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INNOVATIVE TEACHING OF COMPUTATIONAL METHODS USING DESIGN THINKING TECHNOLOGY

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Abstract:
This article discusses the possibilities of using design thinking technology with the introduction of innovative technologies in the teaching of computational methods in higher education institutions.

Keywords: Higher education, innovative teaching, innovative technology, information technology, pedagogical innovation, innovative activity, innovation, innovation, computing methods, design thinking.

It is known that the decree of the President of the Republic of Uzbekistan No. PF-5847 dated 08.10.2019, in the concept of the development of the higher education system of the Republic of Uzbekistan until 2030, also defines the priorities for the systematic reform of higher education in the Republic of Uzbekistan in order to raise the process of training highly qualified personnel with modern knowledge and high spiritual and moral qualities to a new level in terms of quality, modernization of higher education, based on advanced educational technologies in the higher education system The task of developing suggestions and recommendations for the meaningful and purposeful organization of work on personnel training and the development of scientific and innovative activities of pedagogues is set, and improvement of student education based on new innovative technologies is among such urgent tasks [1].

Currently, serious changes are being made in the field of education system in our country. This is related to the use of innovations in teaching methods in the course of the lesson. The main task of higher education is to improve the educational process and expand the opportunity for students to demonstrate their creative abilities and knowledge. In solving these problems, there is a need to introduce innovative teaching technologies by improving traditional methods into the educational process.

It can be said that the organization of the educational process based on the technology of design thinking, which is one of the modern innovative technologies, is one of the main factors of achieving educational efficiency [2].

The application of innovations to any professional activity and its natural study, analysis and implementation are relevant today.

Innovative technologies in education is an educational process built on the basis of qualitatively new principles, tools, methods and technologies, and is considered to be the maximum assimilation of knowledge, creative activity, the acquisition of a wide range of practical skills and competencies, and the improvement of teaching effectiveness. [3].

Design thinking technology, which is one of the innovative technologies in teaching computational science, is a modern innovative educational technology based on how we can find solutions to problems in the educational process and achieve results. Design thinking technology aims to increase the quality of education by developing students' creativity and independent thinking.

Pedagogical innovation is intended to bring innovation to pedagogical activity, give new content and change to the technology of education and upbringing, and increase its effectiveness. The analysis shows that there are differences in the concepts of "novation" and "innovation", and these differences are reflected as follows[4]:

Innovation is applied within the framework of theory and methods are updated, existing methods are improved.

In the case of innovation, the activities of subjects are completely renewed, new methods are put into practice. Innovation is a new change that enables the system to move from one state to another. Innovation is the result of innovation. The innovation process goes through three main stages: idea generation, idea implementation, and innovation implementation. release The introduction and application of new ideas into practical activities, their management is called innovative activity.

Innovations do not appear by themselves, they can be created by researchers conducting scientific research and their advanced pedagogical experience. One such technology is design thinking technology.

By introducing design thinking technology in teaching subjects in the field of information technology, higher education students can improve the quality of their knowledge [5].

Why is this technology called design thinking? Design thinking technology is a technology that helps to identify, teach, learn, and apply this technology to solve problems in a creative and innovative way.

What are the characteristics of the use of design thinking technology in the teaching process? Design thinking empowers students to solve problems in computational science and enables students to think quickly in problem solving.

It is important to get effective results in innovative teaching of students. Design thinking technology is implemented in five stages and they are as follows:

Stage 1: **Empathy.** At this stage of design thinking technology, students analyze each other's ideas and existing problems. At the empathy stage, students find solutions to complex problems that focus on the person they are meant to solve. It is advisable to use design thinking technology in solving any problems in the audience. In design thinking technology, empathy is an important step in the process, because it gives students ample opportunity to solve problems that arise when using software, to search for and analyze data. It is important to start with empathy when finding a solution to a user's problem.

Step 2: **Identify.** At this stage of design thinking technology, students should briefly express the issues they want to solve with their proposals and examples. After empathizing, the student applies what he has learned from his research to the topic and develops a clear explanation of the problem. In this phase, students review and analyze the insights they gained in the empathy phase. It is very important to create a clear and concise description of the problem at this stage to focus on the end user. So, at this stage, he invites us to consider an important part of the problem.

Step 3: **Thinking.** It is more important to give an idea than to solve a problem. After students embrace the human experience through empathy, they develop new solutions to problems. At this stage, students often think about an idea or an algorithm. Students will also need to explain their goals to their peers, share information in a group, express new ideas, consider effective ideas in the process of solving problems, and learn to choose the best ones for solving a problem. They need to be creative and ignore obstacles when solving problems.

Step 4: **Prototype.** At this stage, the group goes into solution search mode and develops prototypes based on the ideas received. Prototypes can be anything from simple to complex ideas and well-functioning algorithms. After testing the prototypes created by the group, they evaluate their solutions, and it is necessary to improve these solutions and work on unsolved problems. Prototyping allows a team to develop multiple solutions to a problem in a short amount of time. Not all prototypes created by the team will work, but even the wrong decisions can provide valuable insights. At the end of prototyping, the group should come to a consensus.

Step 5: **Testing.** The test requires solving problems clearly. However, students do not stop at the final stage of design thinking. Therefore, students create several prototypes to test their ideas. Student experiences and solutions cannot be popularized without careful testing. During the test, students can correct their problems if they do not get results. For the testing phase, it is common to "restart" other phases of design thinking, such as ideation or testing, because new ideas may raise other problems that require a new approach.

Thus, if classes are conducted using design thinking technology to improve the process of teaching computing methods in universities, it will have a positive effect on the development of teaching methods, improvement of the quality of education, and the use of design thinking technology in teaching the science of computing methods to students.

In summary, Design Thinking is a person-centered technology that starts with understanding people and takes into account their abilities and interests.

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