USE OF DIFFERENTIATION TECHNOLOGY IN TEACHING MATHEMATICS

Anvarjon Rashidov
Bukhara State University
UZBEKISTAN
anvar.rashidov@bk.ru

ABSTRACT

The following article deals with the results of effective use of differentiated teaching and information technology in conducting Mathematics classes.

Keywords: Differentiation, innovative, facultative, intellectual, didactic, information.

INTRODUCTION

The use of innovative technologies in the implementation of the requirements of the Law on Education and the National Program of Personnel Training plays an important role in improving the methodological quality of teaching technology, improving the efficiency of learning and introducing new methodological elements to the young generation in this process of upbringing them [1].

The use of differentiated teaching technology, which is one of the modern teaching technologies, is also important in this way [5-10].

MAIN PART

The correct organization of the educational process in the teaching of mathematics depends on the readiness of each student, his or her level of knowledge. The individual differences of a student are clearly seen in his or her mental abilities, special training, reading ability, mastery, interests and other similar features.

Students study at different levels over time, as it takes time to master the material and there are two closely related methods of teaching in the literature - external and internal differentiation.

In external differentiation, a special group is formed depending on the individual abilities of students. The students in this group have a higher level of knowledge than their peers and are distinguished by their intellectual thinking. They should be educated in advanced or more complex groups. If there are no in-depth groups in higher education institutions, external stratification is carried out on the basis that students are free to choose one or another optional course. In internal stratification, it is necessary to organize the educational process in simple groups, taking into account the individual abilities of students in the working environment of the teacher. The teacher determines each student's level of knowledge based on the students' ability to answer questions of varying difficulty, solve problems, and so on.

The teacher should organize the learning process in such a way that at a certain stage the student can show his or her intellectual abilities. In this case, the principle of universality must be clearly observed. Other basic principles of this pedagogical technology are as follows:

1. General Talent - there are no untalented people, there are those who are not busy with their work.
2. Mutual superiority - if one is treated badly by another, then something should be taken well; it means looking for something.
3. The inevitability of change. Any opinion about a person is not considered final.

Thus, the teacher brings to first group those students who can remember and distinguish learning materials, who can master the material at the standard level, but they do not know the basic skills of analysis, cannot solve more complex examples and problems. This group of students thinks that the examples they have set are impossible.

The second group includes students who can solve, think and remember examples and problems of medium difficulty. They remember, understand and apply the learning material in the learning process. The main method of their work is to rely on old experiences and use them as a template for learning new topics. This group differs from others in that intellectual ability is goal-oriented.

The third group of students is characterized by a sufficiently creative approach to solving examples and problems. They understand, narrate, use, and do independent creative work using examples from the study material. They are highly active and use problem-solving techniques wisely, and analyze the meaning of the given example. Students in this group learn the material more broadly and deeply than students in groups I and II.

In order for the teacher to divide the students in the group into conditionally dynamic groups, the teacher must identify their individual differences. To do this, the teacher must analyze the students' work in depth.

Experiments on differentiated teaching were conducted with first-year students of Bukhara State University. As mentioned above, they were divided into 3 groups. The following tasks were performed with them.

Task: Check the functions using the derivative
The following elements of the student's answer are considered in the analysis of this work:
• Knowing the definition of the derivative of functions;
• Knowing the geometric and mechanical meanings of the derivative;
• Memorizing the table of derivatives of simple functions;
• Knowing the function differential;
• Ability to find high-sequenced derivatives and differentials;
• Time spent to complete the work (minutes).

To learn more about a student's abilities, the teacher suggests tasks of varying difficulty. The option is up to the students. In this case, the candidate for a grade of "5" performs the tasks of version III, for the grade of "4" - version II, and for the grade of "3" - version I. By comparing the approximate conclusions and the results of the work, the teacher will have a clear idea of the preparation of the group. As a result of such an analysis, the teacher always takes into account the students' ability to learn mathematics in the future.

Learning stratification can also be used to explain new material, reinforce it, and test and generalize knowledge. The teacher has a clear idea of the differentiated tasks independently, that is, he or she assigns the task to one or another group depending on the level of difficulty. If the method of solving the task is given in an ambiguous way, it is included in the task of medium

difficulty. In the end, the most difficult task is given. The student will be able to create the task independently, design solutions, obtain and evaluate the results of their solution.

Mechanisms for carrying out experimental works.
Examples of creating differentiated tasks of varying difficulty.

Version I.

1. Geometric and mechanical meanings of the derivatives.
2. To remember the table of derivatives of simple functions.
3. Find the increasing and decreasing range of the function $\mathbf{f(x) = 8x^3 - x^4}$.
4. Prove the inequality $\mathbf{(1+x)^{\alpha} \geq 1 + \alpha x \ \ (x \geq -1, \ \ \alpha > 1)}$.
5. Check the function to the extremum $\mathbf{y = \frac{x^4}{4} - 2x^3 + \frac{11}{2} \cdot x^2 - 6x + 3}$.

Version II

1. Differential function.
2. High-sequenced derivative and differential.
3. Find the increasing and decreasing range of the function $\mathbf{f(x) = x^5 \lg^7 x \ \ (x \geq 1)}$.
4. Check the function o the extremum $\mathbf{y = \sqrt[3]{2x^3 + 3x^2 - 36x}}$.
5. Check the function completely and draw the graphics

$\mathbf{y = \sqrt[3]{(x-2)^2} + \sqrt[3]{(x-4)^2}}$.

Version III

1. Basic theorems of differential count.
2. Detect uncertainties. Lopital rules.
3. Check the function completely and draw the graphics $\mathbf{y = \arcsin|x|}$.
4. Find the asymptotes of the function graph $\mathbf{y = \sqrt{x^2 - 1} - x}$.
5. Calculate with Lopital rule $\mathbf{\lim\limits_{x \to 0} \left(\frac{\sin x}{x} \right)^{\frac{1}{x^2}}}$.

On the one hand, in order to complete such tasks, the student must have knowledge of solving such types of examples. On the other hand, setting an example condition encourages the student to find a way to solve them. Therefore, setting the conditions for examples in the future will require knowledge and preparation not only from the student, but also from the whole group of students. The differentiated tasks given above can be used in the preparation of didactic materials. Didactic materials can be divided into several types depending on the purpose of use:
- Informative
- Instructive
- Training
- Checking.

There are written, oral, and practical ways of doing examples of such learning. In fact, one card-task is used as an exercise in one lesson, while the other is used as an examiner. One chart is used as an instructional guide in one lesson and as an exercise guide in another.

At the end of each group's independent work, the teacher draws a diagram on the board (students' notebook) based on the results obtained.

This way of consolidating students' knowledge teaches them to work with a sense of responsibility and interest, as the results of their work are needed to generalize the knowledge gained. The practice guidelines, as a rule, specify the conditions for all experiments to be performed by students.

Thus, the level of knowledge of the student and his activity is determined by the results of the implementation of this derivative.

Another way of stratification is to take into account the time spent on tasks. In this way, the third group is given less time to complete the same task than the first and second groups. The rest of the time is spent on in-depth study of the material.

The essence of stratification is the stratification of teacher-student support, meaning that some need more help and some need less help. The teacher uses a variety of methods to categorize the assistance provided to students.

The stratification of written assistance can be, for example, in the form of a didactic card. In this case, the student is offered specific assistance in completing the assigned task.

The stratification of student assistance leads to a gradual decrease in the amount of assistance provided. Too much support also reduces students' independence and ability. Inadequate support also results in students not completing the assignment.

This is especially true when the homework is done independently. This is evident in the independent activity of students. Homework is categorized according to the size and content of the assignment. Therefore, the teacher gives a special task to a student who is actively interested in science, and assigns homework to low-achieving students, taking into account that they must do it.

The homework task may consist of 3 questions or examples in ascending order. The student chooses the amount of homework to complete. At the end of the lesson, the teacher shows the homework electronically on a slide.

Homework should be structured in such a way that students often refer to additional literature to find answers to their questions.

One of the manifestations of differentiated teaching is individualized teaching, because it takes into account the individual psychological and pedagogical abilities of the teacher.

The process of creative assignments can be very important in the process of individualization. In the process of creative assignments, the student determines the time and methods of the work based on his or her own abilities. The main conditions for the effectiveness of differentiated education are:
1. The requirements for students in differentiated education should not be reduced.
Assignments should also take into account the knowledge of the lowest learners and the strongest learners. The basic principle of stratification is the stratification of teacher support for students.
2. The conditions for the organization of differentiated teaching, that is, teachers must have a sufficient level of knowledge, be able to develop students' knowledge, be able to take into

account their individual typological abilities. Dividing students into groups according to their level of knowledge increases their mobility.

3. In order to increase the effectiveness of differentiated teaching, it is advisable to use individual, frontal, group forms in the organization of the learning process, depending on the educational purpose of the lesson.

4. Conditions for differentiated teaching: adequacy of didactic materials (assignments, instructions, etc.); regular checking by teachers and assessment of student work; conscious teaching, taking into account the cognitive abilities of students.

From what has been done, it can be said that differentiated education, taking into account the student's abilities and interest in science, plays a positive role in the acquisition of their knowledge of Mathematics.

REFERENCES

1. Harmoniously developed generation is the basis of development of Uzbekistan. – T.: “Sharq”, 1997. - 64 p.
2. Farberman B.L. Progressive pedagogical technologies. - T.: IPVSSSh. 1999. – 84 p.
3. Farberman B.L. Advanced pedagogical technologies. –T.: “Fan”, 2000.
4. Klarin M.V. Pedagogical technologies in educational proces.-M.: “Znaniye”, 1989. - 80 p.
5. T.H.Rasulov, A.Sh.Rashidov. The usage of foreign experience in effective organization of teaching activities in Mathematics. International journal of scientific & technology research. 9 (2020), № 4, 3068-3071p.
6. A.Sh.Rashidov. Development of creative and working with information competences of students in mathematics. European Journal of Research and Reflection in Educational Sciences, 8:3 (2020), Part II, 10-15p.
7. T.H.Rasulov, Z.D.Rasulova. Organizing educational activities based on interactive methods on Mathematics subject. Journal of Global Research in Mathematical Archives, 6 (2019), № 10, 43-45p.
8. F.Ya.Mardanova, T.H.Rasulov. Advantages and disadvantages of the method of working in small group in teaching Higher Mathematics. Academy. 55 (2020), № 4, 65-68p.
9. M.N.Boboyeva, T.H.Rasulov. The method of using problematic equation in teaching theory of matrix to students. Academy. 55 (2020), № 4, 68-71p.
10. U.Umarova, G.Kurbonov. "Step-by-step" method in teaching discrete Mathematics and Mathematical logic. Scientific-theoretical and methodical journal of pedagogical skills № 6 (December 2019), 211-214p.