

## About the use of interactive method and phet electronic resource in educational process

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### ABSTRACT

*This article focuses on the application of an interactive method in the educational system, especially on the advantages, convenience and brightness of increasingly popular simulations in the modern distance learning system, as well as on another explanation of the effectiveness of this pedagogic technology. The author in the preparation of this article prepared on the basis of his personal pedagogical experience and the opinion of the owners of knowledge, taking into account such principles as simplicity, curiosity, easy supply of the source to the educator, closeness.*

*This article will play an important role in the knowledge of scientific achievements at a time when modern innovative technologies are developing, in particular lecture classes on distance learning platforms based on PhET Interactive Simulations, information on the conduct of virtual laboratory work. This program, through its interactive models, allows students, students to achieve a vivid understanding of the physical phenomena observed in nature before their eyes, to create a real laboratory environment, in a state that virtually combines pictures, diagrams, animation and quantitative tools.*

**Keywords:** *Interactive method, PhET interactive model, simulation, distance learning, virtual laboratory, virtual physical machine tools.*

### I. Introduction

Today, a number of developed countries have accumulated rich experience in the application of pedagogical technologies that increase the educational and creative activity of students and guarantee the effectiveness of the educational process, and the methods that form the basis of this experience are of particular importance.

The main thing in modern teaching methods is the "interactive" method, and now its translation is often referred to as "interactive". The term "interactive" is actually an English word, meaning "interaction", and in an activity or method, a solution is understood on the basis of mutual argument, discussion, thinking, activity or solidarity.

The interactive method of teaching is the method by which the teacher participates in the mode of communication and conversations between the student and the student and the student.

The following are the forms and methods of interactive education based on the characteristics of interactive education.

1. Form of discussion: interactive lectures, dialogue, discussion of situations in the group, discussion of practice discussions, etc.
2. Form of organization of games: game business, role-playing, organizational activity

management, etc.

3. Form of training: communicative, personal and professional growth.

Often the term interactive education refers to distance learning, as well as electronic textbooks and reference books, with the use of information technology, internet resources, mentions of the situation with work on the internet.

The informatization process of modern society provides rapid access to all kinds of information, especially in education, to the improvement and mass dissemination of modern information and communication technologies (ICT). Suffice it to say that in place of proof of this, the number of sites dedicated to education and science in the section Ziyonet portal, "sites" exceeds 2548, or is dedicated only to the use of ICT in pedagogy to more than 400 sites in Russian-language sources.

A modern teacher should be well versed in various fields of science, the basics on which he teaches, his opportunities for solving socio-economic, industrial and cultural problems. But this is not enough - he must always be aware of new studies, discoveries and hypotheses, get acquainted with the close and distant prospects of the subject being taught.

It should be noted that modern readers and educators are accustomed to seeing and understanding the world, the events in it on the big screen in an impressive and bright color. In this regard, it is difficult to overestimate this interaction. Failure to pay attention to the effect the computer has on the student especially as a teacher brings out some difficulties. It can be said that: as long as computerization does not fully cover the course processes, the lessons will not be able to achieve their goal in its entirety.

In the present time, the participation of text processors, spreadsheets, presentation preparation programs, database management systems, organizers, graphic packages, etc., in them: e-mail, mailing lists, news groups, forum and chat, in a word, universal office applications and ICT tools in teaching contribute to the acquisition of high results. Because of this given the computer, clearly defined, variable operations sequence – it is considered a device capable of carrying out sequences or a machine working on a specified system, which includes input - output operations. The description of the sequence of operations is called the program. Currently, special programs have been developed for communication in real-time, which, after the connection is established, transmit texts entered from the keyboard, as well as sound, images and other files. Therefore, it is very important that an excellent machine that carries out digital calculations and data management operations takes place in the processes of lessons.

The above, of course, also applies to the teaching of physics. Currently, the teacher can use a lot of electronic textbooks, which are provided by social networks, in the teaching of this science. The most common form is the use of presentations in which the age, subject matter of the cognitive recipient is taken into account and the subject has a universal feature. In addition to the presence of clarity, openness and clarity of incoming presentations using, there are also disadvantages. This resource cannot ensure the variability of the information given, although it is in accordance with the requirements of a particular training program, it is not able to teach a program that requires extensive coverage, great accuracy.

The fact that he began to correct the presented shortcomings, the creation of visual and symbolic models of phenomena in nature, the precursor of virtual Constructors, which allowed him to conduct experiments with these models, paved the way for a more perfect teaching of physics. In this regard,

virtual constructors are step forward that allows you to create visual and symbolic models of mathematical and physical reality and experiment with these models.

Sergienko A.Y. "Research on the technology of teaching physics in the general education system in the United States of America", writes in his thesis: ...The main purpose of teaching in the USA is to understand nature, to rediscover and apply physical laws, as well as to understand real natural phenomena from the point of view of physical laws, in the Russian style of teaching physics, the main attention will be paid to physical models, training will be conducted within the framework of solving standard problems and typical.

At present, in accordance with the most modern didactic principles, the development of independence, creative thinking of the younger generation is aimed at eliminating misunderstandings, which are represented by images, virtual constructors - sims.

The entry of simulators into the educational system, "a scenario structured by a well-developed system of rules, tasks and strategies that have a clear goal, which can be directly applied to a specific life, to the formation of certain competences, is described".

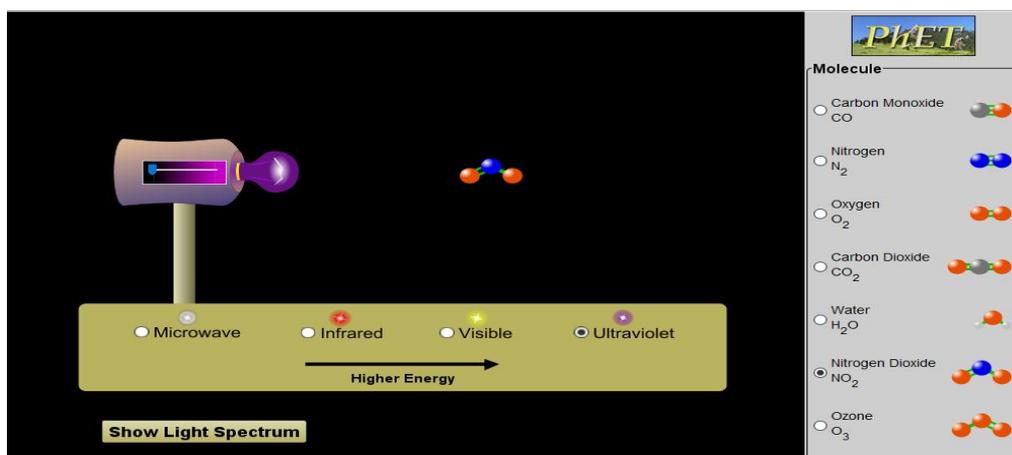
Simulation (eng.simulation) - imitation of physical processes ( Latin "imitatio" using an artificial ( eg: mechanical or computer) system.

Simulation is a research method in which the system under study is replaced by a model that characterizes the actual system under experiment with sufficient accuracy to obtain information about this system. Experimenting with the model is called imitation (by imitating real reality, explaining the essence of the phenomenon without experimenting with the real object).

Simulation is a special case of mathematical modeling. There is a class of objects in which analytical models for various reasons have not been developed or methods of solving the resulting model have not been developed. In this case, the analytical model is a simulator (a software and hardware tool that creates an impression of reality, reflecting some virtual phenomena and features) or it will be replaced by a simulation model. Simulation is sometimes called the acquisition of private digital solutions of a formulated problem, either on the basis of analytical solutions or using digital methods. A simulation model is a logical and mathematical description of an object that can be used to design, analyze and evaluate an object for experimentation on a computer.

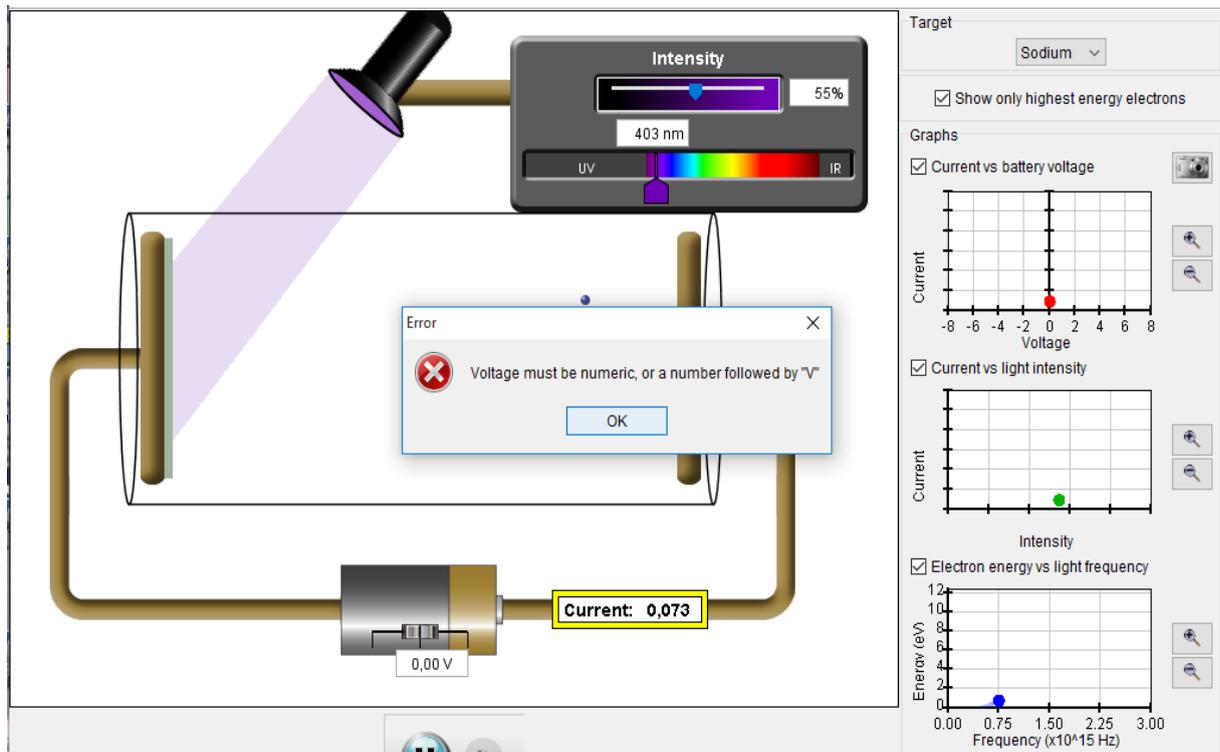
Simulation is used in situations where experimentation on a real object is expensive or impossible. (Simulators are unique: they help in explaining events and solving them)

Picture 1 ( Phet simulator )



The purpose of the simulation is to develop a simulator (English simulation) of the area of science under study for different experiments - on the basis of the analysis of the most important links between the elements of the system under study, or in other words - on the basis of the analysis of the most important links between its elements.

Simulation allows you to model the behavior of the system in a timely manner. In addition, the advantage is that time management in the model is possible, slowing down in the case of rapid processes and accelerating to model systems with low variability.



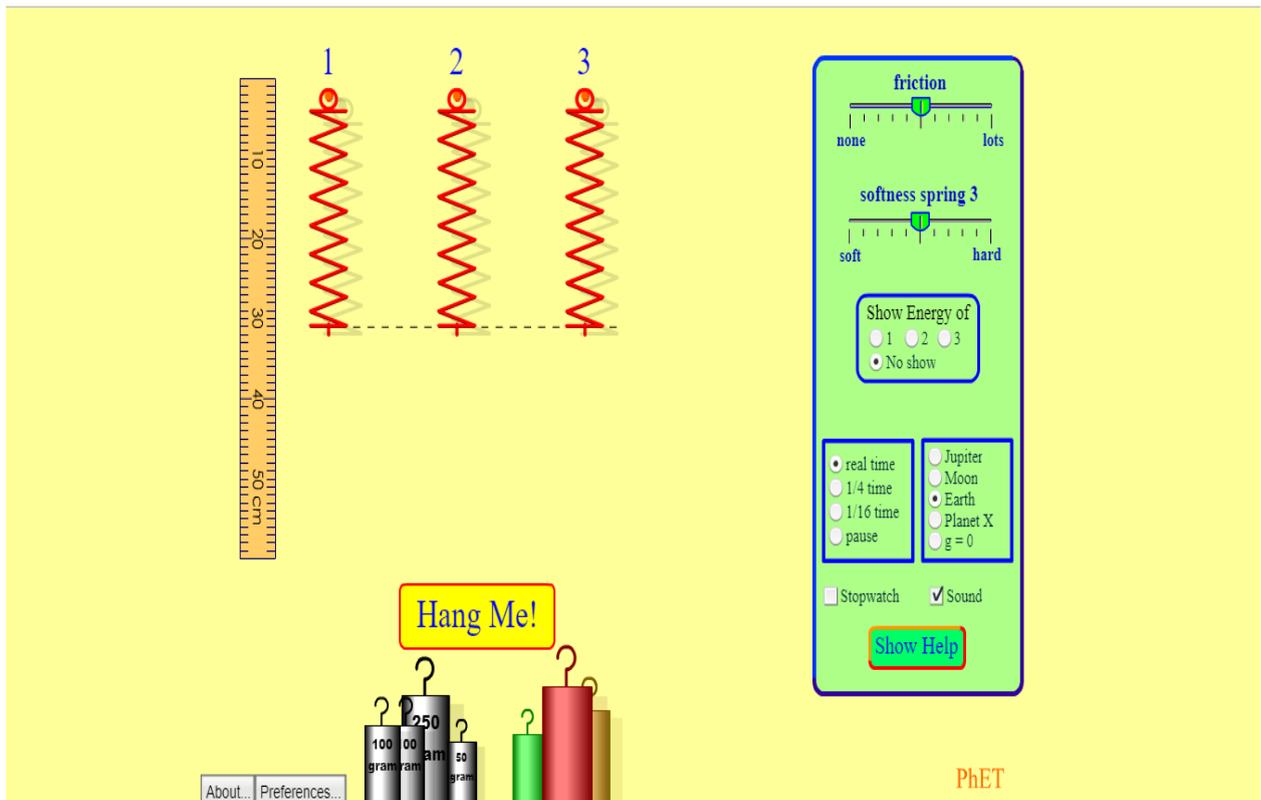
You can analyze the behavior of objects in real experiments that are expensive, impossible or dangerous. ( Picture 2 of PhET simulator )

One of the sources offered by the Internet for free is the project - Phet interactive modeling. This project was founded in 2002 by the Nobel Prize winner Carl Wieman at the University of Colorado in Boulder. The task of the PhET project (in subsequent places "PhET") is to develop physics, mathematics, chemistry, biology, earth sciences all over the world with the help of free interactive simulation. It should be noted that the authors of electronic hands - on training create hands-on training, which is now translated into 65 languages, not only in the field of physics, but also in other fields of science.

The creation of a meaningful, capacitive and flexible armband that can be used for a lecture show, laboratory or homework was the result of a PhET interactive modeling project. This feature greatly contributes to the process of giving its knowledge, alleviating the responsibility of the cognitive person. These tutorials use intuitive gameplay, while the cognitive can learn new information about simplified reality by simulating dynamic visual imagery associated with real-life events.

**Laboratory activities:** "Laboratories" allow to carry out non-practical research with the help of

models of real equipment.



### 3-figure PhET simulator

Since Virtual designers allow us to experiment with these models by creating visual and symbolic models of real physical and mathematical reality, they eliminate the main disadvantage inherent in other hands - the impossibility of carrying out a controlled survey. To complement this idea even more, the Phet interactive modeling project is one of the sources offered by the internet for free. Knowledge of sims will receive the necessary information by playing over and over again. The main thing is that the failure of the cognitive equipment that conducts experiments with these sims and repeated experiments without the supervision of the teacher, along with the fact that the independent thinking of the learner is a factor in the development, plays an important role in the formation of new ideas and findings in it.

The PhET consortium, in addition to identifying the smooth objectives of education, has introduced the provision of simple and minimal directions for the application of wires, relying on the existing knowledge and understanding of students, rewarding their thinking and conclusion, the main thing is to ensure their participation in collaborative projects by engaging them directly in experiments.

On account of the organization of distance learning in the educational system, this created program will serve as a solution to the problem of distance learning. Even if viewed from an economic point of view, PhET, like other similar electronic sources, its use will increase in emergency situations, for example, during the pandemic period in 2020 year. It became clear that the provision of online application of this electronic resource is becoming more relevant.

In this regard, different types of distance learning were organized in Uzbekistan. In accordance with the curriculum, a transmission of lessons was prepared for all classes. Of the Ministry of public

education "UZEDU" official telegram channel and "YouTube" there is a video hosting channel where a schedule of television classes will be published and lessons for all classes will be recorded directly. They are even being broadcast on many channels of television, even in the summer season. In addition to edu.uz there is also a telegram channel, which informs about the latest developments in the field of education and publishes materials for self-education. At the same time the Ministry of innovative development, "Qr book" launched the project. The process of formation of more than 3500 electronic textbooks on various subjects placed on the website of the innovative library operating in our republic continues.

The electronic manual of Fet can take a worthy place in teaching and help teachers greatly in improving the learning process.

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