MODELING PHYSYCAL PROCESSES WITH THE PROGRAM CROCODILE PHYSICS

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Abstract: This article gives an overview of the virtual laboratories existing in physics education, as well as new material about the Crocodile Physics virtual laboratory.. The article shows the shortcomings and positive aspects of the program. It also reveals the disadvantages of traditional training, which can be corrected by using a virtual laboratory.

Keywords: virtual laboratory "Crocodile Physics", physical animation or model, main program menu, program tabs, traditional education, e-learning

"CROCODILE PHYSICS" DASTURI YORDAMIDA FIZIK JARAYONLARNI MODELLASHTIRISH"

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Abstract: Ushbu maqolada Fizika ta'limida mavjud bo'lgan virtual laboratoriyalar, shuningdek, Crocodile Physics virtual laboratoriyasi haqidagi yangi materiallar haqida umumiy ma'lumot berilgan..Maqolada dasturning kamchiliklari va ijobiy tomonlari ko'rsatilgan. Bu, shuningdek, virtual laboratoriya yordamida tuzatilishi mumkin bo'lgan an'anaviy ta'limning kamchiliklarini ochib beradi.

Keywords: Crocodile Physics" virtual laboratoriyasi, fizik animatsiya yoki model, dasturning asosiy menyusi, dastur yorliqlari, an'anaviy ta'lim,
e-Learning.

МОДЕЛИРОВАНИЕ ФИЗИЧЕСКИХ ПРОЦЕССОВ С ПОМОЩЬЮ ПРОГРАММЫ CROCODILE PHYSICS

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Abstract: В этой статье дается обзор виртуальных лабораторий, существующих в физическом образовании, а также новый материал о виртуальной лаборатории "Crocodile Physics". В статье показаны недостатки и положительные аспекты программы. Это также выявляет недостатки традиционного обучения, которые могут быть исправлены с помощью виртуальной лаборатории.
Keywords: виртуальная лаборатория "Crocodile Physics" физическая анимация или модель, главное меню программы, вкладки программы, традиционное обучение, электронное обучение

Introduction

At the current stage of education, the information is very extensive and everyone has a noticeable lack of time to fully possess information in its necessary requirement. And in this aspect we can use information technology. It is impossible to imagine teaching physics without the use of information technology and computer programs(G.N.Yunusova, 2014). Physics is the science of nature, teaching the laws of natural phenomena, processes, laws of nature(G.N.Yunusova., 2015). And of course, laboratory work is of great advantage in teaching it. It is by fulfilling them that a person himself observes the regularities and connections between various parameters of a substance, sees empirical proof of the theoretical formulas of physics. For teaching physics in the environment of information technologies and programs, online resources have been created, programs that help to visually see the processes of nature by means of a computer, which cannot be seen with the naked eye, since they occur in the size of 1 Angstrem 10 $^{-8}$ cm). A modern teacher is always in search of innovations in technology and science for a more effective lesson, for a more accurate visual display for students or pupils of physical processes, optical or electrical phenomena. And the goal of our work is not only to review existing programs, online applications, computer programs and resources that interact more effectively for teaching physics, but also to show and talk specifically about such a program that has completely changed the attitude towards teaching physics with the help of computer programs in general(G.J. Soteng., 1898), (J.J.Tomson., 1897), (P.Zeeman., 1897).

Currently, when the flow of information is avalanche-like, it is unthinkable to assimilate all the innovations of science and technology, it is not easy to study subjects on the basis of new requirements of the curriculum and time [1-3]. The flow of information is very extensive and the teacher should be able to introduce and use new achievements of science and technology, apply pedagogical technologies, new methods and ways to more accurately transfer knowledge to students (G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).
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The teacher must be able to complete the program in terms of the topics highlighted in the model and work program for the subject, and it is interesting to

train them using various teaching methods and technologies. Every teacher, like all people of the 21st century, has a problem of lack of time. It is here that information and communication technologies, training programs, and virtual laboratories help teachers. Today it is impossible to imagine the learning process without the use of information technology, including physics training. An important issue is the application and use of information technologies themselves by subject specialists. Information technology, e-learning, using additional channels for supplying information on a computer, helps to bring to the attention of trainees those moments and aspects in learning that cannot be conveyed by traditional teaching methods: verbal methods of training or through a thought experiment. Indeed, in traditional training, the student must imagine the physical phenomenon mentally, but this representation of it depends on his level of knowledge, world view, and understanding of the topic. And therefore, in her training a huge role belongs to experiment. In carrying out experiments, effects, laboratories, we are confronted with a number of problems that are associated with the obsolescence of devices or with the requirement of high-resolution installations. But the development of technology and science depends on physics, on the level of its education and implementation. And therefore, training and mastering it at a high level at the present stage is very important. Secondly, all the innovations of computer science, all its programs, from office programs to programs for creating animations in Flash, 3 d Max, are used in teaching physics, in creating facilitations in its training and assimilation. Thirdly, in the teaching of physics there are experiments that cannot be carried out in traditional laboratory conditions, it is here that the animation frames of virtual laboratories and experiments help. The latest achievements of science is the creation of virtual laboratory stands in physics, as well as virtual laboratories. There are enough virtual laboratories in Russia. Russian developments of the Physcstron of virtual technologies such as "Living Physics", "Open Physics", "Physics in Pictures" with drawings, animated "Physics in Animations" help to visually teach physics, here you can clearly see real physical phenomena close to their origin in nature (G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).

Of course, one cannot fail to note the positive aspects of these developments. This is a full range of animated visual-virtual developments that required a lot of work from the creators, knowledge of both physics and information technology, flash technology and other programs in the process. To develop such programs, a specialist must not only be a physicist, but must be able to create flash animations, work with the PHP program to create a virtual laboratory web application, and be able to master the programs and computer perfectly. Virtual laboratories visually depict the physical process on a computer, they can clearly help to conduct

laboratories, experiments, effects that cannot b e carried out in ordinary laboratory conditions ("Retherford's Experience"). Since it is impossible in traditional conditions to conduct this experiment. We need a radioactive drug, a luminescent screen for scintillation, a gold foil. But in the laboratory this is not possible. It is impossible to visually see the processes between molecules and particles, the distance between which is 1 angstrom (G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).

This is the collision of molecules, the movement of particles, alpha-beta-gamma decay and others. This point is also subject to computerization. Many physical topics require the derivation of distribution functions, which are based on the use of differential equations, processes of differentiation and integration, on the derivation of long calculations of the result, is based on a complex mathematical apparatus of calculations, which takes a lot of time, this point is also subject to computerization, since electronic training it saves time, it can in complete clarity and sequence submit the output of the distribution of the function visually, setting out every moment of the output of the formula. You can use sound effects, on the computer, the output of the distribution can be output and the process of outputting the distribution function can be explained aloud. Along with the above-mentioned programs in Uzbekistan, 4 programs of American developers began to be applied, which made their changes in the teaching of mathematics, physics, chemistry and computer science subjects: Crocodile Mathematics, Crocodile Physics, Crocodile Chemistry, Crocodile ICT. These programs have caused changes in the e-learning of physics. In the learning process, the student can create models himself, visually perceive the fulfillment of the kinetic energy, force and mass formulas, optical laws, and laws of electricity[G.N. Yunusova., 2014: p. 178-182], [SEE:G.N.Yunusova, 2015: p. 278-282]., (G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).

Literature review

We have fully reviewed the existing online applications, animations, programs that are dedicated to physics on the Internet. Quite a lot of material is devoted to this topic. But as I mentioned above, we were interested in the problem of using computer programs, applications, online resources, sites for teaching sections of general physics. We looked through them with interest and studied them, of course, we would like to note and emphasize the importance of such online applications as "Open Physics", "Live Physics", "Physics in Animations", "Physics in Pictures" and others. Which in one form or another help the teacher and students to imagine the processes of nature close to their origin in nature. But we were always interested in the question of when, together with the teacher, the student or student himself would participate in the physical process on the computer, change the

parameters of the formula, and observe the process. In reality, I would immediately understand the dependence between the parameters when they were changed, he would draw conclusions and conclusions himself. This is especially necessary to observe when performing laboratory work. The program that we want to present to you is aimed at solving this issue, to reveal to you the methodology of working in this program.

The idea of using computer programs for a clearer understanding and assimilation of the material, as well as because of the time that we always lack, led to the idea of using computer programs for a clearer understanding of the physical content, for understanding the relationship between physical parameters, as well as for clear intervention of the physical process. By means of their additional channel, computer programs can provide students with those subtle aspects of physical processes that cannot be shown or explained verbally. Not everyone can imagine it as it actually happens. In the presentation, everyone relies on his own worldview, idea and knowledge, which he has already determined, and moreover he can go on a false party, relying on a false idea of the phenomenon. The creation and application of Yenka's programs completely changed the quality of teaching physical processes, the sections of physics completely managed to show the relationship between the parameters of speed, rocket mass, gave an idea about the meanings of creating alternating current circuits, helped to answer such questions that a person involuntarily arises, why is it burning a light bulb, how a microscope works, why our eyes see, etc. the virtual laboratory Crocodile Physics helps to find answers to these and many more questions (G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).

Methods / Methodology

In our research, we relied on modern methods of analysis and synthesis, the method of juxtaposition, comparison and the probabilistic-statistical identification of patterns. We offer training in traditional physics techniques, by the method of conversation, storytelling, visualization of an experiment, laboratory work, relying in this case on a thought experiment that should be presented and turned out in the imagination, in the perceptions and ideas of the student, and his clear correct idea depends on himself, from his worldview, from his conclusions, conclusions. And so that they are correct with him, the teacher influences the student with his vocabulary, thesaurus, worldview, his stories and explanation. and if the teacher has difficulties in this aspect, or he does not fit into time, he has to perform a large study load, in which there is a very large material with peculiar lectures, laboratory exercises that require presentation, understanding of the essence of the material, its physical meaning, patterns and connection between different physical parameters, in this case it is necessary to use computer programs. And traditional teaching

methods here are replaced by electronic ones, and you can use only computer programs in teaching, in lessons from beginning to end, or vice versa, you can turn to the combined teaching method, using modern programs in traditional teaching, virtual laboratories, turning to the use of simulations, animations in teaching.

Discusion

The trainee can collect alternating current circuits, create a circuit to turn on the light bulb, to fulfill Ohm's law and others virtually, while visually observing the process itself. This program can be applied in schools and universities to teach physics teaching methods for future specialist physicists. This program includes some sections of physics, as well as many models and animations. For students, the program offers electrical circuits, here you can create an electrical circuit so that the bulb burns or vice versa, if the connection is incorrect, the bulb may burn out, this can be seen on the computer screen. The program includes such sections of physics as "Electricity", "Electricity and Magnetism", "Waves", "Optics", "Kinematics" and others. The most interesting thing is that students or pupils can enter the speed of the rockets and visually monitor their movement, while observing that the rocket arrived at high speed earlier than the rocket at lower speed, you can also see the relationship between the mass and speed of the rockets. This program includes 50 physical models, more than 150 animations that can work with the user together, while changing physical parameters, the animation also changes. Processes are visualized as they occur in nature.

Crocodile Physics, like all applications, has its own main menu. Fille (Fayl) Edit. View. Scenes. Help.

This program has its following form:
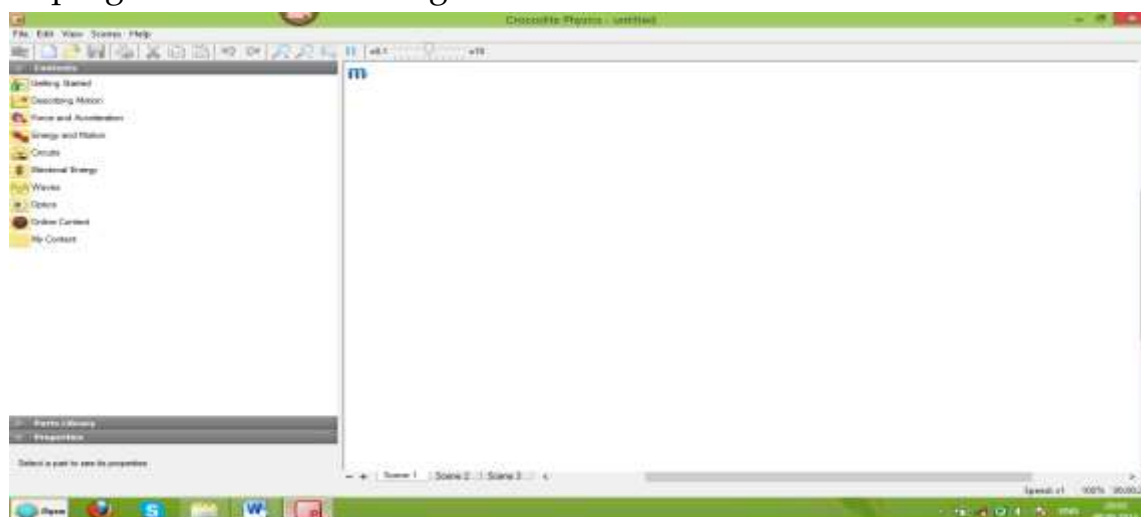
Picture №1. Interface of program.

On the left side of the window are the main tabs with the names of models or sections of physics for which animations are intended. These tabs are selected and they include a list of different models that you can use and create animations on the right side of the working window. On the same side of the working window,

actions are taken to create and view animations, as well as comments on the action of the animation, its name and purpose. The following tabs: Getting Started, Describing and Motion, Force and Acceleration, Energy and Motion, Circuits, Electrical Energy, Waves, Optics, Online Content, My Content[167].

Picture №2. Parts of Physics for simulation.

If we activate the work of the Getting Started tab, the following sections will open on the screen from which we can choose the necessary topics in which we can simulate the processes of nature:

Let's move on to the second tab. Here you can select a cart to simulate its movement. The second section of this tab looks like the image below:

Picture №3. Virtual laborotory.

The next tab will help you create a simple circuit.

Picture   №4.   Using   virtual   laboratory.

The following animations helps to determine the relationship between the strength of the thread, mass, as well as the angle of movement of the body, clearly showing the oscillatory motion as shown in the figure.

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[167] yenka.com/en/Free_Yenka_home_licences/

International Journal of Education, Social Science & Humanities. FARS Publishers

Impact factor (SJIF) = 6.786

Picture №5. Virtual labarotories.

And finally, the last animation of this tab will clearly show the movement of various balls from various materials. This naming shows the relationship between the strength of the thread, on which the ball is suspended from the mass of this body. Moreover, different bodies with different masses are selected from various materials, which not only have different masses, but their densities are also different. The heavier the ball, the greater the elastic force acting on the thread, if the gravity of the ball is greater, the greater the likelihood of a thread breaking. If gravity becomes much greater than the elastic force of the thread, then the thread breaks. A light ball can oscillate on a thin thread. Its gravity is less than the strength of the thread on which it is suspended[168]. In the next tab we can determine the increase in the speed of movement of cars depending on their severity, as well as on the dependence of their purpose, how many people they can move or how much gravity they can carry on themselves.

Picture №6. Laboratory and work in it.

This animation helps to understand the connection between the speed of the car and the distance, the higher the speed, the car travels faster along its intended path. It also draws a timeline. Animation helps to understand the physical meaning of the analytical formula, the faster the speed, the faster the car will go the distance.

Picture №7. Uniform accelerated movement of the machine.

The learner manually enters machine speed data, monitors the movement of the machine at various speeds. In this virtual laboratory, the student himself introduces the values and himself comes to practical results that have been theoretically passed. These animations are created by developers based on physical formulas and work clearly according to their rules. In addition to motion animations, there are other animations to determine the relationship between speed and distance. In each tab there are animations or models for creating animations designed for a particular topic. For example, to determine the moment of motion, based on the laws of the moment of motion[169] .

Picture №8. Many different animations related to the laws of radiation, interference, diffraction, optical phenomena.

Many different animations related to the laws of radiation, interference, diffraction, optical phenomena.

Picture №9. Model of interference.

Interference can also be observed visually using the Interference model.

Picture №10.Models and animations for optics and others.

A whole section of models and animations is designed for optics. The Optics section includes animations such as an animation to explain the structure of the

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[169] www.alsak.ru/
yenka.com/en/Free_Yenka_home_licences/

human eye, which obeys the laws of optics, the operation of a microscope, several models are designed to create animations that teach how to use a microscope to determine the image of a remote image.

Picture №11. Microscope and others object in demonstrating.

You can also learn how to use a microscope, its structure, then there is a section on concave and convex lenses using animations about concave and convex lenses.
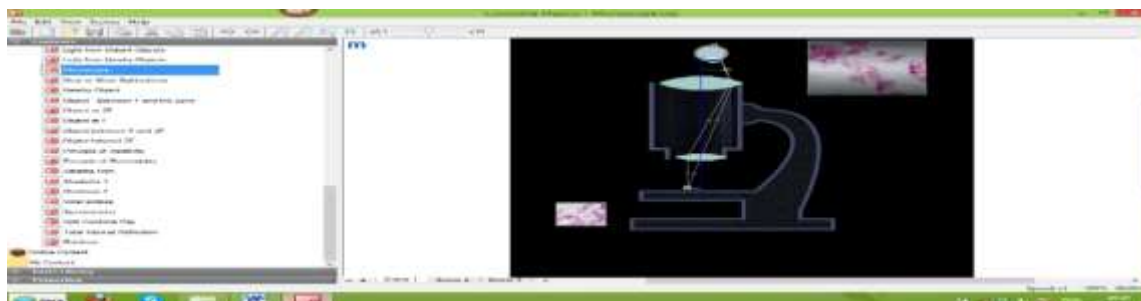
Picture №12. Microscope.

Having shown the animation, the trainees can be asked to explain the optical meaning of the structure of the eye and the image entering the retina of the human eye. This animation is also designed based on the optical laws of physics[170].

Picture №12. Many others phenomens.

You can observe the phenomenon of interference.

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[170] yenka.com/en/Products/

Picture № 13. The phenomenon of interference.

We gave an example of one program, looked at a series of virtual laboratories of Russian developers and concluded. These programs are the result of the achievements of the human mind, a person creates things on the computer that improve his life, facilitate work. The most difficult of them is mental work, the process of learning and improving oneself and teaching others. These programs have several positive aspects: -they facilitate the work of man, at a higher level teach information; - These are stimulants of physical processes, this is a simulation of physical processes close to their origin in nature;

- with the help of a computer and its additional channel, the most effective animations are created with information on the subject, which cannot be presented in traditional laboratory conditions due to a number of reasons; - in the process of their use, the teacher does not remain aloof, as when using electronic textbooks, but rather, the teacher is in the training center, because at the lesson he and the student can simulate animations of physical processes using program models, this kind of thread is performed here, connecting the three learning objects: Computer (with a virtual laboratory) + Teacher + Student;

-the teacher can visually simulate the physical process and engage students in the process of creating animations using ready-made models for the sections of physics., here the connection Computer (with a virtual laboratory) + Teacher goes into a three-way connection Computer (with a virtual laboratory) + Teacher + Student;

Based on this point of view, the created virtual laboratories give an effective result in training, clearly depict the processes of nature, but they have a number of disadvantages: - firstly, they use peculiar models that are copies of a molecule, particle, they are in the form of a ball, and a molecule or particle is not an ideal ball in reality; - secondly, virtual laboratories do not cover all physical processes, among which there are difficult to grasp physics topics that are subject to computerization;

-thirdly, the used models of molecules or particles in the form of a ball do not capture the very process of the state of these molecules or atoms, as well as

particles, because the particle has the shape of a cloud, similar to a "dumbbell", which we equate in animations with the ball; -fourth, in some virtual laboratories the section of physics "Atomic Physics" is not considered, although this is one of the largest and most important sections of physics for the future, in which there is a lot of novelty of science and technology. Virtual laboratories as models of natural laboratories help to avoid the shortcomings of traditional training, in which, due to shortcomings in training, there may be gaps in the continuous training of the subject of physics. The discreteness in education that has appeared helps to remove the visual training of physics by means of a computer, and the virtual training of visualized processes is the impetus for independent learning, and also causes the development of distance learning in physics. The disadvantages that we recalled above may be different: - outdated devices, lack of funds for re-equipment, the high cost of high-resolution physical devices; - the training material can be complex, a detailed description and conclusion of the material is necessary, a formula is derived based on differentiation, integration, transition from one coordinate system to another, knowledge of the mathematical apparatus, solution of differential equations is necessary;

the requirement in the traditional teaching of sequential interconnected material of the content of the topic leads to a lack of time, because lesson schedule does not always satisfy reality, because at the present stage, the teacher is in the rut of his documentation and he must also be armed with all kinds of methods and the skill of submitting new material, knowledge of the use of pedagogical and information technologies, which is one of the main reasons for learning - this is the lack of time, as in the lesson, and in the process of education itself, time is the teacher's most necessary and necessary tool for saving (G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).

Results

The use of this program will help to really see many natural phenomena, things and objects around us, their movement, the connection between them, to determine and understand the physical content and essence of the processes of movement, the structure of devices, their application, helps to understand how the law of breaking light is used in obtaining images in microscope, its structure is based on the use of the physical features of the lenses, as well as the person understands and gets an idea of the work of their eyes, like living lenses. The trainee will clearly show in the use of animations, and simulations that an airplane with a higher speed arrives faster, if airplanes with the same speeds, but with different weights, then an airplane that is lighter, and one with a greater weight, arrives faster to the designated place. can independently participate in the connection of electrical circuits, in the collection of all devices in his apartment:

refrigerator, TV, etc., mark the electrical wires correctly, correctly place the ares of cars when she has to drive at dusk, in the dark and a number of different laboratory works in the sections of general physics, it helps to determine the essence of certain regularities, trainees in practice clearly see the implementation of theoretical formulas, changing some parameters and observing others and the process or movement   itself.
Using   this   program   led   our   research   to   the   following   results:
-         the   activity   of   students   has   noticeably   increased;
- assimilation of the processes of nature, the operation of devices, optical and electrical   phenomena,   is   organized   by   attracting   trainees;
- there is an interest in the assembly of electrical circuits, in the assimilation of the reasons for movement, an increase in speed, there is knowledge about the connection between the path and speed, about optical devices, lenses, about the laws of refraction in them, or the laws of refraction of light in different media, air and   glass;
- a toolkit has appeared according to which the teacher can explain the essence of the laws of nature, he himself can work in them on his own, teach the learners to work   in   this   program;
-the possibility of e-learning of laboratory work has appeared, to link the teaching of topics with the use of a computer program, even using online through this program;
-such learning became the reason for changing the quality of teaching physics, because ready-made simulations, animations, models help teach the processes of nature, show the connection between components and parameters, as well as participate   in   the   processes   themselves;
- using various devices, circuits, you can independently create an electrical circuit, connect the light bulb correctly, or if the connection is incorrect, you can observe how the light bulb burned out, from such animation works, the student, thanks to clarity, can draw conclusions and conclusions in technology, physics, which can serve   as   an   incentive   for   his   future   scientific   works.
The processes of nature are at the source of all sciences and knowledge, and each time we strive to find out the causes of certain phenomena, human development, the use of the knowledge gained by him in science and technology, depends on their correct interpretation, which can be the foundation in the creation of new inventions.

Conclusion

Physics is a science that studies the laws of nature, and the correct perception of the laws and laws of nature, which a person will need in future in his studies, in the direction of technical progress and flourishing, depends on the correct

interpretation of the essence of certain natural phenomena, processes, electrical and optical phenomena , because all the innovations created in our time are based on the laws of physics. From robots to computers, all technology works on the basis of the physical assembly of objects, based on the laws of physics, thermodynamics, electricity, magnetism, superconductivity. And then the teaching of physics, the laws of nature, its correct interpretation is necessary for the assimilation and perception of all the laws and phenomena of nature, for using them for favorable purposes for more comfortable work, convenient for humans. For this purpose, the Crocodile Fisiss program serves, which allows its animations, models, simulations to simulate the process of nature, but also involves the learner himself this process, in which he, by changing parameters and data, can observe the process and visually see the changes and understand the relationship between physical quantities , on the spot, to see empirically the fulfillment of theoretical formulas. This program is designed to bring theory and practice together, which is what the developers have achieved. This program is used in stakes, institutes and universities of Uzbekistan in order to familiarize children with technology, science, physics, so that young people understand that everything is based on the laws of nature and the whole future of humanity depends on their knowledge. This program, as a result of the human mind, completely changed the attitude towards laboratory work, virtual laboratory work using this program can fully simulate the processes of nature, movement, optical and electrical phenomena, laws(G. N.Yunusova, 2013), (G.N.Yunusova., 2014), (G.N.Yunusova, 2015), (G.N.Yunusova , 2015).

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