UDC 378:[1+004.8]

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Studying the section «Basic properties of a function» using computer programs for the development of knowledge and activity

In the article it is analyzed one of the main subjects of the algebra which studied at high secondary general school. The intersubject communication and use of computer programs used in the course of training of a subject is estimated. Authors of article show relevance of use of the training computer programs used for development of knowledge and skills in pupils. And also in article use of the animation Flash program is analyzed. The article deals with the improvement of the methodology of teaching mathematics in secondary schools. The methodology of teaching mathematics using special computer programs along with the traditional method of teaching makes it possible to explain more deeply the specific subtleties of a difficult school subject. However, many kinds of such special computer programs leave a choice for the teachers of the subject and this requires the teacher knowledge in this area. In this article, a program analysis is provided to help the teacher. Using the capabilities of programs such as MathCad, MS Flash gives the math teacher the opportunity to create animated material for such complex topics as the rotation of geometric figures, the point of intersection of figures, etc. However, the practice of using such programs by teachers in math lessons improves the methodology of teaching mathematics.

Keywords: mathematics, methodology, computer programs, traditional teaching methods, active teaching methods, special program, training, learning outcomes, private methodology, animation program.

For the Republic of Kazakhstan, the early XXIst century is characterized with social and economic prosperity based on scientific and technological progress. Because of the above, the process deeply introduces information technology in the field of society, requires specialists appropriate for the development of education, professional qualifications, science and technology. In this regard, each country applying new techniques and technologies to its education system should pay attention to its improvement. In the law of «education» of the Republic of Kazakhstan, one of the tasks of the education system in the Republic of Kazakhstan is national and universal values, aimed to the formation of personality on the basis of achievements of science and practice, development and hardening of the profession, and identified the creation of the necessary conditions for obtaining a quality education [1].

1. The Law of the Republic of Kazakhstan on Mass Media establishes the legal basis for informatization in the country, regulates public relations arising from the use of the creation of electronic information resources and information systems [2].

2. In this regard, the actual problem of interpreting the subject of geometry in secondary schools has become quite a maximum.

Nowadays it is very effective to use new information technologies in teaching algebra and starting analysis. Among the computer programs, new teaching programs provide great opportunities to submit concepts, that is, with the observance of traditional teaching methods, provides a new quality. On its basis, there was a renewal of clarity, that is, increasing efficiency, increasing the activity of students' cognitive activity, and improving the mechanisms of figurative thinking.

In the study of the topic «Basic properties of a functions» the teacher should bring the following topics to students:

– functions and their graphs;
– elementary transformations of functions` graphs;
– even and odd functions;
– the periodicity of trigonometric functions;
– increasing and decreasing of functions;
– increasing and decreasing of trigonometric functions;
– research of function.

Everyone knows that the above topics will not be easily assimilated by school pupils. Therefore, the teacher along with the traditional methods, referring to information technology aimed at developing knowledge and skills of students can rely on the training of computer programs.

Mostly learning through computer programs is a dynamic process. The main trends in its development related to the increased use of computers in the educational process. If today to conduct research on the computer software market, products are specially manufactured for the subject of mathematics from various firms and private users. For example, the «Mathematics of grades 5-11, made in Russia» («1C») «All the tasks of school mathematics» («Education-Media»), «Mathematic for enrollee» («New Disc»), Mathematics 5-11. New opportunities for mastering the course of mathematics «(«Drove`s»), «Interactive mathematics. Grades 5-9 « («Drove's»), «The basic course of mathematics. For schoolchildren and enrollee» («Media House»), «Algebra. 7-11 class» («KUDITS», «Cordis & Media»), Teacher of mathematics school of Zelenograd Y.M. Astratov`s programs: «The Theorem of Vieta» (for 8-9 grades), «Solving linear equations» (for 5-7 grades) «Solving linear inequalities» (for 8-9 grades) etc., The familiar organization to publish of electronic textbooks in our country is the National Information Center. «Mathematic» (for 1-10 grades) electronic textbooks are published more and finds more applications. Most of these programs is made on the basis of the so-called algorithms as 1) training; 2) exercise; 3) control. Therefore, these programs work well as assistants to the teachers and students.

As any product is accompanied with advantages and disadvantages, when choosing a software product, it is necessary to take into account the correspondence aim of the lesson, the tasks, the form and the type of the lesson.

Using of special software for teaching algebra and starting analysis:

– increase of motivational basis of students; development of creative abilities;
– for formation of mathematical thinking;
– for mobilize students for research;
– for self-government;
– to promote development of logical thinking and the ability to memorize,

Computer programs that are carried out in a certain direction must use modern achievements of computer technology, that is, high-quality graphics, animation, sound support, video clips and other multimedia tools.

In the preparation of effective training systems, it is necessary to take into account student interactions in the computer system didactic and psychological requirements and principles. A distinctive feature of self-learning computer programs for training, the presence of direct or any interaction through technical way of interactive influences between the student and teacher. For this reason, the choice of special programs should take into account the interactivity of training computer programs, that is, it is possible to immediately answer the questions and actions of students, in addition to determine the receipt of the question, provide information, offer information to the student.

If a close relationship is found between the computer and the student, then such training is called interactive. As a rule, such a relationship among students is observed when trying to find a decision to any task. The main aim of interactive learning is to teach students to find answers to tasks by themselves. When students are given ready answers, their mental activity will not developed. When they are used to solve a problem themselves, their mental activity increases.

In studying the discipline, using of application programs when submitting specific information should satisfy the following principles:

1. Training material software equipment correspond with the system of education of pupils of a certain age, smoothly presented in a familiar language of students. In other words, the presentation of teaching materials should be understandable to the learners, but should not be very easy. Because the material is easy, the students have less interest in it.

2. Applied software is designed to perceive visual information, and for high school students are directed to the adoption of information through logical thinking.

3. Applied software should develop the students' visual and logical thinking.

The teacher tells to students some information, that is, explains to them. Teacher believes that all students have fully accepted the information. But, while teaching the 25-30 students at the same time, the teacher can not match the pace of training, the meaning of interpretation of information in the particularity of each student, because their characteristics are different. Many teachers conduct lessons «at an average pace», considers the «convenience» of secondary students. Classes with such a pace is not very convenient for all students. Because weak students can not keep up with the «average impulse», that is, they do not understand what the teacher said. In this case, we can say teacher made a «mistake». And, begins braking in the development of students taking quickly what the teacher said, they start to get bored because the teacher

slowly reports and the material that they study becomes «easy». In addition, since the teacher conducts a lesson considering the level of knowledge of the «average» student, a certain part of the knowledge remains unexplored. And, multi-level is responsible for the didactic criteria of applied software equipment. In the choice of the content of education should be taken leadership of science, system, accessibility, continuity, life cycle, as the basis of the principle of learning; In the choice of teaching methods, the visibility related to the content and tasks of the principle of consciousness and activity of students in learning coordination of various methods is taken to guide the teaching. In Table, considered the selection of levels of didactic criteria for applied software equipment (ASE) for cycles of disciplines of mathematical and scientific natural sciences.

Table

Didactic criteria of the ASE selection`s levels

ASE levels	Elements	Components of the learning process				Personal computer tools
		Aims	Stimulate	Content	Method	
1	Acceptance, Understanding	Understand, remember	Achievements, Positive emotions when using a PC	Understanding the theory of the nucleus,	Reproductive, explanatory-illustrative	Graphics, animation
2	Awareness, approval	Clarification approval	Cognitive	1-level knowledge extension	Problematic	Hypertext dictionaries, encyclopaedia
3	Application, analysis	Self-education	Self-affirmation	Additional Study Materials	Problematic	All the 1-2 levels

The content of education, as indicated above, is the difference of criteria. The first is the level of cognitive. This level as a help provides training materials, training the basic content based on specific discipline.

If you clarify on the basis of the agreement, while studying the topic «Trigonometric functions», you can use the program «trigonometry for the best», that is, after introduction with the theory the student begins to perform test tasks. If necessary, the student checks the answers or reads the theory, can see solutions or a schedule. Each student works at his own pace, after solving one task will take place in another. Under this program, the form of training an organization the degree of independent work is characterized by a volatile independent work.The using of program is simple. A student who is familiar with the technology can work without a teacher on the computer, and there are also many instructions in the program.

Algebra lessons use two types of information technology: presentations and slideshows. These allows students to visually understand the material.

The presentation is the provision of information to the teacher's front work, and also consists of slides. Basic forms of given information - text, drawings, schemes [3].

At the lesson there are different types of electronic devices:

– image in the form of audio-video and presentation;

– Together received the forecast and again checking decisions, the posing of problematic issues, in itself again there is a combination of illustrative materials;

– quiz, crossword, games test knowledge on their own and front;

– including covering different branches of knowledge in one lesson, involving, accepting the image of the world, giving the opportunity to fully show the material to prepare a form of the lesson on the topic;

– using the Visual Basic programming language, production of electronic channels to classes is the best relationship of the student with the computer (done by the teacher,accepted the objectively-oriented programs)

Frequently used information technologies in the learning process can be divided into two groups:

1. World and local INTERNET (methodical instructions in electronic form, server of distance learning, applications) using network technologies.

2. Technologies oriented to the local computer (training programs in the process of a specific computer model, electronic tasks of the demonstration program, control programs, didactic materials) [4].

Funds for training. I.V. Robert showed the following methodological goals aimed at teaching the use of software tools effective in the traditional educational process:

– privatization and differentiation of the learning process;

– implementation of communication control and error diagnosis;

мthe implementation of self-learning activities and self-correction (correction);

– to win the study time taking into account the performance of difficult computer work by a computer;

– visualization of educational information;

– modeling the educational process or presentation;

– conducting laboratory work in artificial conditions of real experiments or experimental computers;

– forming the ability to find optimal solutions in different situations;

– the development of a certain type of thinking (for example, through a software image tool or through software or the setting of game situations);

Formation of culture of cognitive activity, etc.

Information technologies for teaching - new opportunities for transferring knowledge (changing pedagogical action,), making knowledge, assessing the quality of education, it is necessary to understand the educational process of a student's personality for comprehensive formation as an application of information technology

The main goal of Informatization of education – is «in the information society students in home, public and professional spheres of action, mixing fully and effectively» [5].

In the subject Algebra and the beginning of the analysis, among the topics that we noted in the above there are topics leading to the work with the function graph. It is clear that it is not easy to learn for all students. Therefore, even if you can draw charts on the board, mixing of animations is not possible without special programs. For example:

– functions and graphics;

– elementary transformations of function graphs;

– periodicity of trigonometric functions;

– мincrease and decrease of functions;

– increase and decrease of trigonometric functions ;

It is appropriate to apply a special animation program «*Flash* animation program» on the topic of the study of functions. Today, this program is particularly in demand for the convenience of its facilities. This program contains:

– vector graphics;

– using animation;

– the ability to create interactive elements of the interface;

– support for various graphic formats, (as well as raster graphics);

– enable Flash movies in HTML format;

– The ability to watch Flash movies in a Web browser;

– Due to the availability of various visual tools it is possible to uncover all aspects of the graphics function [6].

The main task of information systems in the spheres of education and science is the creation of scientific bases for the application of information systems in the sphere of education and science, the definition of scientific directions of information systems in education, this:

– the analysis of social compatibility of information systems in the sphere of education;

– computer technology, provision of disciplines with scientifically-methodic which connected with new information technologies;

мprovision of educational institutions with hardware in connection with the passage of time;

– definition of pedagogical and psychological foundations in training specialist.

Approach to the world standard of education,it`s using the method of open learning.

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У.А. Қосыбаева, И.С. Қауымбек, Д.К. Шегирова, Н.Б. Михайлова

Білім мен белсенділікті дамыту үшін «Функцияның негізгі қасиеттері» бөлімін компьютерлік бағдарламалар көмегімен оқып үйрету

Мақалада жалпы білім беретін орта мектептің алгебра пәнінде оқытылатын басты тақырыптардың бірі талданды. Пәнді оқыту барысында қолданылатын пәнаралық байланыстар аталып, бүгінде маңызды болып табылатын компьютерлік бағдарламаларды қолдану сарапталды. Авторлар оқушылардың білімі мен іскерлігін дамытатын үйретуші компьютерлік бағдарламаларды қолданудың көкейкестілігін қорытындылады. Сонымен қатар мақалада Flash анимациялық бағдарламасының қолданылуы берілген. Орта білім беру мекемелерінде аса маңызды әрі күрделі саналатын математика пәнін оқыту әдістемесін жетілдіру тақырыпта қозғалды. Дәстүрлі оқыту әдістемесімен қатар, оқыту әдістемесінде жаңашылдық әрі басымдылық танытып отырған арнайы бағдарламалар көмегімен оқыту пәнді оқушылардың толық түсінуіне көмегін тигізеді. Алайда арнайы бағдарламалар түрлері өте көп болғандықтан да, пән мұғалімі үшін тақырыпты ашуға функциялары сәйкес келетін бағдарламаны таңдау да аса маңызды. Осы тұста мұғалімге көмек ретінде мақалада көрсетілетін талдаулар ұсынылды. MatCat, MS Flash, тағы басқа бағдарламаларға жүгіну анимациялық материалдар ұсыну арқылы оқушының кейбір геометриялық денелердің қиындысын немесе қиылысу нүктелерін анық елестетуіне жағдай жасалды. Десек те, ең алдымен, мұғалімнің өзі аталған бағдарламаларды толық игеруі аса маңызды болады.

Кілт сөздер: математика, әдістеме, компьютерлік бағдарлама, дәстүрлі оқыту әдістемесі, оқытудың белсенді әдістері, арнайы бағдарлама, оқыту нәтижесі, жеке әдістеме, анимациялық бағдарлама.

У.А. Косыбаева, И.С. Кауымбек, Д.К. Шегирова, Н.Б. Михайлова

Изучение раздела «Основные свойства функции» с использованием компьютерных программ для развития знаний и деятельности

В статье проанализирована одна из главных тем алгебры, изучаемой в средней общеобразовательной школе. Оценены межпредметная связь и использование компьютерных программ, применяемых в процессе обучения предмету. Авторы показывают актуальность использования обучающих компьютерных программ, используемых для развития знаний и навыков у учащихся. Кроме того, дана технология работы программного продукта Flash. Авторами рассмотрены вопросы совершенствования методики преподавания математики в средней школе. Методика преподавания математики с использованием специальных компьютерных программ вместе с традиционным методом обучения дает возможность более глубже объяснить специфические тонкости нелегкого школьного предмета. В этой статье в помощь учителю дан анализ возможностей таких программ, как MathCad, MS Flash и другие, которые предоставляет учителю математики преимущества в создании анимационных материалов для таких сложных тем, как вращение геометрических фигур, точка пересечения фигур и т.д.

Ключевые слова: математика, методика, компьютерные программы, традиционная методика обучения, активные методы обучения, специальная программа, обучение, результат обучения, частная методика, анимационная программа.

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