DIDACTIC ASPECTS OF THE DEVELOPMENT AND APPLICATION OF ELECTRONIC SIMULATORS IN THE PROCESS OF PREPARING FUTURE TEACHERS

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ABSTRACT

In the conditions of informatization of modern society and education as one of the priority areas of public life, such training is of great importance, transforming the educational system and stimulating the search and development of new models of personality-oriented learning, taking into account the individual educational trajectory of students. Development, creation and subsequent implementation of innovative electronic educational teaching aids in the educational process, one of which is the simulator considered in this study. Their functions and opportunities for the formation of professional competence of future teachers are revealed. The article reveals the didactic aspects of the development and use of electronic educational simulators in the process of training future teachers at a university. The functionality of an electronic educational simulator is disclosed, which includes automatic generation or selection by a teacher of a sequence of tasks of the same type for better working out and mastering skills on a particular topic, providing the student with consultations with the teacher or the availability of a standard sample solution, analyzing student performance as part of working with the simulator. The simulators developed are focused on expanding the base of additional tasks used to improve strategies for completing test tasks. The main tasks that are solved with the help of simulators are the theoretical training of students, the development of practical skills and knowledge by them, as well as their testing and testing.

Keywords: Professional competence, databases, simulator, computer training programs, electronic educational simulator, feedback.

INTRODUCTION, LITERATURE REVIEW, METHODOLOGY

Currently, the educational activities of higher education institutions have undergone significant changes. They are characterized so that the training of future teachers at the university is carried out according to the curriculum and educational programs, which define the formed professional competencies as the result of professional training at the university. These changes determine, on the one hand, the need to search for innovative forms, methods and teaching aids, on the other hand, created with educational and methodological support for the formation of students' professional competence, which is the most important quality criterion for modern higher education.

We consider professional competence as a complex personal quality of the future teacher, which provides an effective solution to professional, social, personal problems in non-standard conditions. It manifests itself in the ability of a graduate not only to perform typical tasks, but also to solve problems of a high degree of complexity and uncertainty [5, p. 95]. In recent years, electronic educational resources, including simulators, have been widely used for these purposes.

The simulator, in the broad sense, is a complex, a system of modeling and simulation, computer and physical models, special techniques created in order to prepare a person for making high-quality and quick decisions [3].

The use of simulators has certain advantages: in the process of working with simulators, students develop motor-reflex and cognitive skills, students can better understand the essence of processes and their relationship to each other. The student is formed and consolidated skills for performing operations; the student learns to identify defects in the operation of the equipment; - the student reinforces the ability to draw up documentation.

In education, the simulator is determined by V.A. Wexler and L.B. Reidel as a device for training, which, according to the conditions of fulfilling psychological and didactic requirements, should have three fundamental and necessary important parts [3]: constructive, consisting of an exact virtual copy of the workplace; model, reflecting the way the equipment operates and the basic processes in it; didactic, which is a program for evaluating and monitoring the actions of the student. It is understood that the didactic part can be both controlled by the teacher and automated. Based on this, the following advantages of the use of simulators in education can be distinguished: firstly, when working with simulators, the student has the ability to set the pace of work and manage the learning process; secondly, the time for mastering skills is reduced with an increase in the number of training tasks; thirdly, in the process, differentiation by levels is achieved; fourthly, the student's motivation for learning activities increases.

I.G. Giniyatov emphasizes that the simulators give students precisely “procedural knowledge”, and not “declared”, which are contained in reference books or textbooks [4]. In turn, computer simulators occupy a special place in the classification of simulators due to the fact that in them all three parts (constructive, model, didactic) are implemented using software. In other words, computer simulators are a program for the development of certain skills, which performs the necessary functions of a teacher.

When developing simulators, the feedback is taken into account, the location of the tasks offered to the student in the order “from simple to complex”, the possibility of the student repeating the material repeatedly and providing explanations when completing the tasks.

In the pedagogical literature, along with the term “computer simulator”, there are definitions of “computer training program”, “simulator”. Often these definitions are identified or replaced by one another. In this regard, we consider the content of the above electronic learning tools. An analysis of Internet resources [7] shows that a computer training program is an effective tool with an interactive user interface, interactive functions and multimedia elements. At the same time, an adapted structured material is presented to the student as an educational information base. All training material for the course is divided into separate blocks (sections). Each block has a number of training questions. The effectiveness of training and control is ensured by a rational combination of interactive text with multimedia capabilities for presenting diagrams, drawings, 3D-models, photographs, animations, and videos.

Unlike a computer training program, a simulator (from the English. Simulate - to simulate) is defined as a genre of computer games in which various human activities are simulated, mainly various sports, piloting airplanes, car racing, etc. The main indicator of the quality of a game of this genre is maximum the proximity of the game process to real events [10].

A computer training simulator is a training system, which in turn is divided into: a management subsystem, a training subsystem, and a control subsystem. They provide material for training, and also with the help of them you can independently study and develop all the knowledge and skills in this discipline. Also, thanks to them, the management of the instructor is provided, and students are given the opportunity to independently manage their studies.

A computer training simulator can be built on the basis of such principles as: modularity, self-organization of education, adaptability and implementation [7]. Modularity is a complete product of each procedure implemented in the simulator and can be used separately.

Self-organization of education is an interconnected sequence of each element, i.e. Having examined one term, a problem, the student moves on to the next. Adaptability is the ability to use modules and techniques implemented in a web-based interactive simulator to organize knowledge. Feasibility is a possibility of application for both manual and machine versions complete with simple software tools.

M.I. Belyaev, V.V. Grishkin, G.A. Krasnova believe that electronic simulators are designed to develop practical skills. Such tools are especially effective for learning how to deal with complex and even emergency situations when practicing emergency actions. In addition, electronic simulators are used to practice skills and problem solving. In this case, they provide a brief information on the theory, training independence at various levels of training, control and self-control [1]. Proceeding from this, we have defined the electronic simulator as a software package, in the process of which the tasks that require active actions from the student are proposed in stages.

An analysis of the above definitions, as well as the results of studies conducted in A.V. Osin [8], V.A. Trainev [13] and others show that an important condition for the formation and development of professional competence of future specialists is the development and implementation of electronic simulators in the educational process. At the same time, it is advisable to include elements of computer training programs and simulators in electronic simulators.

G.K. Selevko believes that subject to the systematic use of electronic learning tools in the educational process “a person is formed who can act not only according to the model, but also independently, receiving the necessary information from as many sources as possible; who knows how to analyze it, put forward hypotheses, build models, experiment and draw conclusions, make decisions in difficult situations” [9, p. 70]. Agreeing with the opinion of the scientist and relying on the results of the study [6], the author found that the development and implementation of future teachers along with traditional training tools for electronic simulators will be an important factor in shaping their professional competence [14]. This is ensured by the integration of traditional and innovative methods, technologies and teaching aids, the expansion of information search capabilities, easier access to it, and the optimization of diagnostics of learning outcomes.

However, at the moment there are no simulators aimed at building competencies among students on the topic of “SQL queries”. The topic under consideration occupies a rather important place in the database course. At the same time, the study of individual aspects of these topics causes difficulties for students in terms of the practical application of their knowledge. This is partly due to the lack of clarity of presentation of the material when studying this topic in subject studies.

RESULTS, DISCUSSION

One of the main courses of the professional cycle of the bachelor's curriculum in the direction of “Methods of teaching computer science” is the discipline “Databases”. According to the state educational standard, the professional activity of a graduate of this direction, working with databases is one of the most important competencies of the student, and this is not possible without knowledge of the SQL language. Therefore, the principle of “following from simple to complex” was the basis of the methodology for studying the course “Databases”. The entire study material is divided into two parts: in the first part, we consider the construction of queries on a database consisting of one table, in the second on a normalized database consisting of several interconnected tables.

Further, an analysis of the syntax of SQL statements shows that almost all of them consist of several “sentences”, of which the basic, basic, are only two sentences, and the rest are clarifying by any condition.

As an example, consider the syntax of a SELECT statement. This operator consists of several "sentences": SELECT - FROM– WHERE - GROUPBY - HAVING - ORDERBY. The study begins with the "basic" SELECT - FROM clauses, where you can submit queries of the type: selection of all table fields; selection of certain table fields; use of aggregation functions (SUM, MAX, AVG, MIN ...). Then, three sentences of the SELECT - FROM - WHERE operator are considered, where it is already necessary to study the predicates of comparison, occurrences, LIKE, BETWEEN, etc. Gradually, the rest of the operator 's sentences are introduced into the study. With the increase in the number of "sentences" of the SELECT statement, queries become more complex. And so on for all language operators.

An analysis of the language constructions allows us to conclude that for a complete study and mastering of the principles of compiling queries and processing skills, it is necessary to have an initial relationship with a large number of fields of various types. Then, having mastered working with one data table, you can proceed to compiling queries for obtaining data from several database tables, i.e. move on to the more difficult part - joining database tables. Therefore, there is an objective need to create a methodology for studying the SQL language using electronic means that can remotely provide training for students. This type of training has a number of advantages compared to ordinary classes, as it provides for the individual needs of students, an individual pace of work for developing skills in compiling queries in SQL.

From the analysis of electronic educational resources - electronic textbooks, electronic reference books, training complexes, problem books, computer testing systems - a computer simulator was chosen as a training tool.

Unlike mass online courses, the use of computer simulators in the educational process allows the teacher to determine a clear practice-oriented educational process, individualize the student’s educational path, adjust the course content, develop independent work skills, which increases the effectiveness of training and motivation of students. That is why the most effective tool for creating professional computer-based SQL queries is the computer training simulator. This is due to the fact that when learning the SQL language, the student needs to repeatedly perform typical tasks, while seeing the result of his work and adjusting it if necessary.

At the design stage, we assumed that the electronic educational simulator should perform the following functions: competency-based (contributes to the formation and development of

professional competence in working with database queries); interactive (provides stable feedback in the "man-machine" system); reflective (allows you to track the mistakes made by students at each stage of the task).

The structure of the electronic educational simulator includes the following components: 1) information block; 2) training block; 3) consultation unit.

The information block can conditionally be divided into several parts: the first part contains accompanying background information and instructions for students, the second - a structured block of texts for performing tests and the work of the consulting block. In addition, this block includes statistics on working with the program of registered and unregistered users.

The training block includes training modules corresponding to the subtests included in the test and containing a set of tasks in the test form. At the student's initial appeal to one of the selected modules, their appearance is identical to the online test, however, if an error is made, the consultation module is connected, which provides the training part of the electronic educational simulator.

The consultation module is the most complex intellectual part of the system. The task of this part of the system is to provide training that goes along an individual trajectory, the direction of which depends on the success of the assignments offered by an electronic educational simulator to a student.

If an error is made during the assignment, the simulator indicates to students the correct answer, and also makes it possible to see an explanation of why only this answer can be correct. In addition, the system provides the user with the opportunity to get a comment on the chosen wrong option, explaining why this answer may not be correct in this situation.

The use of electronic teaching aids in mathematics lessons at school expands the teacher's ability to fill knowledge gaps among students who are lagging behind, and teachers can also find many convenient opportunities for electronic learning. We want to note that the use of electronic teaching aids develops creative thinking in students, increases their interest in algebra, and also allows for increased visibility during the lesson. And this serves to improve the quality and productivity of education in general [11].

An electronic educational simulator has been developed that allows you to record individual educational achievements of students, depending on the availability of personal computers in the classroom, increase the throughput in performing educational tasks in the lesson. The simulator should be easy to use, have a user-friendly interface, it can be downloaded to a tablet personal computer and used for training in your free time from training sessions.

The distinctive features of the developed electronic educational simulators, allowing to improve the quality of database training are as follows: 1) implementation of a personality-oriented approach to learning and the formation of an individual learning path; 2) an increase in the proportion of students' independent work, as much as possible provided not only with the necessary material, but also with the ways of working with it; 3) instant feedback; 4) an objective assessment of the knowledge and skills of students, as well as the degree of readiness for certification testing in general; 5) reducing test anxiety by developing a student's sense of familiarity and sophistication in working with test tasks; 6) increasing the subjective confidence of students in their willingness to undergo testing; 7) increasing emotional comfort

in preparation for testing; 8) the release of the teacher from routine work; 9) the formation of universal educational activities that allow a person living in the information society to learn independently throughout life; 10) the ability to use both in distance and in traditional training (with a teacher and independently).

Thus, the electronic educational simulator allows you to simulate the completed technological process: the presence of a problem; goal definition; phased activity to achieve the goal; obtaining the result of reflection.

CONCLUSIONS

The results of the study indicate that when students create electronic simulators, the following tasks are achieved: students develop communicative abilities, constructive thinking, teamwork skills; the formation of managerial skills (being in the role of a project manager, students learn to manage personnel, organize interaction and make optimal decisions in a difficult situation, that is, "immerse themselves" in educational and professional activities); the formation of innovative activity skills: scientific research, the creation of innovation, the implementation of innovation and the reflection of innovation. In most cases, in the course of joint cooperation, students have to engage not in reproductive but in creative activity, to find something new (for example, to master programming languages that are not studied in the framework of the curriculum on their own, to search for knowledge from various fields of science and practice); intensification of educational and cognitive activities of students during their classes on military training independently using testing and training programs, devices, simulators, electronic educational and methodical complexes, educational films created by them.

REFERENCES

1. Беляев, М. И. Технология создания электронных средств обучения. – М.: РУДН, 2006. – 130 с.
2. Вербицкий, А. А. Личностный и компетентностный подходы в образовании. – М.: Логос, 2010. – 336 с.
3. Векслер В. А., Рейдель. Л. Б. Интерактивные тренажеры и их значение в учебном процессе // NovaInfo, No. 41-1, 2016., с. 10.
4. Гиниятов И. Г. Разработка тренажерного оборудования для повышения безопасности технологических процессов на нефтегазовых объектах: автореферат диссертации кандидата технических наук. Уфа: Уфимский государственный нефтяной технический университет, 2009.
5. Жук, О. Л. Педагогическая подготовка студентов: компетентностный подход – Минск: Респ. ин-т высш. шк., 2009. – 336 с.
6. Коклевский, А. В. Методическая система формирования технологической компетентности будущих специалистов в процессе военной подготовки в классическом университете: дис. …канд.пед.наук: 13.00.08; Белорус. гос. ун-т. – Минск, 2013. – 234 с.
7. Компьютерные обучающие программы и системы [Электронный ресурс]. – 2015. – Режим доступа: http://neotech-marine.ru/kop. – Дата доступа: 27.02.2015.
8. Осин, А. В. Создание учебных материалов нового поколения [Электронный ресурс] – 2010. – Режим доступа: http://www.rnmc.ru/ideas/osin/sozdmater.php. –Дата доступа: 26.02.2015.
9. Селевко, Г. К. Педагогические технологии на основе информационно-коммуникационных средств / Г. К. Селевко. – М.: НИИ школьных технологий, 2005. – 208 с.

10. Симулятор // Больш. энцикл.: в 62 т. – М.: ТЕРРА, 2006. – Т. 45. – С. 245.

11. Тангиров Х. Э., Алибоев С. Х. Методическая система организации обучения математике в общеобразовательной школе с использованием информационных технологий // Педагогические науки. Научно-педагогический журнал. – Москва, — 2014. – № 1. – С. 12-16.

12. Тангиров Х. Э. Методические особенности использования электронных учебных комплексов на уроке математики в школе // Молодой ученый. Ежемесячный научный журнал. – Россия, Чита: – 2012. – № 5 (40). – С. 510-514.

13. Трайнев, В. А. Информационные коммуникационные педагогические технологии (обобщения и рекомендации): учеб. пособие – 3-е изд. – М.:, 2008. – 280 с.

14. Юсупов Р. М., Алибоев С. Х. Электронные образовательные тренажёры и их роль в системе образовательного процесса// Инновационные подходы в современной науке: сборник статей по материалам LX межнарод. Научно–практической конференции . – Москва, 2019, стр. 43-49.