management of the learning process, helps to improve the quality of education [11].

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