Research Article

METHODS OF USING INNOVATIVE TECHNOLOGIES IN INDEPENDENT STUDY OF BIOCHEMISTRY

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ABSTRACT

The article presents a methodology for using innovative technologies to increase the effectiveness of students' teaching of Biochemistry in independent teaching of the subject at the Department of Biochemistry of the Bukhara State Medical Institute. Examples of increasing the interest of students of higher medical institutions in fundamental sciences and their professional competence through a professionally oriented teaching method are given. The task of the teacher in independent teaching is to encourage and guide the search for ways to solve problems. When working with a mini-group, the initial level of knowledge, students' thinking and perception of the material, individual preparation of clinical problems and their independent work with certain topics are also taken into account.

KEYWORDS

Theoretical knowledge, curriculum, credit-module system, independent, independent work of students.

INTRODUCTION

In accordance with the curriculum of the Ministry of Health of the Republic of Uzbekistan, in accordance with the working curriculum of the Bukhara State Medical Institute, a large number of hours are also allocated for independent education of students in the subject of biochemistry according to the credit-module system. The theoretical knowledge and practical skills obtained in the process of studying these subjects ensure high professional skills and qualifications of future health care specialists.

The Department of Biochemistry of the Bukhara State Medical Institute has developed and approved an instruction on the organization and control of

independent education of students in the credit-module system.

This instruction was developed based on the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 824 dated December 31, 2020 "On measures to improve the system related to the organization of the educational process in higher educational institutions" and the Order of the Minister of Higher and Secondary Specialized Education No. 311 dated July 16, 2021 "On approval of state educational standards of higher education".

The guideline is based on the following general principles:

The student's independent learning load is an integral part of the educational work specified in the curriculum for mastering a specific subject.

The student's independent learning is a set of educational work carried out in the classroom and outside the classroom (excluding the classroom hours allocated in the curriculum) in the form of independent work under the direct supervision of a teacher or independent study of topics in the subject (module) by the student.

Independent learning – is a systematic activity aimed at the formation of theoretical knowledge, practical skills and competencies based on the independent mastery of educational material, creative and independent performance of tasks of varying complexity, and practical tasks in the classroom and outside the classroom.

Independent work – an active method of education that solves educational tasks under the guidance and guidance of a teacher. Independent work is the organization and implementation of specific activities of students in connection with the set goal. A student's independent work is his activity based on a high level of activity, creativity, independent analysis, initiative, and the timely and excellent completion of all tasks.

Experimental part

The department is required to pay special attention to the following aspects when organizing independent education for students:

-        formulation of topics for independent study in the disciplines (modules) of chemistry and medical biochemistry and discussion at the department meeting (methodological association);

-        Accurately and clearly reflect in the curricula topics for independent study in the disciplines (modules) of chemistry and medical biochemistry;

-        determining the amount of learning units (credits) allocated for independent study in the subjects (modules) of chemistry and medical biochemistry, which are intended to be completed independently, and approving them at the department meeting;

-        determining the types and forms of independent work in the disciplines (modules) of chemistry and medical biochemistry and reflecting them in the science program (Syllabus);

-        determining the points allocated for independent work within a 5-point scale (100-point system), distributing points by type of work;

-        discussing the implementation of independent work assignments in the disciplines (modules) of chemistry and medical biochemistry at department meetings and timely eliminating any shortcomings.

Independent study hours allocated in the CURRICULUM for the 2024-2025 academic year of the Department of Biochemistry

№	Subject name	Faculty	Course	Independent study
1.	Biokimyo Biochemistry	Treatment work-60910200	2	120
		Dentistry (by direction)-60910100	2	60
		Pediatrics work-60910300	2	120
		Higher nursing work-60911200	1	30
		Medical biological work-60910600	2	90
		Medical preventive work-60910400	2	120
		Folk medicine-60911100	2	30
2.	Medical biochemistry	Medical biological work-60910600	4	90
3.	Biological chemistry	Pharmacy (by type)	3	90

When organizing independent learning of students, professors and teachers must fulfill the following tasks and responsibilities:

- clearly reflect the topics for independent study and independent work assignments in accordance with the credits (hours) provided for in the curriculum of the department in the subject (module) program (Syllabus);
- ensure that independent work and assignments require mental activity (analysis, synthesis, comparison, comparison, generalization);
- indicate methodological guidelines for mastering the topics recommended for independent study and completing independent work assignments in the subject (Syllabus), assessment criteria and deadlines, and consultation hours for consultation;

- organize the cooperative activities of students in small groups in the subject (module) and conduct surveys on the results of teamwork. This aspect should be taken into account when assessing the results of students' collaborative work;
- when compiling intermediate and final control questions, also consider the topics recommended for independent learning;
- monitor, check and evaluate the implementation of independent work assignments through an electronic system (platform), and deliver the results to students in a timely manner. Conduct a presentation of independent work completed in small groups, clarify the achievements and shortcomings of students and announce their results, adhering to the principle of congruence ("here and now");

- monitor the fact that the professor-teacher provides advice and practical recommendations on independent work based on the student's application during the contact time specified in the subject program (Syllabus);

- prepare additional educational materials for students' independent learning, topics for independent work and assignments on their content, and provide students with appropriate instructions for their implementation.

When performing independent study and independent work assignments, students must fulfill the following tasks and obligations:

- fully master the topics recommended for independent study and study in subjects (modules) and submit independent work assignments in a high-quality manner within the established deadlines;

- do not allow plagiarism when performing independent work assignments;

- have a creative approach to performing independent work assignments, have independent, critical and innovative thinking, information-processing competence, and strive for self-development;

- act in accordance with the common goal of the team when performing independent work assignments in small groups, complete the tasks assigned to them on time, and develop the competence to work in a team.

In case of objections to the grade (scores) assigned to the independent work, the student may apply to the dean's office (registrar's office) via the electronic platform within 24 (twenty-four) hours (1 day) after the expiration of the specified period.

The forms and types of independent education are as follows:

Students' independent education should be organized in the following types:

- preparation for classroom lessons;

- completion of independent work assignments outside of the classroom;

- independent study of topics on the subject (module) in Information Resource Centers, houses (student residences).

Preparation for audience training is carried out in the following forms:

- preparing for lectures, seminars and practical classes;

- preparing for seminars-conferences;

- preparing for colloquiums;

- searching for answers to problems of interest through educational programs through frequently asked questions (FAQ-frequently asked questions);

- participating in forums - exchanging ideas on subject topics on telegram channels or distance learning platforms;

- consolidating knowledge of the subject (module) by practicing in web-quest - educational test programs;

- preparing for control work;

- preparing for a test (exam);

- preparing for the exam.

It is recommended that independent work performed outside of class time be of the following types:

- express one's personal opinion on a current topic in writing in critical, journalistic and other genres (for example, essays);

- prepare lectures;

- write a term paper;

- write an outline;

- compile a glossary;

- compile an individual and collective educational project;

- complete case assignments;

- compile thematic portfolios;

- work with information and analytical materials;

- work with sources;

- compile infographics;

- create graphic and illustrative models (mind maps, frames, logical graphs, etc.);

- create multimedia presentations;

- prepare methodological developments for lessons;

- prepare developments for extracurricular activities;
Depending on the nature of the educational area (specialty), other types of independent work can be used.

When organizing independent work, it is recommended to use information technologies for the following purposes:

1. Searching for information on the Internet - using a web browser, a database, information search, information and reference systems, automated library systems, electronic journals.

Independent work on searching for and processing information includes: writing reviews of sites related to the topic; analyzing and evaluating existing abstracts on the Internet on a specific topic; writing your own version of the lecture plan or a specific part of it; compiling a list of used literature; preparing a video from practical exercises; preparing a lecture on the topic; conducting a discussion on the topic; working on a web quest prepared by a professor or found on the Internet.

2. Conducting dialogue on the network - using e-mail, synchronous teleconferences. Conducting dialogue on the network can be organized in the following ways: discussing lectures that have been held or are planned to be held; communicating with specialists or students in a synchronous teleconference (chat).

3. Creating a thematic web page, web quests (tasks) - using an HTML editor, web browser, graphic editors. The following methods can be used to create a thematic web page, web quests (tasks): posting creative work done by students on the site; publishing a list of literature on the topic; creating thematic web pages for individual and small group work; creating web quests for working on the topic and posting them on the course site.

The general criteria for evaluating students' independent work are as follows:

- The criteria for assessing students' independent learning are developed by the department taking into account the nature of the subjects (modules), discussed at the department meeting and approved by the Scientific Council of the institute.

- The criteria for assessing independent work assignments for each subject (module) are provided to students at the beginning of the semester.

- Assessment of students' independent work assignments for the subject (module) is carried out in accordance with the given deadline.

- The score assigned to independent work should not be less than 20 (twenty) percent of the total score.

- The results of independent learning of the student (s) in the subject (module) are recorded in integers in the relevant teacher's journal Hemis electronic platform.

- The progress of students in independent work in the subjects is regularly discussed in student groups, at department meetings, and at least twice each academic year at the Scientific Council of the institute.

The final part consists of:

This instruction will be put into practice after it is approved and signed by the Institute Council.

Some amendments and changes may be made to the instruction.

In the context of the credit education system, independent work of students with a teacher (IWST) involves paying more attention to the role and effectiveness of individual work, which helps to increase the creative potential of students, stimulate their learning of new knowledge, and develop critical thinking. With this form of classroom teaching, students are randomly divided into mini-groups, so that students do not feel the imposition of someone else's will, while being distributed at the discretion of the teacher. Then, each team receives its own mini-clinical task and enters into its solution with the team, while solving it, it is necessary to pay attention to the thinking of all participants in the mini-group.

The teacher's task is to encourage and guide the search for ways to solve problems. When working with a mini-group, the initial level of knowledge, students' thinking style and perception of the material are taken into account. The need to introduce IWST lessons as an active form of education is associated with the importance of developing students' teamwork skills, independent analysis, competent use of information, and timely adaptation to rapidly changing conditions and requirements of society. Students acquire these qualities through the use of active forms of education, working in pairs, groups, and studying in conditions of solving clinical situations. In this case, more attention is paid to independent work. IWST lessons are conducted according to the developed TBL (task-based learning) methodology, where the formation of small groups, the application of scientific content to solve clinical problems using the teacher's feedback as a subject specialist are used. This method provides training in interpersonal communication skills and communication with colleagues. During such lessons, students' work consists of the following components: individual work, discussion in small groups and discussion with the entire audience.

Since classes in this area are aimed at high student activity, creative revision of the information received, the main attention when conducting TBL is paid to assessing the level of student preparation and group activity.

Another advantage of this method of organizing IWST is that students with high academic results do not take on all the work, experience discomfort, and the low performance of other students does not affect the grades of excellent students. The process holds each team member accountable for his or her personal contribution to the success of the team. The better the joint work of the group, the higher the team and individual results, and the final grade of the student depends on both his or her personal efforts and the effectiveness of the entire group.

Therefore, independent work (IT) of students with specific topics is also provided for individual preparation of clinical problems and their solution.

This form arouses great interest in studying the subject, as it provides freedom in searching for sources of information. In addition, it is a good form of consolidating and assimilating the material. The proposed topics for independent work allow you to choose a topic that interests you and approach your work creatively.

In recent years, the share of independent work of students (ITS) in the overall structure of the educational process has been steadily growing, which indicates a tendency to ensure the active, objective role of the student in the educational process. The organization of independent work of students is one of the complex technological tasks. The full methodological development and methodological support of all types of ITS allows for the effective management of this most important type of educational activity. The creation of educational and methodological manuals in the form of workbooks for independent work with clearly structured tasks and assignments eliminates the need for the student to enter only the correct answer, definition, diagram, formula, conclusion, rewrite the procedure, saves the student's time, and also allows the teacher to control the implementation of ITS. The competency-based approach requires changes in the monitoring and evaluation system for developing the curriculum. Today, the most advanced form is the modular rating system for assessing student knowledge.

Another form of monitoring and assessing students' knowledge is an oral intermediate control, which concludes the study of a particular section and allows the teacher to individually assess the level of mastery of the material. Thus, the teachers of the department

have a fairly wide range of possible forms of assessing knowledge, which provide the necessary systematicity and depth of checking students' activities. Systematic monitoring of students' knowledge allows you to obtain grades of a sufficient level that allows for an objective final assessment at the end of the year.

RESULTS

At the end of each lesson, a reflection is held, during which each person answers questions about how well he prepared for the lesson, whether it was difficult to cope with the proposed situation or task, and evaluates the practical significance of the knowledge gained. Thus, the most important thing that needs to be understood from the lesson is consolidated. At the same time, students always have the opportunity to familiarize themselves with the current rating at any stage of the subject and thereby track the dynamics of their success.

For students who have problems with academic activities due to insufficient understanding of the topics, consultations are provided outside of class, during which teachers answer students' questions about preparing for the lesson.

In recent years, the share of independent work of students (ITS) in the overall structure of the educational process has been steadily growing, which indicates a tendency to ensure an active, objective role of the student in the educational process. The organization of independent work of students is one of the complex technological tasks. The full methodological development and methodological support of all types of ITS allows for the effective management of this most important type of educational activity. The creation of educational and methodological manuals in the form of workbooks for independent work with clearly structured tasks and assignments, allows the student to enter only the correct answer, definition, diagram, formula, conclusion, eliminates the procedure for rewriting,

saves the student's time, and also allows the teacher to control the implementation of ITS. A competency-based approach to the development of the curriculum requires changes in the monitoring and evaluation system. Today, the most advanced form is the modular rating system for assessing student knowledge.

The inclusion of assessment for the implementation of tasks on ITS in the continuous monitoring of knowledge acquisition is due to the focus of modern education on the active independent activity of students. The technological organization of this type of educational activity is associated with certain difficulties. Full methodological provision with step-by-step instructions for the acquisition of knowledge, as well as regular assessment and scoring of tasks on ITS, increases the manageability and, therefore, the effectiveness of this type of educational activity. The training manuals for ITS developed by the department (Vice-Rector for Academic Affairs of the Bukhara State Medical Institute) include both tasks aimed at memorization - recording the main theoretical principles, definitions, terms, and more creative tasks - solving problems, drawing up diagrams, tables, logical structures.

CONCLUSION

Thus, the use of the considered forms of organizing the educational process in the subject of "biochemistry" among students encourages students to devote more time to independent work with information sources, directs them to independently search for and solve assigned problems, which, of course, arouses additional interest in the issue being studied. The work introduced in mini-groups allows for the implementation of a moment of mutual learning between students with different levels of knowledge.

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