

USE OF INNOVATIVE METHODS IN TEACHING THE TOPIC OF FUNCTIONS

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Annotation. This article highlights the pedagogical importance of using innovative methods in teaching the topic of functions. The article analyzes methods for effective teaching of the topic of functions using modern interactive methods, digital technologies and creative approaches. It also shows the role of innovative methods in developing students' logical thinking, analyzing graphs and solving practical problems.

Keywords: Function, innovative method, mathematics education, interactive technology, graphics, creative approach, GeoGebra, problem-based learning, digital platform, functional connection.

Mathematics education is one of the important factors of social development. Especially in general secondary schools, effective teaching of mathematical knowledge plays an important role in developing students' logical thinking, analytical thinking, and problem-solving skills. The topic of functions, which is one of the main sections of mathematics, plays a fundamental role in forming students' algebraic knowledge. With the help of the concept of function, the connections between different quantities are expressed, and this topic creates a solid foundation for mastering further mathematical knowledge. Therefore, effective teaching of the topic of functions is considered one of the urgent issues of modern pedagogy[2].

In today's era of globalization and the development of digital technologies, there is an increasing need to use innovative methods along with traditional teaching methods. Innovative methods allow increasing students' interest in the lesson, encouraging them to think independently, and connecting theoretical knowledge with practice. In particular, interactive methods, information and communication technologies, multimedia tools, project-based learning and STEAM approaches provide high efficiency in explaining the topic of functions. With the help of such methods, students understand complex mathematical concepts more easily and master the topic more deeply.

The use of graphic images is of particular importance in teaching the topic of functions. Because through the function graph, students have the opportunity to visually observe the relationship between variables. Dynamic depiction of function graphs using

modern electronic programs and interactive platforms expands the imagination of students. In particular, programs such as GeoGebra and Desmos allow students to independently analyze the properties of functions. This helps to understand the content of mathematical concepts more deeply[3].

Also, the use of innovative methods increases student activity in the educational process. Group work, analysis of problem situations, interactive methods such as “Brainstorming”, “Cluster”, “Insert” develop students' free thinking. As a result, they learn to solve problems on the topic of functions using a creative approach. This develops not only mathematical literacy, but also communicative competencies.

Teaching the topic of functions using innovative methods is an important factor in increasing educational efficiency. Modern pedagogical technologies serve to organize the learning process of students in an interesting and effective way. Therefore, the widespread use of innovative methods in mathematics lessons remains one of the priority tasks of today's education system.

The concept of a function is one of the main categories of mathematics, which represents the relationship between two variables. Students learn to mathematically model various physical, economic and technical processes using functions.

The role of innovative methods

Innovative methods increase student activity in the lesson and help to master the topic more deeply. Brainstorming, cluster, INSERT, problem-based learning and project-based approaches are effective in teaching the topic of functions.

GeoGebra and Desmos programs allow you to dynamically depict function graphs. For example, by changing the graph of the function $y = x^2$, you can practically explain how the parabola is formed.

Example:

In the function $y = x^2$, if $x = 2$, then $y = 4$.

In the function $y = x^2 + 3$, the graph shifts up by 3 units.

Problem-based learning encourages students to think independently. For example, students are given the task of graphically representing temperature changes in everyday life. This method helps to understand the importance of functions in real life[1].

Using group work and interactive methods in teaching the topic of functions gives effective results. Students analyze graphs in small groups, compare functions, and present results.

Practical examples

Example 1: The initial price for a taxi service is 5,000 soums and 2,000 soums are added for each kilometer.

Function: $y = 2000x + 5000$.

Example 2: If $y = 3x - 1$ for a linear function, then $y = 11$ for $x = 4$.

Example 3: If $y = x^2 - 4x + 3$ for a quadratic function, the graph will be in the form of a parabola.

In conclusion, teaching the topic of Functions based on innovative methods develops students' mathematical thinking. With the help of digital technologies and interactive methods, the effectiveness of lessons increases, students understand the topic more deeply and can connect it with practice.

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