Modular learning technology based on a subject-activity approach

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Abstract. The article discusses the essence, purpose, and objectives of modular learning, which is one of the types of personality-oriented learning technology. The sequence of transition to modular learning, the technology of the subject-activity approach, with the use of which continuity, intensification, individualization of learning is ensured, is presented. Key words: Module, modular training, personality-oriented learning technology, subject-activity approach.

1 Introduction

The modular education system was first officially discussed at the UNESCO World Conference in Tokyo in 1972. The technology of modular learning is derived from the general theory of functional systems, the neurophysiology of thinking, pedagogy and psychology.

According to research in these areas, the human brain, consisting of tissue modules, perceives information in quantum form (in other words, in the form of known particles).

In the second half of the twentieth century, the pace of development of science reached its peak. The scientific data collected during this period make up more than three-quarters of the amount of knowledge accumulated over the entire history of mankind. The phenomenal achievement of the results obtained by fundamental and applied sciences was the exploration of space and nuclear energy.

Intensive scientific and technological progress has led to intensive growth and updating of scientific and technical information, which has taken an avalanche-like character. Hundreds of thousands of books and journals are published annually in the world, more than 100 thousand dissertations are defended, and the flow of information on the global Internet is practically immeasurable.

Such an effective development of science, technology and technology has led to the emergence and constant development of new knowledge-intensive production processes, a sharp increase in the quality and volume of products. Naturally, changes in production methods require corresponding changes in education.

In the era of rapid scientific and technological progress, the effectiveness of teaching largely depends on the role of the student in the learning process, the attitude of the teacher towards him. There are two types of learning technology: authoritarian and personality-

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oriented.

In authoritarian technology, the teacher is the sole subject of the pedagogical process, and the student is just an "object". At the same time, the initiative and independence of the student is suppressed, teaching is based on coercion. The authoritarian technology of education includes traditional education, which means, first of all, the class-lesson organization of education based on the principles of didactics, formed by Ya.A. Komensky.

Traditional learning is characterized by a pedagogy of coercion; explanatory and illustrative teaching methods; mass learning. Authoritarianism in traditional education is characterized by the fact that the student is still an inferior person (he only has to), and the teacher is the commander, judge, the only initiative person.

In an era of rapid development of science and technology, the volume, diversity, accessibility and adequacy of information create the necessary conditions for organizing effective individual and independent learning. In order to accelerate learning, the attitude of the teacher to the student must change from "leader" to "partner".

In this case, training is student-centered, the development of the student is carried out to the level of natural abilities [1].

For the system of higher and professional education, the following personality-oriented learning technologies can be attributed:
- business games;
- problem-based learning;
- differentiated training;
- programmed training;
- computer training;
- modular training.

2 The main part

The term "Modular training" is associated with the international concept of "module", Latin mobulus, one of the meanings of which is a functional node. In this context, it is understood as the main means of modular learning, as a complete block of information [2].

Modular training allows you to solve modern educational problems, such as:
- optimization and structuring of the training content on an activity-based modular basis, providing the possibility of flexible change - variability of programs;
- individualization of educational programs and interaction between the student and the teacher;
- practical training and monitoring of the success of training at the level of assessment of observed actions;
- activation, independence and maximum realization of the capabilities of the trainees.

In the modern theory and practice of modular training, two approaches can be distinguished: subject-activity and system-activity.

In the context of a subject-based education system, the combination of modular methodology with a separate academic discipline characterizes the subject-activity approach. The technology of modular training based on this approach is advisable to use in the system of higher, secondary special and vocational education, advanced training of teachers. In the technology of modular learning based on the subject-activity basis, the module is:
- a fundamental concept of an academic discipline, a certain phenomenon, a law, a major topic, a group of interrelated concepts;
- a logically completed unit of educational material based on the principles of modular learning, designed to study one or more fundamental concepts of the discipline.

The module is most effectively compiled on the basis of a strict system analysis of the

conceptual apparatus of the discipline, which makes it possible to identify groups of fundamental concepts, logically and compactly group the material. This allows you to avoid repetitions within the course and in related disciplines.

The module is an independent structural unit, which in some cases allows individual students to listen not to the entire course, but only to a number of modules. This makes it possible to optimally plan the individual and independent work of gifted students [3].

The purpose of the transition to modular training is:

• ensuring continuity of training;

• individualization of training;

• creating the necessary conditions for the independent development of educational material;

• intensification of training;

• achieving effective mastery of the discipline.

With modular training, all the necessary conditions are created for students to acquire knowledge in accordance with their abilities.

The effectiveness of the transition to a modular learning system depends on the following factors:

• the level of the material and technical base of the educational institution;

• the qualification level of the teaching staff;

• the level of preparedness of students;

• evaluation of the proposed results;

• development of didactic material;

• analysis of results and optimization of modules.

The transition to modular training involves the following [4]:

• on the basis of a thorough analysis of the working curriculum, groups of the most closely interconnected disciplines are determined, i.e. the entire curriculum is considered as a collection of individual macromodules (Fig. 1).

It is most expedient to form macromodules of three varieties:

a) including the humanities;

b) including economic sciences;

c) including general education, general technical, general professional and special disciplines.

Each macromodule has its own goal in the formation of a specialist. The purpose of studying a certain macromodule follows from the goals of studying individual disciplines included in it. The totality of the goals of studying individual macromodules is the general goal of training a specialist, reflected in state educational standards. The purpose of studying each macromodule should be clearly formulated and communicated to the student at the beginning of studying his first discipline [5-7].

Before studying each of the following macromodule disciplines, students are informed of the purpose of studying each of these disciplines:

• the optimal sequence of studying disciplines within each macromodule and the optimal terms of their study are established. I.e. it is necessary to ensure continuity of training, shortening the terms of studying disciplines and the macromodule as a whole. Disciplines with a small amount of study hours (1-2 in some cases 3 hours of classroom lessons per week) are more appropriate to include in the list of block subjects, which can be conducted in the first or second half of the semester
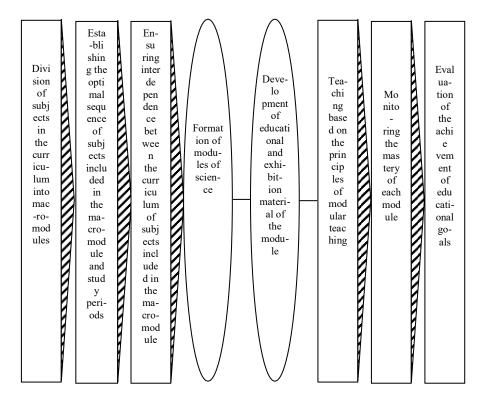
Fig. 1. Modular learning technology based on a subject-activity approach

The compilation of macromodules is based on taking into account close vertical relationships, however, when determining the optimal timing of their study, it is necessary to take into account the presence of horizontal connections of macromodules.

• the interrelation of the curricula of the courses included in the macro module is ensured in order to eliminate repetitions of the educational material.

The working curriculum of the course is being revised taking into account the grouping of individual topics into modules. For each module, it is necessary to formulate a goal indicating its theoretical and practical significance.

The module may include 2-3 lectures and related practical exercises and laboratory work.

The following materials are prepared for each module.
• tests to control students' knowledge;
• individual work assignments;
• tasks for independent work;
• educational and methodological handouts;
• list of educational and scientific literature;
• working curriculum.

Each module should end with testing: for the current module, it is a control of the material passed, and for the subsequent module, it is an input control.

For each module, a set of reference and illustrated materials is formed, which the student receives before starting his study. The module is provided with recommended literature, each student moves from module to module as they master the material, gifted students can take the test independently of others. The functions of a teacher can vary from information-controlling to advisory-coordinating. Modular training involves the reading of

problem and installation lectures that provide generalized information on the key issues of the course. Lectures should be aimed at developing students' creative abilities. Practical and laboratory work of the module is worked out in conjunction with lectures, complementing their content with the study of new material and the acquisition of certain practical skills.

When preparing lecture materials, it is advisable to use structuring and systematization techniques, i.e. presentation of the material in the form of flowcharts, a block of drawings. At the same time, the efficiency of assimilation of the material increases, because:

• the ultimate goal of the module is realized;

• the connections of the elements of the educational material and its transitions are clearly presented;

• the nodal points are highlighted;

• the entire volume of the educational material (module) is covered by the eye.

Structuring the content of the educational material during the construction of the module, first of all, pursues the goal of "compressing" information.

It is necessary to strive to present knowledge in a complete, user-friendly form.

This provision is fundamental in the construction of the methodology of modular training. On the block of figures for each module, it is advisable to arrange symbolic designations (in the form of a question statement), the image of questions in the form of drawings, the presentation of formulas, tables, graphs and methodological guidelines.

In principle, block drawings, flowcharts and other illustrative materials can serve as a handout for students. At the same time, it is advisable to compile an explanatory dictionary of terms of this discipline for each course, including the module. Increasing the effectiveness of modular training is achieved by using the following teaching methods: brainstorming, problem dialogue, heuristic conversation, educational business games, etc.

Thus, the transition to modular training provides for the following sequence;

• Differentiation of the disciplines of the curriculum into macromodules.

• Establishment of the optimal sequence of studying disciplines with the compression of the training period.

• Ensuring the interconnection of curricula, disciplines of the macromodule.

• Formation of discipline modules.

• Development of educational and visual material of the module.

• Design of learning technology based on the principles of modular learning.

• Preparation of lesson schedules taking into account the optimal number of simultaneously studied disciplines.

The organization of the educational process can be considered an integral part of the modular learning system.

One of the distinctive features of the modular learning system is the intensification of the educational process, which can be considered in 2 aspects:

• compression of educational information in the teaching process based on the principles of modular learning;

• optimization of the training schedule and, based on it, the schedule of classes by compressing the training period.

An effective form of organization of the educational process is weekly modular planning of classes and rating assessment of students. This means that the development of one module (2-3 lectures and related practical and laboratory work) should be planned for 1 week and ends at the end of the week with testing or other type of control and assessment of students' knowledge.

The following advantages follow from the content of the modular training system:

• ensures continuity of training between disciplines, within the discipline between modules;

• methodological sound coordination of all types of educational process within each

module and between them is provided;
- flexibility of the modular course structure;
- systematic and effective control of students' learning (after each module);
- rapid differentiation of students by abilities (individual assimilation of the subject can be recommended by the teacher to individual students immediately after the first modules);
- intensification of training, as a result of "compression" of information, effective use of classroom hours and optimization of the structure of study time; lecture practical (laboratory) individual independent hours of work. As a result, the student manages to acquire the necessary knowledge, skills, and abilities.

3 Conclusion

Thus, the training of highly qualified specialists using a modular training system is provided by:
- continuity of learning (at the same time disciplines are absorbed more effectively);
- intensification of training (due to which more information is absorbed through computer networks during individual and independent work);
- individualization of learning (the possibility of obtaining knowledge in accordance with the student's abilities is provided).

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