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Ergonomic Foundations for Designing Computer-Assisted Teaching Programs in Pedagogy for Future Computer Science Teachers

Azizbek Tokhtamurodov, Ph.D
NamSU student

Abstract. In the article, the ergonomic principles of designing computer-aided training programs in pedagogy for future informatics teachers were analyzed and conclusions were drawn.

Key words: informatics, teacher, pedagogy, computer, training program, design, ergonomic basics.

In Uzbekistan, on the basis of the national personnel training program, the process of revealing the potential opportunities of the society and forming a strong intellectual and spiritual potential is being carried out step by step. The concept of building a civil society is directly related to the development of the educational system, the design of new technologies and the implementation of pedagogical practice.

At the 14th session of the Oliy Majlis, the President of the Republic emphasized that "it is necessary to ensure timely development and introduction of new textbooks, modern pedagogical and information technologies." Today, scientists and teachers are required to seriously engage in the development of advanced pedagogical technologies, and they are responsible for this work. Close foreign countries are also paying attention to this field. Below we will get acquainted with the new pedagogical technology projects proposed by Russian scientists.

1. Axiomatic approach. The main idea underlying this approach is that the design and creation of pedagogical technologies should be based on the requirements of the system of didactic axioms.

According to scientists, the science of pedagogy has been using axioms since time immemorial. It is known that a condition that does not require proof is called an axiom. Such cases can be found in the pedagogical process in many ways: class-lesson system, 45-minute lesson, thematic plan and others.

The author divides the system of axioms into three groups. The first is the axioms of integrating pedagogical technologies into a whole educational space, the second is the axioms of modeling the educational process, and the third is the axioms of standardizing the educational process. In turn, each of them combines three axioms.

The first (A1) is the axiom of pedagogical technology's demand for educational space; A2 - the axiom of compatibility of pedagogical technology with the "teacher" system; A3 - the axiom of universality of pedagogical technology in relation to the subject methodology system.

The second group (A4) includes the design axiom of the educational process model, which forms the basis of pedagogical technology. This information model is described using the following parameter assignments:

Parameter 1 (aimability) expresses the general goal and direction of the educational process in the form of a system of micro-goals.

The 2nd parameter (diagnosis) embodies management information about the evidence of achievement or non-achievement of micro-goals.

Parameter 3 (quantitative measure) provides meaningful and quantitative information about the characteristics, nature and extent of independent activity of students, which is sufficient to guarantee the successful completion of the assessment.

The 4th parameter (logical structure) takes into account the stage of turning the teacher's methodological ideas into a coherent and logical instructional model of the educational process and determines the high level of the teacher's skills. This activity is not just a photograph of the logical structure of the educational process, but a specially formed workspace, in which all elements are expressed on the basis of technological laws and sufficiently alternated with the help of certain procedures.

5 - perimeter (correction) describes information about pedagogical inadequacy, i.e. students who have not passed the diagnosis and methodical ways of correction.

Also, the second group (A5) includes the axiom of integrity and reproducibility of the system of constituent indicators of the educational process model.

The object of technologyization of the educational process should be the subject of any subject, and its volume is distinguished by its strictness: - 6-8 lessons, maximum - 22-24 lessons. In this subject project, the future educational process is given as a whole using the above-mentioned five parameters, and it is this educational topic that demonstrates the reproducibility of technology and design in the form of uniform procedures that allow designing the educational process for any subject. provides

Another axiom (A6) belonging to the second group is the technologicalization of the axboard model of the educational process. In V.M.Monakhov's experience, he created technological maps of the educational process design, which includes five parameters within one subject. If technology equips the teacher with a system of design procedures, technological maps are needed as a passport for the design of the educational process for the subject of study.

The author describes the axioms of the third group (normative educational process design) as the main product of the existence of pedagogical technology. The axiom of axiomization of technologicalization of the professional activity of the teacher (A7) refers to the following innovative components of the professional activity:

- expression of the pedagogical ideas of the educational process design in the form of a sequence of micro-goals by the teacher for the entire academic year based on his own methodological experience, the content of the curriculum and the requirements of the state educational standards professional skills. In other words, this is a technological process of translating the requirements of the standard into the language of micro-goals, and the micro-goal is a ladder of students' knowledge and development. This component is directly related to the reconstruction of traditional educational subjects.
- Professional skill of technological map design. This process is considered the peak of pedagogical skill, because the teacher knows the future educational process rather than preventing it, and describes his ideas on the technological map in a regular way. It should be noted that this professional skill is quite complex, multi-level, integrative in nature, and requires a well-developed reflexive ability from the teacher;
- the professional skill of constructing an informative map of the lesson or a set of these maps is a defined project of the future educational process for each educational topic;
- the professional skill of comparing two pedagogical objects: the project of the educational process in the form of technological maps and the system of informational maps of the lesson together with the results of the real educational process in a certain class. The comparison should be made on the basis of specific indicators and technological procedures. According to the results of the diagnosis based on the comparative procedures, there is a special monitoring that records the development of educational activities in this class.

The essence of the axiom of standardizing the educational process project (A8) is as follows: when the educational process project is ready in the form of a technological map, the necessary calculations must be made directly: training time, the amount of didactic information, the speed of its assimilation , the time allocated to the methodical program of student development within the limits of the educational subject, etc.

Finally, the last axiom of the third group is expressed as follows: the axiom of the formation of the workspace for the optimal use of pedagogical technology that guarantees the final result (A9). Any pedagogical technology must satisfy the requirements of this axiom at the same time in terms of both educational and general workload of students; within the informational map of the lesson, it is necessary to maintain the norm of the main types of learning activities of students within their group in terms of age. This is directly related to maintaining psychological-pedagogical and physio-hygienic standards.

The leading quality sign of problem-module teaching technology is flexibility. As a flexible automated system is considered important in modern high-tech production, the effectiveness of pedagogical technology now and in the future depends to a large extent on its ability to have a remote and immediate impact if it adapts to the changing scientific-technical and socio-economic conditions. ladi Flexibility can be structural, substantive and technological.

Structural flexibility is provided by a number of conditions: the mobilization of the problem-module structure, the level of the problem-module program, the availability of a flexible

schedule project and the possibilities of equipping multipurpose classrooms, etc.

Content flexibility is first of all manifested in the possibilities of stratification and integration of educational content. Such an opportunity is created in the proposed technology thanks to the selection of educational material based on the block and modular principle.

Technological flexibility is provided by the following aspects of the problem-modular educational process: the variety of teaching methods, the flexibility of the control and assessment system, the individual organization of students' educational activities, etc.

At the same time, the opponents pointed out a number of shortcomings of problem-module teaching, which are: the educational process is divided into parts, that is, the weight of independent work of students is quite large; denial of the integrity and logic of the educational subject; narrowness of training of pupils (students): reduction of the training course to a series of unrelated problems or issues; forming only specific, specific skills that harm generalization; preparation of problem modules and preparation for training are labor-intensive.

Although many of the listed shortcomings are clearly noticeable at the stage of installing the modular teaching technology, they are gradually being ironed out. It should be noted that it is impossible to introduce this or that technology "cleanly". Whether we like it or not, we have to rely on the traditional approach to the organization of the educational process and the existing didactic process.

The problem-modular design of educational content consists of the following main bases:

- put the course in place within the framework of fundamental methods of bilis activity. For example, in the course of mathematics, such methods include mathematical modeling, axiomatic, coordinate, vector, logical methods;
- identify the content of the base problem modules. An important aspect of the classification is the principle content of the methods of cognitive activity, and it acquires general cultural and practical importance. This requires taking into account the following criteria regarding the basic content of education:
- fundamental, organic, continuity and humanization of education;
- separation of major professional-practical problems that require the use of suitable methods of solving activities, taking into account the uniqueness of different groups of professions;
- choose the content and size of the variable modules aimed at providing specialized and level stratification, as well as take students (students) in an individual order according to various full, shortened and deepened versions of problem-module programs Create conditions for the displacement of a.

In summary, the essence of the problem-modular teaching technology can be explained as follows: in order to reach the required level of knowledge of the students (students), the content of the educational material is not structured, and the teaching methods, tools and styles are selected in accordance with it. , they are directed to independently select and train pupils (students) in full, shortened or in-depth training options. According to the author, 70

percent of the educational material on the problem-module teaching technology is highly customized (Ka ≥ 0.75) and a clearly established level of competence is guaranteed.

Problematic situations express the student's clear or vague understanding of the difficulty (problem), and conquering it requires searching for new knowledge, new methods and actions. If the student lacks the basic knowledge to find ways to overcome difficulties, he cannot accept problematic situations and, naturally, the process of conflict and confrontation in his thinking.

IV. Uzbek and Russian scientists paid more attention to the middle link of the educational trinity - "goal - process (means) - result", while American pedagogues made a deep study of the people on both ends of this chain. those who did. In particular, the creation of the concept of the "taxonomy of learning objectives" in the 50s of the last century under the leadership of Professor Benjamin Blum of the University of Chicago was recognized as a classic study, and it has not lost its value even today.

Bloom's taxonomy is built on the following four principles:

practical: taxonomy is an effective tool for a teacher-practitioner, it should represent a hierarchy of goals;

psychological: the taxonomy should be based on the achievements of modern psychology;

logical: the taxonomy must be logically complete and have a specific internal structure;

objectivity: the hierarchy of goals does not determine the hierarchy of their values.

Based on these principles, a taxonomy of educational goals was created for the above-mentioned types of educational activities.

It is possible to determine the objectives of any educational subject based on this taxonomy. For this purpose, subjects (sections) of educational subjects are written in a vertical column. The types of mental activity of students are recorded in a horizontal column. They are logically intersected at a certain point, and the level of achievement (know, identify, apply, analyze) to the current educational goal is determined.

Various modifications of Bloom's taxonomy are given in special literature. The fact is that this taxonomy, although it has advantages, is not without some flaws. The taxonomy, which claims to systematize learning goals according to the cognitive field of Incun, is not considered at the levels of the cognitive structure, such as perception, thinking, memory, some learning goals are repeated at different levels of mental activity. Nevertheless, the classification of educational goals by subject gives the teacher a great opportunity to correctly define his own pedagogical activity, to express not only the inner state of students, but also to show them outwardly, to be preserved as a person. screams.

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