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Methodology of Application of Innovative Educational Technologies from Astronomy to Laboratory Activities

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Abstract: *Innovation in Uzbekistan was one of the first to enter the education system after independence as follows: The Legislative Chamber on Innovative Activities for the Development of the Education System was adopted on April 7, 2020, approved by the Senate on June 19, 2020, and is widely used today. This Law, the Law "On Science and Scientific Activity" is aimed at ensuring freedom of scientific creation and information.*

Key words: *Sky sphere, innovation, technology, education, SWOT, learning process, independent work.*

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Basic concepts of science and research, the Cabinet of Ministers of the Republic of Uzbekistan, the Ministry of Innovative Development of the Republic of Uzbekistan, the Academy of Sciences of the Republic of Uzbekistan, the higher education system, as well as ministries, departments and organizations subordinate to scientific organizations. The powers of local authorities in the field of science and scientific activity are being strengthened.

In addition, the law defines the scope of subjects of scientific activity, their rights and obligations, the procedure for conducting scientific activities in higher education institutions. The following basic concepts are used in the law:

- Innovation – a new development that is included in the civil circulation or used for personal needs, the application of which in practice provides a large socio-economic effect;
- Innovative infrastructure – a set of enterprises, organizations, institutions, associations of any form of ownership, providing innovative activities in material, technical, financial, organizational and methodological, informational, advisory and other terms;
- Innovative project – a set of measures for the creation of new developments, providing deadlines, executors, sources of funding and the formation of appropriate infrastructure;
- Innovative activity – the organization of new developments, as well as activities to ensure their implementation and implementation in the field of production;
- The state order for creation of innovations – the task for implementation of the innovative project at the expense of means of the State budget of the Republic of Uzbekistan and other sources which are not forbidden by the legislation;

- technology transfer – a set of measures aimed at the transfer of new development from the field of its production (production) to the field of practical application;
- new development – the result of intellectual activity (new or perfect technology of production, administrative, commercial or other nature, which has new features in relation to the results of similar intellectual activity, can be applied in practice and achieve great socio-economic benefits when used in practice, service and organizational and technical solution).

One of the first innovations to enter the higher education system can be seen in the following:

1. The introduction of innovation into the education system is observed in the content of education, teaching methods, forms of teaching, types and means of teaching as follows:

- Innovation in the content of education in the introduction of non-traditional and distance learning;
- the introduction of innovative interactive methods in the teaching process;
- The use of non-standard and virtual forms of lesson organization;
- in problem-based, heuristic, hierarchical, integrated, interactive, informal types of education.

Application of innovative educational technologies in the educational process are:

- Orientation of the educational process to the student's personality, ensuring their perfection as an individual, increasing the effectiveness of the acquisition of knowledge, skills and competencies standardized by the STS;
- Improving the effectiveness of professional and pedagogical training of teachers, especially methodological training and preparation for innovative pedagogical activities;
- Realization of didactic goals, such as understanding the role of innovative technologies in future pedagogical activity, creating the basis for the acquisition of methodological knowledge, skills and abilities necessary for their use by making the active participation of future teachers in lessons based on innovative educational technologies.

The use of innovative educational technologies in the educational process sets the following tasks:

1. To study the need for the introduction of innovative educational technologies in the educational process of educational institutions.
2. Study of advanced foreign experience in modern educational technologies and selection of optimal technologies.
3. Establish the necessary conditions for the introduction of innovative educational technologies in the educational process.
4. Analysis of the state of application and use of innovative types and forms of educational technologies in the educational process, based on the nature of science.

One of the main tasks of teachers is to highlight the effective ways of introducing innovative educational technologies in the educational process of the educational institution and the development of appropriate methodological recommendations. At the same time, the use of innovative educational technologies provides interdisciplinary communication, qualitatively complements the content of education, improves the methodological training of future teachers and increases the effectiveness of the educational process, while organizing their methodological training at the level of modern requirements. [1; p.102, 2; p.38, 3; p.20, 4; p.15].

The use of innovative educational technologies encourages students to work and research independently, realizes initiative, ensures continuous work of the professor and leads to the renewal of their activities. The following are examples of physics lessons with the introduction of innovative educational technologies:

Below we present the application of the “Cube” method, which is applied step by step in the learning process. This method gives good results if used during lesson reinforcement.

Step 1. Once the topic is covered, an understanding of the topic is formed. It is suggested to write the formed concept (size, instrument, unit of measure) as follows:

Describe, Compare, Compare, Analyze, Use, State the pros and cons.

Step 2. For example, after the topic of "Heavenly Sphere," students write as follows.

1. Celestial sphere, 2. Infinite, Diurnal motion, 3. Circle, Latitude, Geographic longitude., 4. Deviation., Straight output 5. Equatorial coordinate system, 6. Horizontal coordinate system, 7. Dream line, Universe axis, 8. Ecliptic, celestial meridian, celestial equator.

Step 3. The main point of the celestial sphere, a straight line, is introduced by its circles.

Information is given about the equatorial coordinate system and the catalysts that characterize the horizontal coordinate system.

Thus, in the process of learning, students can work independently, think freely and get a lot of additional information on the topic of "Sky Sphere".

Innovative educational technologies can be used to teach students to organize the sequence of actions correctly, to think logically, to choose different ideas based on the science being studied, from the data. For example, the use of the method of "Blis-questionnaire" (quick survey) gives good results in strengthening the topic in the learning process. We apply this to the "Sky Sphere" above. Questions according to this method are asked by the teacher. The answers to the given questions can be returned in a modern, group, pair and individual way [1; p.102].

The teacher gives each student a handout and asks prospective teachers to study it carefully. The teacher then explains the content of the handout and the task to be performed, i.e. asks them to determine the given sequence of forces based on the sequence of the physics sections and include them in Table 1.1:

Sequence of evaluation of prospective teachers on a 10-point scale

Table 1.1

Group prices	**Group error**	**The correct answer**	**Alone error**	**Alone error**	**Sequence of actions**
1	+	1	+	1	The celestial sphere
2	+	2	+	2	Horizontal coordinate system
4	-	5	-	4	Equatorial coordinate system
3	+	3	+	3	Deviation
5	-	4	-	5	Exit correctly
6	+	6	+	6	Ecliptic

Rating: 4-5 correct complete answers – excellent;

2-3 correct incomplete answers – good;

5-6 Uncertain Responses – Satisfactory.

The use of the SWOT-analytical method of innovative education allows a future teacher to analyze the knowledge acquired in a particular section or topic of astronomy, which allows to obtain high results. We use this method to analyze the knowledge gained on the topic "Sky Sphere":

The results of the SWOT-analysis of the knowledge of future teachers on the topic "Sky Sphere" are given in Table 1.2 below.

The effectiveness of the SWOT-analysis method.

Table 1.2

S - (strength) - strengths	**W- (weakness) -** weaknesses
- Mathematical construction of the daily movement of lights; - a hypothetical sphere with a random radius passing through the point of observation of the center;	- inability to use the celestial sphere for any situation.
O - (opportynity) - options	**T - (threat) -** threat
- use in the study of the starry sky; - Distinguish between geographical and equatorial coordinate systems, etc.	- inability to manage natural disasters;

The introduction of the “Written Debate” method in the assessment of future teachers' knowledge in the learning process allows prospective teachers to plan conversations with their peers in the classroom on topics of public concern. This method helps to create conditions for future teachers to deepen their knowledge in the given topic, to form a culture of discussion and to develop the ability to justify their opinions.

Using this method, the professor will be able to quickly and fairly assess future physics teachers. The method of written discussions allows such dialogues to be conducted in writing with the participation of all students in the classroom. The evaluated future teacher fills in the answer and its proof on the basis of the following table, which we will consider on the basis of the topic “Sky Sphere”:

Discussion topic: The celestial sphere.

Answer: Mathematical construction of the daily motion of lamps;

Proof: The time taken for the Earth to revolve around its own axis is a day.

The rotation of any celestial body around a central celestial body is equal to a year.

Answer: A hypothetical sphere whose radius passes through a point where the center observer is arbitrarily chosen.

Proof: The lights are at different distances from us and are in constant motion.

Thus, in the education system, the teacher chooses the right educational technology according to the nature of physics and the form of training, the possibilities of its application. should also be enriched. That is, innovative educational technology and its application to education will ensure that future teachers have the knowledge, skills and competencies.

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