THE METHODOLOGY OF TEACHING THE CONCEPT OF DERIVATIVE AND THE VISUALIZATION METHOD IN THE ALGEBRA COURSE OF ACADEMIC LYCEUMS

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Abstract: *This article provides one of the ways to study the concept of "Derivative", a mathematical model of a physical process is compiled in a language accessible to students, the representation of this model in the form of a mathematical concept and the interpretation of this concept. The application of the new concept for the derivation of formulas is considered in detail.*

Keywords: *methodology, ways of studying, concepts of derivative, increment of argument, increment of function, geometric meaning, physical meaning, algorithm.*

Аннотация: *В данной статье дается один из путей изучения понятия «Производной», на доступном для учащихся языке составляется математическая модель физического процесса, представление этой модели в виде математического понятия и интерпретация этого понятия. Подробно рассматривается применение нового понятия для вывода формул.*

Ключевые слова: *методика, пути изучения, понятие производной, приращение аргумента, приращение функции, геометрический смысл, физический смысл, алгоритм.*

One of the important motivating forces of learning is the motive of achievement success. To achieve the effectiveness of teaching mathematics, it is necessary to create a success situation for each student in each lesson, the essence of which is that each student works at the level of his capabilities, allowing him to cope with the requirements imposed on him. Feasible difficulties develop students' positive motivation for learning, allow them to turn learning from compulsory into voluntary. To achieve the desired result, the teacher must create such a situation, use such teaching methods and tools that would be interesting to the student, encourage him to work together, and activate his teaching. Only where creative work and mutual trust reign, it is easy for the teacher to work, and the student is happy to live.

Visualization is the creation of an imaginary image of a goal. You imagine what you want to achieve, how to do it. Many perceive visualization as good expectations about the future. "Create a wish board and look at it." Such a strategy lacks one important aspect – the connection with reality. If you imagine living in a beautiful house and do not think about how to make money to achieve it, then the dream will remain a dream. Effective visualization involves the object of desire and the efforts to achieve it. You will have to

imagine each step to achieve your goal: in which direction you will work, what obstacles you will have to overcome and how you will do it. It is not so pleasant as ordinary dreams, but it helps to achieve real results in many areas.

Scientists have found that the brain does not go to the difference in what is happening in imagination and reality. When we memorize something or imagine future actions, our brain detaches chemicals that are in a real situation. Your brain behaves monotonously. It doesn't matter to him whether you are experiencing or imagining the phenomenon in real life. Neuromediators-the brain commands the body with the help of exactly these chemicals, performs motor control, attention and planning, motivates a person to action. A recognized theory in neuroscience is that excited neurons connect with each other. By imagining the future, you create new neural connections in the brain. They allow you to think and act differently. In particular, visualization triggers a reticular activation system – an area in the brain that filters information and focuses on what is important to you. That's why opportunities come unexpectedly when you think about a new job or new customers.

During the transition from the school curriculum to the academic lyceum program, students experience quite great difficulties. This also applies to the main topic of this course – "Derivative". The teacher's goal is to help students overcome these difficulties. A feature of the educational material is a clear, accessible and sufficiently scientific presentation of the concept of "derivative".

Experience shows that it is relatively easy to teach students to formulate a definition of a derivative, calculate a derivative, and find a derivative function at a point using the basic rules of differentiation.. The application of the derivative to the study of the function does not cause any particular difficulties. And to do this, at the very beginning of studying the topic "Derivative", you should find the right way to introduce a derivative, introduce educational material at an accessible level. If the student is able to apply the definition of a derivative to find it, show geometric and physical meanings, then we can say that he will be able to continue to see it in various applications, in physics, chemistry, biology, etc.

Let's imagine that we are going on a car trip. Getting into the car, let's look at the mileage meter. Now, at any given time, we will be able to determine the path traveled by the machine.. We will know the speed of movement by the speedometer. Thus, with the movement of the car, as with the movement of any material point, the quantities are associated – the path - «S» and the velocity – «V», which are functions of time – «t». It is

clear that the path and speed are related by quantitative characteristics. It turned out that the relationship between the quantitative characteristics of many processes studied in physics, chemistry, biology, and engineering sciences is similar to the relationship between path and speed.

The main mathematical concepts expressing this relationship are derivative and integral. Newton's model of mechanical motion remains the most important and simplest source of mathematical analysis studying the derivative and its properties. That's why the question of what a derivative is is the shortest answer. The derivative is the rate of change of a function. Textbooks also give a definition of the derivative through the limit. Therefore, it is necessary to introduce the concept of a limit on several simple tasks.

In the course of the analysis of school textbooks, school textbooks and scientific and methodological literature, it was found that:

- the applied tasks found in the textbooks considered are focused on the physical meaning and are not related to independent modeling based on real process data;

- the transition from the value of the derivative of a function at a fixed point to a derivative at an arbitrary point is not transparent to students, it is considered analytically in textbooks, although its graphical interpretation is available to students;

- the geometric meaning of the existence of a derivative at a point can be considered in detail; the means of visualization used are limited to statistical models.

The solution to the above problems is possible through the use of visualization using ICT tools.

As a result of the analysis of domestic and foreign experience, the concepts of visual thinking and visualization are defined. Visual thinking is thinking through visual processing or thinking through visual operations.

Visualization is a process associated with working on visual representations as real objects (graphs, diagrams and other mathematical models) so it is with mental images.

The necessity is justified:

(1) the development of visual-spatial abilities through the use of a number of modern studies showing the correlation of visual-spatial and mathematical abilities;

(2) the use of visualization, as it has a positive effect on the quality of mastering mathematical concepts.

The experience of using visualization in teaching the elements of differential calculus is analyzed:

- the use of graphs allows you to model the relationships of objects identified at the algebra level, lead to a deep assimilation of the concept;
- visualization makes it easier to understand formulas and definitions;
- visualization makes it easy to consider counterexamples to plausible reasoning.

A possible problem that you will have to face when using visualization is the imperfection of the visual apparatus, which does not allow you to use visualization as the leading method of proving mathematical statements.

The most appropriate way of visualization in teaching mathematics is the use of ICT, which allows: to introduce new forms of organization of the educational process, new methods and means of teaching; to "see" mathematical concepts and ideas; to master the skills of using ready-made computer programs in solving problems; to shift the focus from solving problems to using problems; to automate complex calculations and use the results for a deeper study of the topics of the school mathematics course; use data from real processes in teaching mathematics.

CONCLUSION

The introduction of ICT into the educational process poses a number of problems: disorganization of students; oversaturation of information; insufficient amount of materials for independent use in teaching.

REFERENCES:

1. Суяров К.Т. Уровни проверки экспериментальных знаний, обучения и умений учащихся по математике и их практическое применение: Образование, наука и инновации. 2016.

2. Абдалова С. Роль креативных технологий в управлении самостоятельным образованием и развитии творческих способностей учащихся. Математика. «Учитель»-1989.

3. Бандаркова А. Креативная педагогическая технология формирования профессиональной культуры обучающихся. Научно-методический журнал.-Москва, 2008

4. Каримов, У., Хакимова, Д., & Халилов, Л. (2018). Информационное И Коммуникационное Технологии Влияние На Образование В Техническом Обслуживание. Мировая наука, (10 (19)), 193-197.

5. Abdurakhmonova, M. M., ugliMirzayev, M. A., Karimov, U. U., & Karimova, G. Y. (2021). Information Culture And Ethical Education In The Globalization Century. The American Journal of Social Science and Education Innovations, 3(03), 384-388.

6. Ulmasbek, K. (2024). THE USE OF SOFTWARE TOOLS IN SOCIOLOGICAL RESEARCH. FORMATION OF PSYCHOLOGY AND PEDAGOGY AS INTERDISCIPLINARY SCIENCES, 3(29), 253-257.

7. Karimov, U. (2024). COLLECTION AND ANALYSIS OF PRIMARY DATA IN THE PROCESS OF SOCIOLOGICAL RESEARCH. EPRA International Journal of Research and Development (IJRD), 9(6), 192-195.

8. Ахмедова, Ф. А. (2024). ДИСКУССИЯ В ИНТЕРАКТИВНОМ МЕТОДЕ ОБУЧЕНИЯ-КАК СРЕДСТВО ФОРМИРОВАНИЯ КЛЮЧЕВЫХ КОМПЕТЕНЦИЙ В ПРЕПОДАВАНИИ МАТЕМАТИКИ В АКАДЕМИЧЕСКИХ ЛИЦЕЯХ. PEDAGOGICAL SCIENCES AND TEACHING METHODS, 3(33), 70-74.

9. Gulnoza, K. (2024). SOCIOLOGICAL MONITORING SYSTEM IN SOCIOLOGICAL RESEARCH. FORMATION OF PSYCHOLOGY AND PEDAGOGY AS INTERDISCIPLINARY SCIENCES, 3(29), 265-269.

10. Ахмедова, Ф. А. (2024). ОСОБЕННОСТИ ОБУЧЕНИЯ МАТЕМАТИКЕ В АКАДЕМИЧЕСКИХ ЛИЦЕЯХ. FORMATION OF PSYCHOLOGY AND PEDAGOGY AS INTERDISCIPLINARY SCIENCES, 3(29), 258-260.

11. Ахмедова, Ф. А. (2024). ИСПОЛЬЗОВАНИЕ СОВРЕМЕННЫХ РЕСУРСОВ И ТЕХНОЛОГИЙ В ОБРАЗОВАТЕЛЬНОМ ПРОЦЕССЕ. International Journal of Education, Social Science & Humanities, 12(10), 330-334.