THEORY AND PRACTICE OF DESIGNING AND DEVELOPING MODULAR TYPE EDUCATIONAL PROGRAMS IN MEDICAL EDUCATION (LITERATURE REVIEW)

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The article offers an overview of modular training as described in scientific literature. It discusses the main theoretical and methodological aspects of modular training pertaining to the Russian system of higher education, and in particular to medical education. The transition to modular training requires the creation of a methodological base, accounting and adaptation of the principles of modular training to the existing standards of higher education, the creation of adequate means of assessing the competencies that are being formed. The absence of a systematic approach to the methodology of creation, design and development modular type educational programs, necessitates the development of a new methodological basis for documenting and assessing qualifications in accordance with existing federal standards. The article presents our own experience in applying intra- and inter-departmental modules of training qualified medical staff.

Keywords: medical education, modular training, design and implementation of modular programs, overview

Currently, the wide application of innovative learning technologies allows instructors to individualize the educational process and to enhance the cognitive activity of students. Learning technologies create conditions for easier assimilation of the educational material as well as encourage the creative development and self-expression of the individual. Such modern technologies include modular training [8].

Modular training in various forms is widely used by numerous educational institutions. It arose in the 1960s, and quickly spread throughout English-speaking countries such as the USA, England, Canada. The essence of this method was that the student was able to work with a proposed individual educational program which included a goal-oriented lesson plan, a bank of information, and guidance books targeting the achievement of educational goals. The role of the educators varied from being informative-regulatory to being consultative-coordinating. Initially, the modular format was proposed for individual study, but eventually ended up being applied as a new approach in the classroom. At the UNESCO world conference on adult education held in 1972 in Tokyo, modular training was rendered most suitable for continuing education. Subsequently, the significance of this technology was extended to training youth and high school students [30].

Currently, modular training is actively applied to school and university education, including postgraduate professional training [5, 9, 35, 38].

The module is a self-contained part of an educational discipline. It includes cognitive and professional aspects the mastering of which is tested with the appropriate form of knowledge, skills and abilities tests.

The use of modular training allows educators to differentiate the content of the educational material, to individualize the educational activities, and to encourage the development of independent study. It also stimulates goal-oriented work and a sense of personal achievement. The method allows instructors to develop an effective system of grading. It offers students the opportunity to learn at their own pace within the module.

The above criteria determine the advantages of modular technology compared to the conventional teaching model, which currently remains most commonly used in medical schools. Attempts to introduce elements of modular education at the level of medical school undoubtedly exist and are based on the analysis of the advantages and disadvantages of the traditional system [10, 33]. According to N. Oh. Bartosz, N. S. Podchernyaeva (2007), the indisputable advantages of the traditional system include integration and continuity in the study of fundamental (basic) and clinical (applied) disciplines within the framework of a logically structured clear system, the presence of highly qualified teaching staff engaged in scientific research and medical work, the cooperation between specialized departments with the purpose of mutual enrichment, creative growth and improvement, in-depth preparation in individual disciplines with the purpose of training student-scientists. In addition, the authors note that the essential advantage of the Russian medical education system is the focus on deep clinical training of students. A great amount of time is traditionally devoted to the development of practical skills and their systematization including training “at the bedside”, demonstration and analysis of clinical observations. All of these aspects contribute to

the creation of a system of effective learning as well as establish the foundations of clinical thinking, and the ability to solve professional problems.

However, along with the obvious advantages of the traditional subject based system, there are also certain problems in the current state of medical education. These include excessive fundamentalization with low motivation of students related to the study of basic disciplines, overcrowded classes, difficulties associated with the design, development and implementation of interdisciplinary programs reflecting the current condition of various medical fields [6]. It is obvious that there is a need to solve these problems in light of increasing demands on the part of employers in terms of the quality of training of graduates.

It is known that in order to increase the competitiveness of specialists, it is necessary to create adequate educational programs that ensure on one hand the formation of a system of professional knowledge, skills, and habits, and on the other hand the development of creative, innovative abilities [23]. The practical orientation of modern medical education and the need for implementing a competence approach, actualize the problem of modernization of the traditional system of education and raise the question of the need for deeper integration of subjects and the creation of modular educational programs.

The modular approach is relevant, first of all, in the design of continuing professional education programs. The implementation of such programs, according to S.R. Filonovich, requires fundamental institutional changes in the organizational structure of the university, and the formation of a new type of a teacher. One way of achieving this goal can be the individualization of learning, and the creation of individual educational trajectories. The fact that the technology of modular training is based on the theories of personality and motivation of activity, the theory of subjectivity and activity of the individual, the concept of cognitive ergonomics makes this approach most applicable to the design and implementation of the personality-oriented model of education.

It should be noted that the principle of "lifelong learning" (or "continuous lifelong learning") has always been inherent in the medical education system. Due to the specifics of their work, medical doctors are obliged to validate their practice license once every five years. They are also required to improve their qualifications, to constantly participate in conferences and seminars, and to continue taking professional courses. In this regard, the development of programs that are relevant to the modern requirements of the health care system and the student's personal requirements, creates a competitive advantage for the university. In the age of rapid development of medical technologies, educational programs need to be flexible and dynamic. They need to contain variable elements but at the same time they must include the necessary amount of fundamental knowledge that builds essential professional skills. It is these features that distinguish modular training from other modern educational technologies.

The analysis of foreign literature based on this subject showed that most often, the module is represented by several courses, during which a coherent system of knowledge and skills in a particular discipline is built. Within the modules, fundamental and applied disciplines can be combined both thematically and methodologically in the process of learning. They range from simple to complex, gradually forming students' basic knowledge and practical skills – the final result of training [22, 41]. More often, this technology of training is used in the system of educating surgical specialists and doctors of emergency medical care, which is probably a result of the need for effective knowledge and ability to quickly make optimal professional decisions [11, 14, 20, 25, 31, 40]. Practical orientation of learning, students feedback, improved academic achievement and satisfaction with the educational process (confirmed by numerous studies) allows us to use this approach in teaching pre-clinical disciplines like anatomy, physiology, pathology [26], as well as clinical disciplines at the interface of different fields [1, 15, 28, 42].

The experience of foreign colleagues in the application of modular interactive training of medical specialties within electronic learning environments with online testing is appealing in the context of our domestic practice. The majority of authors note higher results of training in comparison with traditional educational programs [3, 7, 16, 17, 18, 19, 32, 36, 39].

For the purposes of successful planning and implementation of modules, foreign researchers recommend focusing on the main stages of training: knowledge, understanding, application, analysis, synthesis, development. At each stage of training, it is necessary to take into account three main domains of training: cognitive, affective and psychomotor. Thus, the assimilation of cognitive (informative) strategies is aimed at developing the ability to solve a new problem (to rebuild the known, to

discover, to invent the solution to the problem). Affective training forms the ability and readiness to make choices with regard to people, phenomena, events. This concerns not only feelings and emotional experiences, but also personal value orientations. Psychomotor training is important in the formation of practical skills, which is especially relevant nowadays in the development of effective knowledge [27].

From the point of view of foreign authors, it is especially important to plan training, taking into account the existing traditional experience and the use of modern training technologies. The formula for PIE-R3 (Prepare – Input – Explore – Retain – Reconfirm – Reflect) is important for the successful design of modules and description of the steps of the design [13]. Taking into account these stages, specific instructions for the development of modules are offered. First, the results of the student should be documented (a list of abilities acquired by the student during the educational process within the module is needed). Second, the preliminary steps for acquiring practical skills should be explained to the students (the educator should prepare the students, teach relevant vocabulary, define the expected situations and the results). Third, practical activities promoting the acquisition of skills by students should be conducted (it is necessary to help students in learning and acquiring knowledge in a certain field). Fourth, activities which aim at building a solid base of knowledge should be organized (the creation of conditions for demonstration of knowledge and skills acquired during the module is needed). Finally, basic skills required for training in the module should be offered [2].

The credit-based modular system is traditionally used to evaluate the results of learning at foreign universities. Existing models of credit-based modular systems (UMAP Credit Transfer Scheme, United States Credit System, Credit Accumulation and Transfer System, European Credit Transfer and Accumulation system) are focused on the accumulation and transfer of points to ensure academic mobility of students and academic recognition of the specific university, facilitating the interaction of universities from different countries. Currently, in Europe (France, Spain, Germany, Italy, UK) the most common credit-based system is ECTS (European Credit Transfer and Accumulation System). ECTS allows these countries to evaluate the curricula of their universities on a common scale, which stimulates the convergence and integration of national educational systems. The Russian higher education system is included in the common European educational space in accordance with the Bologna Declaration. Hence, the transition of Russian universities to ECTS and the implementation of modular technology seems promising. As for medical universities, at this stage it is necessary to create a powerful methodological base for the introduction of modular training and methods of evaluating its results. The system of assessment of qualification skills needs to be changed from a traditional discrete-in-session system to a rating system, the different methods and advantages of which are widely covered in specialized literature [4, 24, 34].

In the process of transitioning to modular learning technology and the implementation of new educational standards, there may be certain difficulties. These difficulties are due to the disciplinary-cyclic (horizontal) structure of the Federal Standards for Higher Education, presented by the units of grading in various disciplines and semesters (these values are not always multiples of three, which makes it difficult to divide the curriculum into modules). There are difficulties in calculating the credit value of each academic year in the process of developing large modules (more than one year) [21]. A solution for this problem, according to E. V. Karavaeva (2012), is the introduction of amendments to the Federal Standards of Higher Education, the abolition of the disciplinary structure of the Basic Educational Programs (BEP), the calculation of the credit values of the sections of the BEP in multiples of three, the division of large modules into course units. However, in our opinion, these difficulties should be overcome, since it is the use of modular technology that will make it possible to more effectively create and implement interdisciplinary programs, both within and outside of the faculty departments.

The methodology of creating modular programs was tested and is being used at Samara State Medical University (SSMU). Traditionally, the teaching of pathological anatomy and pathological physiology in medical universities is carried out within the framework of individual subjects by different departments. At Samara State Medical University, a modular program of teaching pathological anatomy and pathological physiology has been introduced at the Department of General and Clinical Pathology. This approach is implemented in the educational process with the purpose of integrating pathological anatomy and pathological physiology as interdisciplinary areas of medicine encompassing the pathochemical, morphological and pathophysiological processes of vital activity of the body within the

normal and pathological ranges. The use of the modular program makes it possible to focus its content on specific problems, to form well defined outcomes of the learning process, namely interdisciplinary fundamental and effective knowledge. In order to implement the modular approach, changes were made in the curriculum, in the lecture schedules and in the practical courses. Considering that the cyclic principle of training in medical universities is applied starting with the third year, the program provides three basic modules consisting of two consecutive sub-modules – pathological anatomy and pathological physiology. Each sub-module is divided into basic and variable parts.

The total credit value of the discipline is 16 credits (576 hours), the credit value of the modules in accordance with the schedule is based on 4, 2 and 10 credits accordingly. The first module is aimed at familiarizing the students with the content of the subjects offered and with the process of inflammation. The second module is devoted to the problems of oncology. The third module deals with the issues of specialized pathological anatomy and pathological physiology, clinical pathological anatomy, clinical pathophysiology.

The structure of each module includes lectures, practical classes in a group format, classroom and extracurricular independent work, ongoing tests (including oral exams based on situational problems), chapter-based tests and final exam.

The experience of designing and implementing modular training is undertaken at the department of advanced training and retraining of teachers at SSMU. The content of the modular cycle "Modern educational technologies" is represented by four modules: a basic module ("organization of the educational process"), and three variable modules of advanced level ("Design and development of educational programs", "Organization of independent work of students", "Control and documenting outcomes in medical education"). The structure of each module includes lectures, workshops, both in an individual and group formats, classroom and extracurricular independent work, ongoing tests, chapter based tests (in sections) and final exam which is a final paper based on the subject of interest of the attending student. During the training, there is ongoing communication with the audience the purpose of which is to determine the success of learning, to analyze errors, etc.

The modular format of the cycle provides teachers with the opportunity to choose topics depending on the educational needs, their work experience, the need to design and develop educational and methodological support of the learning process for a particular discipline.

Thus, the analysis of literary sources and our own experience of applying modular type programs, allows us to conclude that currently there is no system approach to the methodology of creating, designing and developing modular educational programs at the level of higher medical education [5, 6, 9, 10, 12, 29, 37]. The transition to modular training requires the creation of a methodological framework of documenting and adapting the principles of modular training to existing federal standards as well as the creation of adequate methods of evaluation of acquired qualifications.

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