Methodological Factors in The Use of Information Technologies in Independent Learning

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Abstract: The study explores the possibilities of using modern educational technologies in organizing independent student learning (ISL) in physics in higher education institutions. It examines the characteristics, structure, and didactic support of technologies aimed at encouraging students to independently complete educational tasks, fostering interest in learning, and deepening knowledge in specific subject areas. The content of ISL involves performing practical tasks that contribute to the development of logical thinking, creative activity, and a research-oriented approach to mastering academic material. Relevant issues have been analyzed and conclusions drawn.

Keywords: Digitalization, empirical knowledge, academic impulse, feedback, technology, multimedia, method.

Introduction: Independent Student Learning (ISL) is a specific type of student educational activity aimed at independently completing didactic tasks, fostering interest in learning, and deepening knowledge in a particular subject area. The content of ISL involves practical tasks that help develop logical thinking, creative activity, and a research-oriented approach to assimilating educational material [1].

Typically, ISL includes both fully independent student activities and guided independent learning outside the classroom under the supervision of a teacher (GISL).

In full-time undergraduate programs, ISL accounts for half of the total subject hours, with about 14% allocated to GISL. In part-time education, ISL is recommended to comprise four-fifths of the total subject hours.

The GISL workload is not fully included in the teacher's overall workload. However, separate workload

allocations are specified for contact sessions (e.g., drawing assignments, coursework, course projects, graduation papers, master's theses, mentoring of researchers and PhD candidates, etc.).

The organization of ISL is carried out in accordance with the core regulatory documents of the higher education institution, including working curricula (syllabi) and requirements for independent study of subject modules.

ISL can be implemented in the following forms:

- Independent activities carried out directly by students using their mobile devices;

- Traditional teacher-supervised independent student work;

- Electronic teacher-supervised independent student work.

Independent activities carried out directly by students via mobile devices may include [1,2]:

- Preparing for lessons: studying lecture notes, video materials, practical and laboratory session explanations;

- Information search: using digests tailored to personal interests to explore internet resources;

- FAQ (frequently asked questions): searching for answers to relevant issues using educational software;

- Forums: discussing topics via Telegram channels or distance learning platforms;

- Solving tests: reinforcing module content by practicing on educational testing platforms;

- Preparing for assessments: getting ready for midterm and final tests in the subject;

- Participating in competitions: engaging in contests under the academic guidance of instructors;

- Taking part in subject olympiads: participating in academic competitions between HEIs (physics, IT, etc.);

- Presenting at scientific conferences: giving presentations on research topics at institutional, national, and international scientific-technical conferences;

- Publishing theses and articles: submitting theses to conference proceedings and research articles to scientific journals based on their research topics;

- Contributing to the development of educational materials: participating in the preparation of textbooks, manuals, methodological guides, instructional materials, and other educational resources.

Electronic forms of TLMs are impossible to implement without modern information tools. These include:

TLMs, including their descriptions, topics, assignments, methods of delivery, and the number of hours, are presented in the course syllabus according to subject modules.

TLMs must be based on innovative technologies. The in-class form of TLMs involves students performing tasks using textbooks and primary sources, engaging in group work, and conducting individual analytical activities within the framework of given assignments.

TLMs are conducted according to a schedule that specifies the date, time, classroom, and tutor for each subject throughout the academic period.

Lessons within the framework of TLMs are conducted in advisory and interactive formats. The ratio of these formats depends on the complexity of the subject, the number of classroom hours allocated, the availability of didactic electronic resources, and the students' preparedness.

During physical experiments, students must be taught how to measure, perform tasks, obtain results, and make final conclusions.

Thus, electronic educational-methodical support aimed at developing students' professional competencies and creative abilities ensures empirical knowledge acquisition in physics education.

The educational process in higher education is a complex system that encompasses various aspects such as organizational, managerial, and cognitive activities in preparing highly qualified specialists.

The educational process mainly consists of academic sessions and assessment procedures. Academic sessions include all types of academic activities, students' independent learning, and practical training. Assessment procedures indicate the extent to which students have mastered the educational program.

In today's environment of globalization and educational reforms, several factors determining the ranking of higher education institutions are being prioritized.

Therefore, it is advisable for each higher education institution to consider these factors, improve its ranking, and modernize the educational process, including making adjustments to the pedagogical workload standards.

Granting such opportunities to universities by the Ministry of Higher and Secondary Specialized Education creates a strong foundation for increasing the effectiveness of educators' work and improving the ranking of higher education institutions.

The Role of Digitalized Independent Learning in Enhancing the Quality of Education

The role of digitalized independent learning in improving the quality of education is significant. Knowledge gained through independent activity tends to be more effectively absorbed than information directly provided by a teacher.

To fulfill the tasks currently set before the education system—such as promoting students' independent learning of materials, encouraging their professional development, and fostering creative engagement—it is necessary to increase the responsibility of teachers.

Both students and teachers must understand that independent learning is conducted for the benefit of the student. The student must realize that independent work is not done for the teacher, but for themselves, and it is a key factor in ensuring their future success.

According to modern pedagogical technologies, learners should study independently as much as possible during the learning process, while the teacher should manage this independent work by providing the necessary materials.

Organizing TLMs is hardly conceivable without modern information technology, multimedia and animation environments, and software tools.

Teachers create their own module, i.e., an electronic collection, containing presentations, handouts, syllabi, case studies, situational problems, and similar tasks related to their subject. This collection is then uploaded to a specialized educational portal.

Students, with the teacher's permission, can access this blog, download necessary materials in advance, and engage in independent learning.

Teachers and students communicate online via a news forum—teachers post assignments, announcements, news, and other subject-related information in this forum.

Communication between the teacher and the student can also be carried out through modern messengers such as WhatsApp, Facebook Messenger, WeChat, Instagram Direct, Telegram, Snapchat, Viber, Line, KakaoTalk, Discord, and Skype. The communication time is specified in the teacher's syllabus.

The electronic module provides broader opportunities for teachers to demonstrate their pedagogical methods and allows them to modify certain parts of the information it contains. It also creates great opportunities for students to complete independent work in the subject, both with and without the teacher's involvement.

Taking into account the achievements in this field, it is important to note that the effective use of modern information tools and computer technologies in the overall activities of educational institutions can be realized through the following aspects:

Organizing the institution's operations more efficiently via interactive teleconferences, virtual consultations, and the rapid transfer of important information to the personal or group computers of professors and instructors;

Creating the conditions for communication with education management bodies or other responsible organizations through modern messengers;

Establishing creative collaboration with other educational institutions, including foreign universities;

Searching for and effectively using information through the internet.

The following directions are considered relevant and promising in the development and implementation of informational resources and their software and methodological support:

Developing and improving systems that control the quality of e-learning programs and methodological support, establishing requirements and legal frameworks for them;

Developing, improving, and implementing software for distance learning courses aimed at independent learning;

Strengthening the material and technical base for implementing e-learning in higher, secondary special, and vocational education institutions;

Establishing the exchange of educational information with the global educational environment.

As in developed countries, the use of computer technologies in educational institutions in our country also allows for the implementation of a wide range of tasks. That is, in institutions with the opportunity for active use, computer technologies perform the following main functions:

Increasing student interest in learning through the use of multimedia technologies;

Enhancing students' thinking abilities and increasing the effectiveness of mastering educational material due to the interactive nature of education;

Providing the possibility to model and observe microscopic processes that are difficult or impossible to demonstrate in real-life conditions;

Having a positive impact not only on the level of mastery of the material but also on the students' levels of logical reasoning and perception;

Providing the opportunity for distance learning for students who missed lessons for valid reasons;

Enabling students to independently search for materials

and find solutions to problem-based tasks, thus conducting certain research work;

Creating conditions for quickly completing tasks such as writing term papers, graduation theses, and master's dissertations, searching and reviewing learning materials independently, making selections, and analyzing information and data.

Hozirgi davrda ta'lim mazmunini takomillashtirishning bosh xususiyatlaridan biri – kompyuter bilan muloqot jarayonida uning doimiy murojaat qilinadigan «qo'llab quvvatlovchi axboroti»ni ko'paytirish, kompyuter axborot muhiti va hozirgi zamon talablariga javob bera oladigan darajadagi axborot bazasining yaratilganligi, gipermatn va multimedia, o'qitishda imitatsiya, kommunikatsiya tizimlari qabul qilinganligidir.

Nowadays, information and communication technologies are increasingly becoming a key factor in the development of all sectors of society and branches of technology.

CONCLUSION

The recommended didactic principles for using modern teaching tools are closely interrelated and complement each other. Therefore, applying all the considered didactic principles in a comprehensive manner is logical. The goal of all scientific and methodological research in higher education pedagogy and didactics is to meet the knowledge requirements for graduates as defined by state educational standards and the standards of higher education institutions.

In teaching the laws and principles of physical processes and phenomena, it is necessary to prioritize educational technologies that align with students' cognitive abilities and to apply virtual animation tasks within a feedback-based visual environment at a productive level.

In physics education, the use of electronic software—especially in laboratory classes through various types of models—helps develop students' creative thinking and professional competencies.

The use of virtual (computer-based) experiments in this research, both as a teaching tool and as a method of learning, contributes to the development of students' creative abilities. It is expedient to implement electronic educational-methodical resources that facilitate empirical knowledge acquisition in physics (such as measurement, task performance, and obtaining results).

By utilizing electronic software tools, a technological structure and schematic design for the animated teaching method has been developed and implemented in practice. This contributes to the formation of students' academic motivation.

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