ORGANIZATION OF MATHEMATICS IN THE APPLICATION OF COMPUTERS IN THE FIRST CYCLE OF THE REFORMED PRIMARY SCHOOL

Abstract:

The informational age and the age of knowledge that developed the developed countries and slowly touched upon, and the rest of the world implied that human society evolves into a knowledge society where knowledge is considered to be the most valuable resource of the human race. The future will definitely be determined by man's ability to use this knowledge effectively. Technological progress implies different and growing expectations from those who use them, exposing such education to increasing pressures and demands from the environment. Now it is imperative for educational institutions to develop in their student's such knowledge, skills, skills and skills as are required in the environment. The increasing role and importance of information and communication technologies in human society are undoubtedly one of the most important characteristics of today's world. ICT (Information and Communication Technologies) is incorporated into all levels of human organizational activities and has largely influenced communication among people. For this reason, the quality of school work and its direct product - the quality of students' knowledge - is an essential active and continuous use of ICT in the teaching process.

Keywords: computer, school, teacher, innovations, information technology, PPT

Introduction

We live in a time in which at any moment in each area of life comes the discovery of new ideas, technical and scientific. Tracking them all, let alone contributing to development, puts man in a position of pre-lost battle. Innovation thus becomes a demand of time, but is, at the same time, relative, because what is innovative today is not tomorrow; what has been abandoned in a social milieu for a long time, in the second one is still new, in the third, it has only become a reality. A wise man, in order to stay in the race, builds his own attitude, thought and style. It can be rigid, and stick to the trained one, which is not as bad as it seems to us, if it proves to be efficient and if it resists the demands of time. It can embark on an impeccable track of innovation tracking and choose the most desirable for its goal, which is only possible for a modern man.

The term "innovation" itself conceals, except for the basic meaning - the novelty, and the second meaning, and that is a change. The change, unlike innovation, points to caution and the process. This process, again, implies that the change will not happen purely in order to change something, but it will, beforehand, be aligned with the context: school opportunities, students 'interests, teachers' abilities, given plans and programs.

We live in a time in which at any moment in each area of life comes the discovery of new ideas, technical and scientific. Tracking them all, let alone contributing to development, puts man in a position of pre-lost battle. Innovation thus becomes a demand of time, but is, at the same time, relative, because what is innovative today is not tomorrow; what has been abandoned in a social milieu for a long time, in the second one is still new, in the third, it has only become a reality. A wise man, in order to stay in the race, builds his own attitude, thought and style. It can be rigid, and stick to the trained one, which is not as bad as it seems to us, if it proves to be efficient and if it resists the demands of time. It can embark on an impeccable track of innovation tracking and choose the most desirable for its goal, which is only possible for a modern man.

The first association on the word innovation (progress, development) is technology. In the field of education, innovation is the largest and revolutionary. Therefore, some teachers believe that, if they start to use some of the technological inventions, they therefore innovate in the teaching. The most stringent technological innovations in classical teaching (class-time system) are only innovations in the field of teaching aids. The introduction of innovations in any sphere of education, even if it was about the latest multimedia systems, is still not a guarantee that the expected improvement will be in the area. In other words, innovation is a necessary but not sufficient condition for improving the current situation (Mijanović, 2002: 91).

The acquisition of mathematical education, which was mainly reserved for students a few years ago, is increasingly taking the place in the initial mathematics education, primarily intended for pupils of elementary school age. It is becoming increasingly clear to teachers that textbooks are not even the dominant sources of knowledge. Thus, the computer occupies a primacy. Teachers use audio-visual and digital media to create ideas that enable them to successfully implement the planned educational goals of contemporary mathematics education.

The computer gradually assumes the function of the main source of knowledge and the main medium that provides the conditions for the methodical scenarios of all teaching content. There are more and more teachers who are ready and able to create teaching units using computers that can meet the development needs of all students (Mićanović, 2007b: 199)

Using computers, as well as educational software, allows students to learn about a new world of learning, primarily by researching and discovering newspapers, as well as by solving problems, playing and working, not just by listening to teachers and answering his questions.

The computer enables students to logically think in their initial teaching of mathematics to express their abilities in an original way, and at the same time, their work and interest are tailored to individual abilities, needs and desires (Mićanović, 2007c:739). Computers have proved to be very useful in the developed world, especially as support for teaching and learning in different categories of students and in various forms of teaching.

More and more open is the crisis of education. School systems are outdated, teaching technology is overcome, education is expensive and insufficiently effective.

A significant number of students have a fear of mathematics. Most likely this fear is already "rooted" by parents or acquired at the very beginning of schooling. Stressing unaddressed material this fear is even more intensified. A significant number of students find themselves hard in mathematics because their content is not presented in an adequate way. Since most students do not find a motive in chemotherapy or type assignments, the most common question the student asks is, "What is all this for me?". Without finding the right answer, the student becomes a passionate participant in mathematics teaching. Unfortunately, the passive approach of students, "assisted" by template tasks in individual textbooks, often results in a student who has just solved a dozen tasks in which his goal was to compile three numbers is not capable of creatively applying his acquired (automated) knowledge solve a textual task in which it is also necessary to add three numbers. Instead of understanding the importance of mathematics in everyday life and its innumerable possibilities, as well as the proper use of acquired knowledge, students often focus their efforts on mastering certain "routines", with the ultimate and only goal of gaining a good mark on the control test.

The practice has shown that there is no psychological barrier when moving from classical teaching to learning with the use of modern educational technology. Old methods and modes of operation can not raise students' attention, nor do they achieve an adequate development of mathematical thinking, as can be done with the help of modern technical means, which to a large extent arouse the interest of young generations for the modern way of acquiring, among others also for mathematical education. Knowledge about this, as well as the desire to improve the quality of mathematics teaching, should encourage teacher motivation for additional activities that the application of modern educational technology requires in mathematics teaching (Mićanović, 2007a: 7).

A significant part of the mathematical content planned for elementary school is by its abstraction quite difficult for understanding and adoption, and therefore obsolete ways of their transfer, i.e. Adequate presentations can not be brought to the students in a quality way, that is, make them clearer.

Experimental design

1.1. *Psychological basis of computer application in the initial mathematics education*

In an effort to transfer knowledge to the children in a more interesting and noticeable way and create conditions for better memory of the learned, the methodology of work in the school has recently been enriched with the increasing use of computers.

Contemporary teaching of mathematics can not be imagined without a good knowledge of children's development and appreciation of his physical, social, emotional and cognitive development abilities (Mićanović, 2007b: 208).

In the process of classically organized teaching, the student is most often outside the centre of pedagogical events, he is mostly a facility, or rather - a more passive recipient and a recipient of various professional and scientific information. Representatives of pedagogical pedocentrism consider that a student must be a sole subject in teaching and that the other one should not be (Mijanović, 2002: 93-95). If that were so in practice, then he would have been above the overall educational process. Therefore, today the world is increasingly supported and accepted by the concept of modern organized teaching, with the adequate participation of modern educational technology, in which the student is at the same time the object and subject of a unique educational process. He is a key player in simultaneous teaching and learning, upbringing and self-examination, that is, a recipient, a creator and a user of diverse sources of knowledge.

Using modern technical achievements, students almost always develop a cognitive style that allows them to discover in their communication with this technology various relationships and relationships between mathematical concepts, reaching their goal in such complex problems. Such use of contemporary educational technology in students develops a readiness to spot a wide range of facts, concepts, and the perception of cause-and-effect relationships among them. By increasing the level of experience and knowledge in working with modern educational technology, students simultaneously acquire greater mobility of intuitive

thinking and acquired knowledge. Divergence in thinking helps them explore new content and find new ways and solutions to mathematical problem situations.

Special or special intellectual abilities are expressed in the tendency that an individual is very successful in dealing with certain types or categories of problem-solving situations, such as:

- solving mathematical tasks,
- logical reasoning,
- verbal expression,

spatial planning, etc. (Mićanović, 2007b: 209)

Unlike special, general intellectual ability means successful management in a variety of problem situations.

In addition to general and special intellectual abilities, the following can be distinguished:

- locomotor abilities,
- manipulative abilities,
- Expressive abilities and

ability of sensory structures. (Đorđević, 1987: 42)

These abilities are so uneven not only among students of the same class but also among students within individual structures. Since modern educational technology has the ability to animate all psychological spheres of the child (cognitive, logical, emotional, social, etc.), it is recommended as a compulsory in the modern teaching of mathematics.

Modern educational technology with its associated equipment has the possibility that they have no other technical means to meet the different needs of students expressed through their:

- general and special abilities (usually expressed in the IQ),
- emotional characteristics (most often expressed by different reactions to new acoustic, perceptual and other effects),
- Motivational characteristics (usually expressed by different degrees of aspiration) and

tendencies and interests (most often expressed through the need to use something new, unusual) (Mićanović, 2007b: 210).

Requests for the application of modern educational technology in initial mathematics can be explained from the psychological point of view by the fact that:

- students with different internal motivations prefer different teaching methods in the learning process (creative learning, more frequent control, faster feedback, etc.) and

- students also prefer the assistance and cooperation in the learning process, which consists in encouraging and enhancing the abilities, motivation and personality of the personality in new forms of learning.

Particular attention needs to be paid to the issues of individualization because all the negative effects in the development of the child are known to cause us to experience failure, especially if these failures are frequent and if they are experienced in the acquisition of elementary education.

1.2. Pedagogical basics of computer application in the initial mathematics teaching

Starting from the fact that educational work at school should be based on respecting the individual characteristics of its students and their real needs and possibilities, it is clear that the organization of teaching mathematics in our school system does not go hand in hand with social needs. Mathematics teaching is still the dominant teaching and receptive learning that neglects the creative potential of students, so it is understandable why existing teaching does not produce the desired results. Teaching is focused on content rather than on the techniques and methods of active learning of that content.

Computer devices allow a completely different organization of teaching, appropriate to the individual abilities and interests of students. The results of US-based experiments show that teaching using computer in mathematics is more effective than traditional teaching in terms of the quality and quantity of acquired knowledge, durability and applicability of knowledge, especially with regard to thought mobility, learning motivation and faster and more objective evaluation and grading (Mandić, Mandić, 1996: 148).

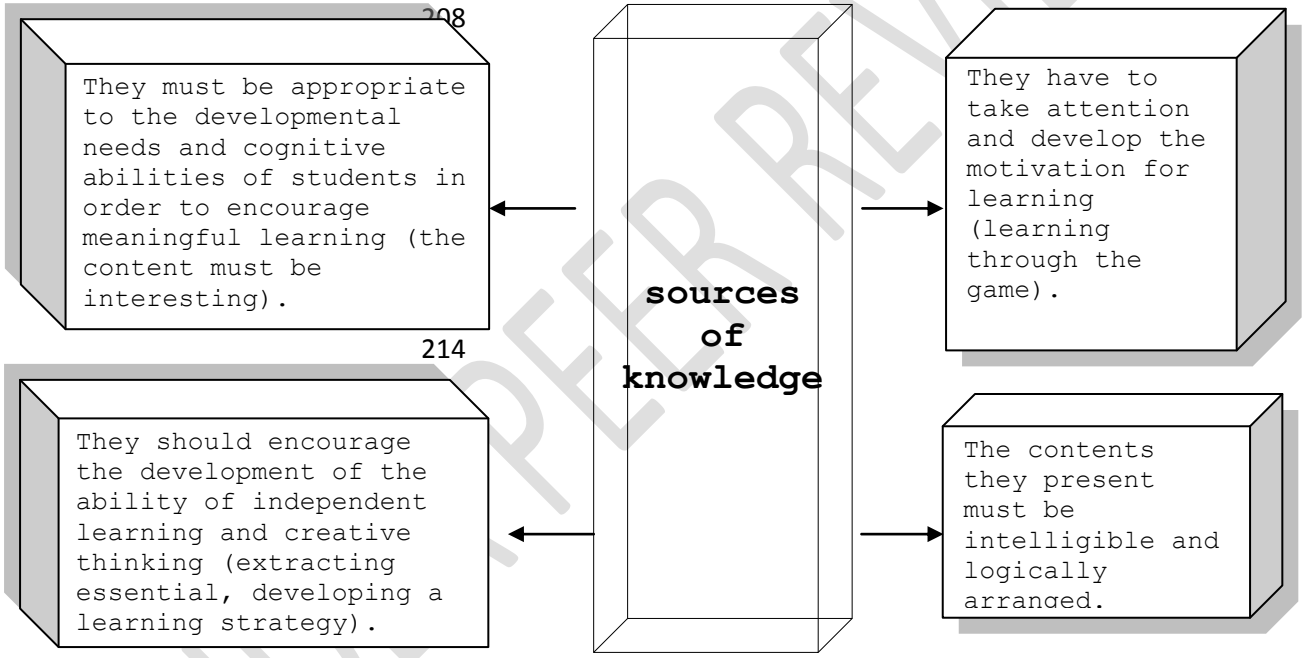
It is necessary to put the student in the position of an active subject, and direct all methods and techniques of work in the process of his training for independent work in the process of learning and training mathematical contents, especially in the initial teaching of mathematics and beyond.

In order to make changes in the process of realization of mathematical content, the change of the teacher-student role and the relation to the teaching content is inevitable. The ability to engage in active learning is not predetermined but is planned and realized in the process of well-organized teaching work. Therefore, it is necessary for teachers to first strengthen confidence in their own abilities, because a higher degree of confidence in one's own abilities stimulates students to greater engagement in learning (Milošević, Janjušević, 2003: 178).

Today, in the world, even in our country, we are looking for solutions for a more successful individualization and differentiation of mathematics education. The application of modern educational technology enables the mathematical content to be personalized to the extent that it is possible to fully carry out democratic teaching appropriate to each individual, her needs, interests, abilities and ambitions.

Information technology is becoming more and more and cheaper. This fact encourages and points to the possibility of introducing information technology into our schools and the abandonment of traditional and to some extent inefficient learning processes (Lazarević, 2005: 47-59).

From the point of view of contemporary pedagogy, knowledge sources must satisfy several basic preconditions (Scheme 1).



Scheme 1: Preconditions of knowledge sources

The computer will, more than any other teaching tool, force the teachers to call what Diezeide spontaneously calls the verbal masterpiece of the mainstream and provide him more time for more constructive and creative contacts with students of discussion, different assessments, new ideas, a more flexible approach to acquiring information and other (Diezeide, Đorđević, 1981).

The acquisition of mathematical education, using modern educational technology, which was mostly reserved for students a few years ago, is increasingly occupying a place in mathematics education, intended for students of elementary school age. It is becoming

increasingly clear to teachers that the textbook is not, nor can it be, the dominant source of mathematical knowledge.

The full and continuous activity of all students is enabled in various organizational modes of application of modern educational technology. Talented mathematicians provide a great opportunity for faster progression and creative expression, and the adaptation of the program to different abilities attracts average and less valuable students to more complete individual development. Contemporary educational technology offers exceptional opportunities not only for individualization and greater activation of each student in the education process but also for the objective, reliable and precise determination and evaluation of the processes and results of each student in each teaching segment (Potkonjak , 2003:54).

2. Planning the realization of mathematical content using a computer

Without the use of modern didactic media, the teacher could not adapt his style of teaching cognitive styles and learning styles in a satisfactory way, could hardly meet their diverse needs and encourage curiosity and motivation for learning, in addition to the best will he could not ensure that each student in itself, a peculiar way to search for the meaning of certain activities and to master the teaching material at its own pace, it would not allow gifted students to progress faster in the learning process, and the weaker to achieve what they perceive in their learning (Mandić, 2003: 18)

The pedagogical value of computer use must not be forgotten; it not only allows for a more successful and more comprehensive acquisition of students' knowledge but also allows giving a concrete form to abstract concepts (Obradović, 1998: 142).

The creativity of teachers who realize mathematics teaching using a computer is not reflected in the teaching itself, but in its preparation. The planning of mathematical content that is realized with the application of a computer requires not only the good will of teachers but also its professional competence and exhaustive documentation of each student, monitoring his progress and interest in such teaching (Mićanović, 2008: 107).

Drawing up an annual plan, not just initial mathematics lessons, but teaching mathematics in general, with the use of a computer, should anticipate the use of this modern teaching tool in the realization of individual mathematical topics or individual teaching units. Therefore, the teacher should make a plan in order to make it easier and easier to consider and develop the possibilities of using computers in the realization of certain mathematical contents.

When drafting an annual mathematical work plan that includes planning the realization of mathematical content using modern teaching aids, in the foreground of a computer, certain requirements must be observed:

- what content is planned and realized;
- when, ie. at what time they are realized;
- how much time to predict for the use of computers in the realization of given mathematical contents;
- in which order to perform the presentation of mathematical content (Mićanović, 5/2008: 140).

When a good yearly work plan is drawn up then a monthly work plan is based on it, which, besides the teaching units, requires the planning of classes of classes, teaching forms and methods of work adapted for teaching at a given age. When planning the realization of mathematical content on a computer, the teacher must take into account the time dimension of the realization of the planned content. Therefore, when planning teaching of mathematics using a computer, a teacher must face several precise questions:

- what it wants to achieve (goal and tasks);
- what content (content selection);
- In what way (choice of learning strategy);
- how to get feedback (work evaluation).

Thus, the computer allows the teacher to faster link the program units and their integration into the annual work plan. By using computers in mathematics planning, the user "programmates" his annual, monthly, weekly and daily activity in a modern and efficient way.

Preparing and adapting mathematical content for their realization by using a computer passes through two basic stages:

- methodical preparation of the teaching unit (separation and interconnection of content sequences);
- the technical preparation of a computer unit (formatting the content sequences on the computer).

Teaching contents are didactically shaped into specific content sequences, and each of the content sequences shown in the form of animation contains:

- information;
- question or task;
- assistance in solving tasks (questions);
- the solution of the task;

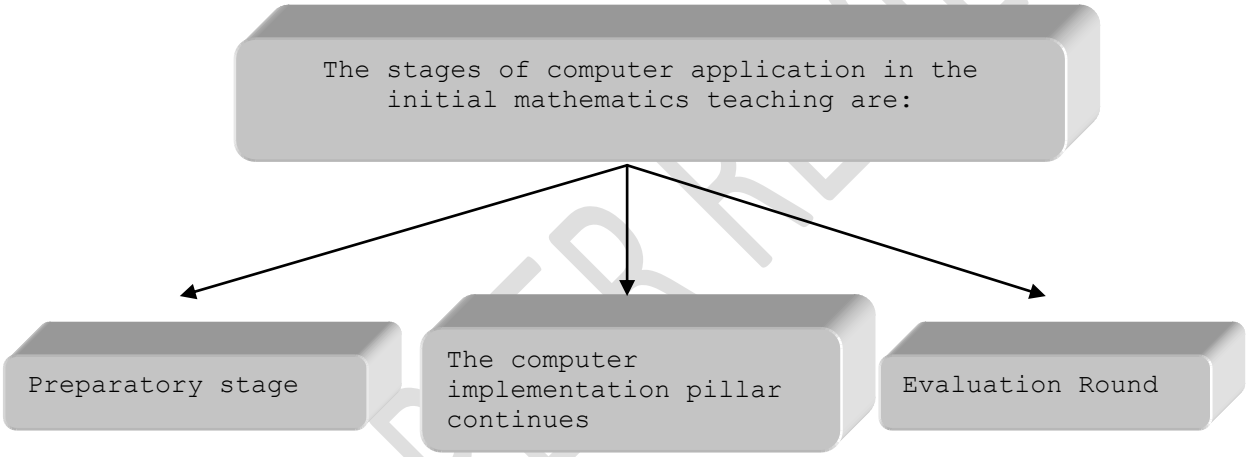
- eedback information (Mićanović, 2008b: 142-143)

2.1. The stages of computer application in the initial mathematics teaching

The teaching process in our schools must basically be changed and adapted to the possibilities of modern teaching technology (Jukić, 3/2005: 72).

If we want to achieve maximum success in the quality and quantity of results by using a computer in the initial mathematics education, we have to set certain requirements.

The application of computers in the initial mathematics must go through three stages (Scheme 2) (Mićanović, 2008c: 563).



Scheme 2: The stages of computer application in the initial mathematics teaching

The preparatory stage in the application of computers in the initial mathematics teaching is, it can be said freely, the basis for the success of the learning process on the computer. This stage includes all physical, technical, organizational and educational segments of great importance for reforming the traditional learning model. That is why this stage is the most complex. It requires a strong material base. The most important factors in the realization of this phase are:

-school,

- teaching staff and

- students.

The school as an irreplaceable factor in every teaching reform is indispensable. In order to realize the initial teaching of mathematics by using computers, the school must take serious steps regarding the purchase of adequate teaching equipment. In addition to computer procurement and computer technology, schools also play an important role in organizing

seminars or other forms of professional development of mathematics teachers in subject and classroom teaching in order to get rid of their changing role in the teaching process.

Teaching staff, which consists of teachers of mathematics and teachers, is a very important factor, efficient use of computers in mathematics teaching. With the advent and massive use of computers in all areas of human work, the position of teachers in the teaching process is significantly changed. Teachers are aware of the fact that the use of new information technologies is aimed at improving all human activities and mathematical education. (Nedeljković, 3/2005: 44)

A good and successful teacher will evaluate the validity of the use of computers in certain parts of the time or the realization of individual segments of the teaching unit and approach its use. It is important to note that computer application in the teaching of mathematics should not be improvised, but that its application should also be based on the use of quality educational software. This is reflected in the creativity, inventiveness and professional ability of teachers who, instead of writing, should pay more attention to preparing the realization of mathematical content on a computer.(Mićanović, 5-6/2008: 566)

The evaluation stage comes to an end when the effects of initial mathematics teaching on the application of a computer in it are sought. Evaluation is organized after one cycle of teaching according to the new model of work. Therefore, the quality and quantity quantification of knowledge is carried out on the quarter, the semester and the end of the academic year.

It is observed that remarkable change had been made in the school Mathematics since independence and in great extent in last two decades to make Mathematics learner friendly as well as meaningful, purposeful, enjoyable to learners of all sections specially at elementary level so that each child can learn Mathematics easily with understanding and can apply their learning in their day to day life. Traditional fear is being replaced by joyful learning in Mathematics. For these in last few years sets of textbooks were redesigned in a totally different way for which teaching-learning process required a major change to provide free and compulsory education not only upto elementary but also upto secondary level (Fan et al., 2013; NCERT, 2012).

2.2. Models of application and use of computers by teachers and students in the initial mathematics education

Contemporary teaching of mathematics involves the inclusion of new information technology in its realization.

It is, therefore, necessary that the institutions in the system of education of equipment are hardware and software, and that teachers receive the necessary training for efficient application of new information technology in mathematics education. It means:

- equipment of mathematics teachers with special computer tools for the realization of the teaching of mathematics and to enable them to constantly innovate teaching;
- training of mathematics teachers in the field of learning models and the methodology of introducing innovations into mathematics education;
- changing positions in mathematics teaching, so that the teacher's central place should be taken by the student;

To achieve better communication in a teacher-student relationship, software products should be used to interpret procedural and static errors and enable model building (Pinter, Petrović, Sotirović, Lipovac, 1996: 154).

True, there are a large number of teachers who do not have previous experience in using the simple "tools" that the computer provides to them in the development of didactic-methodical materials for application in mathematics teaching. In order to enable the teacher in the educational practice to optimally use all the benefits offered by modern educational technology, understood in a wider sense, he must be adequately educated first and then continuously included in well organized and programmed modern forms of professional development (Mijanović, 2000: 131).

Accordingly, the training of teachers who are not in the course of their education have mastered the program of informatics education, should include the following:

- each teacher should go through at least the minimum training on the use of computers for teaching and learning mathematics;
- introductory user courses should include (awareness, application and model creation);
- Mathematical contents and topics for both types of courses should be in accordance with the requirements of the curriculum of the appropriate level of education;
- teachers must learn about new forms of work organization in the classroom and new teaching methods in working with computers in mathematics education.

Owning a computer, i.e. the art of using this modern tool contributes to the teachers to keep in touch with recent developments in the world in the field of development of educational activities and to read more recent literature. The use of computers as teaching aids in preparing teachers for designing and preparing mathematics education is based on modern technology. Organizing teacher preparation by using computers and Internet technology, besides providing

knowledge and information on the Internet, enables teachers to manage and guide teaching in class computer networks.

A contemporary teacher, or rather a teacher who uses modern technology in preparing the lessons of new learning models, needs to have the sense of planning and preparing for new methods and techniques of effective learning (Mićanović, 2008b: 144-145).

There are many factors that influence the preparation of teachers by using a computer depending on whether they originate from the subject itself or reflect external influences. Usually, we can split them into two groups:

- internal or subjective factors;
- external or physical factors.

The internal factors are crucial for the quality preparation of teachers for the teaching of mathematics. The personality of teachers is very important for effective preparation. Anxiety and less ambitious people behave differently in the process of preparing mathematics teaching, they are skeptical towards innovation and less believe in the power and ability to apply the technique.

External factors also have a major influence on the selection of modern tools and aids in preparing for mathematics education. Hence the great influence of these factors on the efficiency of the preparation itself. The external factors of teacher preparation include the working room where the teacher prepares, the possession of computers for work, the conditions in which the teacher performs teaching, and the like.

The basic prerequisites for successful application of computers in the initial mathematics teaching, which are directly dependent on teachers are:

- the appropriate level of teacher training, which allows him to plan and practice the initial teaching of mathematics using computers and the use of the so-called. innovative types and systems of teaching work in the individualization of teaching mathematics;
- high level of mathematical education, i.e. knowledge of mathematical content, in order to improve their didactic-methodical transformation and adaptation to the new way of presentation and individual characteristics of pupils;
- Possession of basic qualities of a good teacher, reflected in the imagination and ability of creative, stimulating and innovative action in the division and transfer of the working atmosphere to students,
- the ability to establish desirable interaction-communication links and relationships in teaching and

- the ability to permanently monitor the progress of students and a good knowledge of different techniques for acquainting students with personality.

A mathematics teacher who uses a computer in his work must possess the qualities of a good methodologist, such as:

- to be an increasing strategist of modern teaching and a new way of learning, and less and less a lecturer and examiner;
- to be a teacher of teaching and learning and organizing student activities;
- to help pupils in the learning process and not to allow the time of mathematics to turn into informatics;
- to direct and create the necessary situations that will continuously stimulate logical thinking processes based on information used by various sensory receptors;
- to be a consultant in the process of independent mathematics education;
- to encourage student self-initiative;
- to respect and apply good suggestions; to objectively evaluate the results achieved;

to be open to positive developments in the profession and science and apply their achievements.(Mićanović, 7-8/2007: 740-741)

Conclusion

A computer in the process of its use by teachers should be considered as a technical tool that helps him to more accurately, clearly, and more clearly present a particular teaching content, assignment or question. It is not used to replace teachers, but to help him improve the quality of his work in the teaching process.

Therefore, it should be accepted as a useful teaching tool that can replace several different teaching aids and take on a variety of functions by placing its technical (hardware) and software (software) available to the user (teacher and student), all with the aim of providing the best possible conditions for better work, learning and personal development of each individual.

Thus, the possibilities of using computers by teachers are unlimited, ranging from teaching, the process of acquiring knowledge, through scheduling classes, record logs, collaboration with parents, general time organization, teaching process management, up to the editing of school documentation.

The use of computers by students develops a number of psychomotor and cognitive skills: the ability to solve problems, the development of abstract thinking, the development of logical thinking, the increase in intuitive knowledge and experience, facilitates the way in the

world of symbols and objects, affects the development of coordination of movement, reading and writing skills, creativity, communicativeness and motivation.

As a teacher, a student can use a computer in the teaching process and in free time, i.e. in extracurricular activities. The work of students on a computer is reduced to solving set tasks and adopting mathematical content using educational software for all students, with the difference that mathematical content differs according to individual mathematical abilities.

It should be borne in mind that the use of computers by students in mathematics's initial mathematics is not just an end in itself, but a means for the quality development of mathematical concepts and a more effective introduction of students into the mathematics world. Namely, the use of computers by students is considered a means rather than a goal of learning. This means that the goal of mathematically organized mathematics is not to introduce a computer at any cost into the teaching process, but it is the real goal to use the computer as a modern means to provide the necessary individualization of the initial teaching of mathematics and to create the basis for a more modern development of mathematical thinking whose final products are thoughts products (abstraction, induction, deduction, creativity, etc.

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