USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN MATHEMATICS LESSONS AS A MEANS OF STUDENTS' CREATIVE THINKING DEVELOPMENT

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Abstract. *The system of work of a mathematics teacher in modern conditions should be aimed at the development of students: their worldview, creative abilities, cognitive activity. Learning for everyone should be interesting and exciting. The competency-based approach to teaching mathematics forces the teacher to constantly review the arsenal of teaching and upbringing tools, choosing the most effective forms and developing them together with students, based on the knowledge and experience of students gained in mathematics lessons. Using a computer allows you to create an information environment that stimulates the interest and inquisitiveness of students. The article reveals the features of the use of information and communication technologies in the classroom as a means of developing students' creative thinking.*

Keywords: *mathematics, information and communication technologies, computer, mathematics lesson, interactive whiteboard, presentations, lesson plan, function, interest, creative thinking.*

ИСПОЛЬЗОВАНИЕ ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ НА УРОКАХ МАТЕМАТИКИ КАК СРЕДСТВО РАЗВИТИЯ ТВОРЧЕСКОГО МЫШЛЕНИЯ УЧАЩИХСЯ

Аннотация. *Система работы учителя математики в современных условиях должна быть направлена на развитие учащихся: их мировоззрения, творческих способностей, познавательной активности. Обучение для всех должно быть интересным и увлекательным. Компетентностный подход к обучению математике заставляет учителя постоянно пересматривать арсенал средств обучения и воспитания, выбирая наиболее эффективные формы и развивая их совместно с учащимися, исходя из знаний и опыта учащихся, полученных на уроках математики. Использование компьютера позволяет создать информационную среду, стимулирующую интерес и любознательность учащихся. В статье раскрываются особенности использования информационно-коммуникационных технологий на уроке как средства развития творческого мышления учащихся.*

Ключевые слова*: математика, информационно-коммуникационные технологии, компьютер, урок математики, интерактивная доска, презентации, план урока, функция, интерес, творческое мышление.*

INTRODUCTION

Mathematics, like no other science, can make a significant contribution to the implementation of the tasks set for the school, since the activity of a mathematics teacher is aimed at developing the skills of spatial imagination, logical thinking - in a word, the development of intelligence. In mathematics lessons, various pedagogical technologies can be used: modular training, project activities, information and communication technologies. In this case, learning becomes active, the emphasis is on learning through practice, the productive work of students in small groups, the use of inter-subject relationships, and the development of independence. In a word, the system of work of a mathematics teacher in modern conditions should be aimed at the development of students: their worldview, creative abilities, cognitive activity. Learning for everyone should be interesting and exciting.

MATERIALS AND METHODS

The competency-based approach to teaching mathematics forces the teacher to constantly review the arsenal of teaching and upbringing tools, choosing the most effective forms and developing them together with students, based on the knowledge and experience of students gained in mathematics lessons. Using a computer allows you to create an information environment that stimulates the interest and inquisitiveness of students.

The form and place of using computers in the lesson, of course, depends on the content of this lesson, the goal set by the teacher. What are the functions and features of the application of educational programs? The following functions can be distinguished: instrumental (making visual aids); demonstrating (showing ready-made demonstration programs, slides, presentations, etc.); training (simulators); controlling.

Various types of lessons are possible with the use of information technologies: lessons-conversations using a computer as a visual aid; lessons in setting up and conducting research; practical work lessons; lessons-tests; integrated lessons, etc.

In recent years, along with computer technology, schools have received interactive whiteboards, which are a touch screen connected to a computer, the image from which is transmitted to the board by a projector. Special software for interactive whiteboards allows you to work with texts and objects, audio and video materials, Internet resources, make handwritten notes directly on top of open documents and save information.

A lesson in mathematics using ICT is visual, colorful, informative, interactive, saves the time of the teacher and the teacher, allows the teacher to work at his own pace, allows the teacher to work with students in a differentiated and individual way, and makes it possible to quickly monitor and evaluate learning outcomes.

The goals of ICT in the process of teaching mathematics are: the formation of skills to work with information, the development of communication skills; preparation of the personality of the "information society"; the opportunity to give the child as much educational material as he can learn; the formation of research skills, the ability to make optimal decisions.

The computer can be used at all stages of the learning process: when explaining new material, consolidating, repeating, controlling ZUN. At the same time, for the student, he performs various functions: a teacher, a working tool, an object of study, a collaborating team, a leisure (game) environment.

The main means of ICT in the study of mathematics are: a computer as a universal information processing device; A printer is a device that allows you to capture information on paper given and created by students or a teacher for students; a multimedia projector as a device

that projects an image onto the screen by means of a signal received from a computer, VCR, CD or DVD player, video camera or television tuner, which radically increases the level of visibility in the work of the teacher, enables students to present the results of their work to the whole class; screen as a device for projecting an image from a computer; an interactive whiteboard is a touch screen connected to a computer, the image from which is transmitted to the board by a projector, special software for which allows you to work with texts and objects, audio and video materials, Internet resources, make handwritten notes directly over open documents and save information, as well as devices for recording (inputting) visual and sound information (scanner, camera, video camera), which make it possible to directly include information images of the world around in the educational process.

The use of ICT tools is a necessary condition for the modern educational process, when the main thing is not the transmission of fundamental knowledge, but the development of creative abilities, the creation of opportunities for realizing the potential of the individual. ICT is used not as a goal, but as another pedagogical tool that contributes to the achievement of the goal of the lesson.

Computer in the lessons in the following forms: the use of media resources as a source of information (disks); computer support for the teacher's activities at different stages of the lesson; using a computer to perform technological maps; portfolio creation.

Multimedia accompaniment of lessons increases the efficiency of obtaining knowledge by students. The term "multimedia" is a tracing paper from the English word multimedia, which can be translated as "many environments" (from multi - many and media - environment). Multimedia technology allows you to simultaneously use different ways of presenting information in the form of numbers, text, graphics, animation, video and sound.

Basically, when studying mathematics, various types of multimedia products are used: this is a computer presentation that is created using the Power Point program, it is a sequence of slides, with the help of this program a presentation is created to study new material.

The advantages of presenting information in the form of a presentation over information in the form of speech: a large amount of time is released, but the presentation must match the pace of assimilation, student recording; the computer allows you to show a complex experience safely, to explain its essence, but this should complement, not replace. The presentation greatly facilitates the management of the lesson, the organization of the work of students, but requires the teacher to be confident in technology, knowledge of programs, and readiness to work as usual.

If necessary, in the learning process, the student can independently return to that part of the information that he did not learn without distracting the teacher, for example: the formula is erased from the board, and if the student did not have time to write it down, then the teacher will have to interrupt the story and return again to the formula. And vice versa, commenting on the material that is on the slides, the teacher can dwell on certain points in more detail. For example, when studying the topic “Prime and Composite Numbers”, you can introduce students to the construction of the sieve of Eratosthenes using a presentation. This will interest students, and they themselves will be able to try to build the sieve of Eratosthenes in their notebooks.

Presentations-surveys: questions, tasks that activate students for further work in the lesson, create a favorable climate. So, when repeating the topic “Ordinary fraction” at the

beginning of the lesson, you can repeat the theoretical material using the presentation and immediately check the correctness of the implementation.

Presentations for organizing both frontal and group work. With the help of presentations, it is also possible to create routes for students, i.e. see the end result of their work. For example, compiling a travel map, or playing by stations.

Presentations for self-testing of knowledge, skills and abilities of students. At any stage, using the presentation, you can carry out independent work, and then students can check it. After completing the work, students can exchange notebooks and mutually check the work. The use of presentations in the classroom is good because less time is spent in the classroom, students see the result immediately; demonstrate to students neat, clear patterns of design solutions; demonstrate absolutely abstract concepts and objects; achieve the optimal pace of the student's work; increase the level of visibility during training; learn more material show students the beauty of geometric drawings; increase cognitive interest; to introduce elements of entertainment, to revive the educational process; introduce level differentiation of training; encourage students to use their home PC to study math; achieve the effect of fast reverse noah connection.

Advantages of using e-learning tools: digital educational resources: screen and sound manuals; technical teaching aids are

- the ability to repeatedly repeat, stop, which allows the teacher to focus the attention of students;
- refer to theoretical material, make historical references, work with definitions and laws;
- clarity of processes, clear images of installations and models, uncluttered;
- modeling of processes and phenomena;
- Obtaining and analysis of graphic dependence.

Computer simulators in mathematics lessons can be used simulators, both in the classroom and at home. They represent a system of tasks on topics and go like electronic to the teaching materials. Features and disadvantages of simulators: programs provided with reference materials and a large number of tasks, exercises, questions; simulation of real processes, laboratory experiments; release of the teacher from routine work; feedback, error detection, tips, examples of problem solving; students have the opportunity to work at home; students feel less constrained and thanks to this they "try themselves"; the ability to objectively evaluate student progress; the ability to record and analyze the answers of the student and the group of students, but the skills of oral and written speech are not formed.

ICT outside school hours can be used in the form of: virtual excursions, creative homework: make a crossword puzzle, anagrams, rebuses, a question; work with tests; student conferences.

The use of computer technology in teaching makes it possible to differentiate educational activities in the classroom, activates the cognitive interest of students, develops their creative abilities, and stimulates mental activity.

Based on the above, we can say that computer technology is one of the best means that helps a person acquire knowledge in a quality manner and use it. And also allows you to create conditions for enhancing the learning process. And if the student himself participated in the process of creating presentations, projects, then this only doubles the effect of acquiring new

knowledge. Therefore, a larger-scale introduction of information technologies into the educational process is necessary as a means of improving the quality of education.

The use of ICT contributes to the growth of the teacher's professional skills, increasing the efficiency of mastering the skills of independent search, processing and presentation of knowledge, developing the personality of students and preparing for a comfortable life in the information society.

Therefore, the main directions for improving the quality of mathematical education are: increasing the professional competence of the teacher; use in the educational process the integration of the content and cognitive activity of students, i.e. active approach: a) to form skills; b) use computer technologies, modern pedagogical technologies, problem-based teaching methods, research and design technologies; It is advisable to carry out control using ICT in a differentiated manner at the basic level (reproductive), advanced and high

RESULTS

The practice of using an interactive whiteboard at school allows us to identify the following areas of its use in the educational process:

1. Presentations, demonstrations and model building. Using the right software and resources in conjunction with an interactive whiteboard can improve understanding of new ideas, as an interactive whiteboard helps teachers present new material in a very lively and engaging way. It allows you to present information using various multimedia resources, simplify the explanation of diagrams, help you understand a complex problem, and study it in as much detail as possible.

2. Active involvement of students. Interactive whiteboards, using a variety of dynamic resources and improving motivation, make classes fun for both teachers and students. Working with an interactive whiteboard can help the teacher to test students' knowledge, develop a discussion to clarify the material being studied, which allows students to better understand the material. By guiding the discussion, the teacher can encourage students to work in small groups. The interactive whiteboard becomes the center of attention for the whole class.

3. Improving the pace and flow of the lesson. Using an interactive whiteboard can improve lesson planning, pace, and flow. Files or pages can be prepared in advance and linked to other resources that will be available in class. On the interactive whiteboard, you can easily move objects and labels, add comments to texts, pictures and diagrams, highlight key areas and add colors. In addition, texts, pictures or graphics can be hidden and then shown at key points in the lesson. Pre-prepared texts, tables, diagrams, pictures, music, maps, themed CD-ROMs, as well as adding hyperlinks to multimedia files and Internet resources will set the activity at a brisk pace. All resources can be commented directly on the screen, using using the pen tool, and save notes for future lessons. Files of previous lessons can always be opened to repeat the material covered. Such methods encourage active participation in the classroom.

Teaching with an interactive whiteboard is much more effective than teaching with a computer and a projector alone, as it has a number of advantages: providing a clearer, more efficient and dynamic presentation of material due to the ability to draw and write on top of any application, save and print images on the whiteboard, including any notes, made during the lesson without spending a lot of time; developing student motivation through a variety of exciting and dynamic use of resources; providing more opportunities for participation in teamwork, developing personal and social skills; using different learning styles (the teacher can

refer to all kinds of resources, adapting to specific needs); ensuring a good pace of the lesson; providing the ability to save the used files in the school network to organize the repetition of the studied material; simplification of verification of learned material on the basis of saved files; ensuring the multiple use of developed materials by teachers, the exchange of materials with each other; stimulating the professional growth of teachers, encouraging them to look for new approaches to learning.

In order for children in a modern school to be interested in mathematics, it is necessary to use information technologies in lessons and additional classes, which allow the formation and development of the cognitive motivation of schoolchildren to acquire new knowledge, helps create conditions for the success of each student in the lesson, significantly improves clarity in the organization of the work of a class or group of students , allows you to create an information environment that stimulates the interest and inquisitiveness of the child, as well as to form communication skills in schoolchildren.

The task of the teacher is to correctly build educational work, taking into account the age-related psychological characteristics of children, where their thinking, criticality, memory, attention, and speech will be improved. And this creates favorable conditions for the development of communication skills of students. In practice, the following techniques are used to develop the communicative skills of students: demonstration of a sample answer; inventing questions on the topic; dialogue between teacher and students; interrogation on questions; verbal counting; explanation of errors; work in pairs or groups; mathematical dictation; commenting on the student's answer at the blackboard.

As an example of the practical application of information technology in mathematics lessons, consider the description of an algebra lesson and the beginning of analysis in grade 11 “Repetition of material on the topic “Exponential function”. Solving inequalities graphically.

The objectives of this lesson were: to review the properties of the exponential function and how they can be applied to solve equations and inequalities; to teach students to apply information technology to solve mathematical problems; improve the graphic culture of students.

DISCUSSION

Lesson plan: organizational moment, voicing the objectives of the lesson and work plan; student performances: exponential function and its properties; solution of exponential equations; solution of exponential inequalities; explanation of the graphical method for solving equations and inequalities; consolidation of new knowledge - oral solution of inequalities in a graphical way according to ready-made drawings; written solution of the exponential equation and exponential inequality; compiling and recording an algorithm for solving an inequality in a graphical way; repetition of graphing techniques in MS Excel (student's message); safety briefing and practical work in MS Excel using instructional materials - graphical solution of an exponential equation; independent practical work to consolidate work skills; test; summarizing the lesson. Homework assignment.

CONCLUSIONS

Thus, the use of information technology in teaching mathematics undoubtedly gives the lesson great advantages over traditional forms of classes. But this in no way means that every lesson and every stage of it must be conducted using a computer, projector or the Internet. The computer really has ample opportunities to create favorable conditions for the work of the teacher and students, brings to a qualitatively new level of application of explanatory-illustrative

and reproductive teaching methods; the use of ICT in the classroom allows you to diversify the forms of work, the activities of students, activate attention, and increase the creative potential of the individual.

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