

**STATUS AND ANALYSIS OF TEACHING INFORMATION
TECHNOLOGY IN STUDENTS ON THE BASIS OF COMPUTER
IMITATION MODELS**

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ABSTRACT

This article examines the use of imitation models created on the main topics of teaching the subject of information technology on the basis of computer simulation in higher education institutions in the field of technology. It is obvious that the introduction of computer simulation models in technical higher education institutions is insufficient. Therefore, this article examines the topics of computer graphics, ie the organization of teaching raster and vector graphics on the basis of simulation models.

KEYWORDS: *Imitation Model, Computer Graphics, Raster Graphics, Vector Graphics, Pixels, Lines, Structural Analysis, Information Technology.*

INTRODUCTION

Analysis of research conducted in foreign research centers and educational institutions on the teaching of information technology on the basis of computer simulation in higher education institutions in the field of technology shows that:

Imakaeva Dariya Amangeldievna's research work on "Imitation modeling in economic optimization" reveals the possibility of using simulation models for the analysis of economic systems.

The feature of the simulation model is that during the execution of the machine (computer) it is possible to obtain reliable information only on the basis of some initial parameters entered into it before the start of execution. In other words, the results of performing the simulation model process depend on the specific values of the given set of parameters.

The results obtained during the research in the simulation models in this scientific work can provide information that will help to make the right decision on different scenarios of the development of the situation.

However, imitation models have a number of shortcomings, including the complexity of mathematical models and the complexity of perception due to the uncertainty of some of the results.

In the research work of EV Konstantinov, TS Vyacheslav "Application of imitation modeling in the educational process of transport VUZa" substantiates the need to develop and apply imitation models in the educational process of the University of Transport and analyzed the results of practical lessons.

This article is dedicated to teaching students the skills of mastering information technology. The

importance of simulation modeling for the study of complex technical systems, their properties and management is significant. The authors follow an increasing trend in students' interest in automating complex processes of problem solving, computation, and analysis using computer technology. Attempts have been made to develop a generalized methodology for conducting practical lessons using the Anylogic program. The article focuses on the relevance of the study of imitation model tools at the University of Transport and the task of improving the quality of the educational process in practical training using modern information technology, in particular, the universal imitation model tool - Anylogic. The method of automatic verification of completed assignments and the mechanism of realization of the objectivity of the established assessment for the newly studied material are also considered.

The article describes the process of analyzing the results of checking the correctness of the answers to the questions on the material studied. The authors justify the need to develop and apply imitation models in the educational process of the University of Transport and analyze the results of practical lessons.

V.N. Sidorenko, AV Krasnoselsky's research work on "Imitational modeling of science and business: approaches, tools, applications" analyzed the results of the application of imitation models in science and business.

The article provides an overview of the approaches and software tools available in simulation modeling. Three generally accepted paradigms of modeling based on system dynamics, discrete events, and simulations are presented. An approach based on simulations, which is relatively rarely used in Russia, has been discussed in detail, but has been shown to be the basis for creating effective systems of decision support in business. The article demonstrates the effectiveness of initial acquaintance with simulation modeling and its introduction into business problems.

DA Medvedev's research work on "Development of an imitation model of prioritization of traffic in multi-service network enterprises and anylogic systems" analyzed multiservice networks based on imitation models.

This work is devoted to the analysis, planning and modeling of traffic priority processes in multi-service enterprise networks. Currently, when examining and analyzing traffic flows over a data transmission network in corporate networks, it can be seen that the traffic of different types, protocols, and levels of the OSI model is transmitted over DTC. This can be voice traffic from IP phones or telephone exchanges, various traffic (continuous, pulse, synchronization, ...) and so on to manage and maintain real-time video traffic equipment and network infrastructure due to videoconferencing between branches. The data transmission network has its own indicators that allow us to assess its quality.

A.V. Adrianova, M.B. Laskin, A.S. Svistunova's research work on "Imitation modeling of the route network of airports" pulkovo "and" domodedovo "in anylogic" analyzed the results of the application of imitation models in the field of economics.

Imitation modeling (IM) is characterized by the development and activation of a software system that replaces the studied object with its model, and on its basis the structure and properties of the studied object, depending on the specified parameters.

The main direction of the use of IM in the study of transport and logistics is systems - it evaluates their performance as queuing systems and consists of three main elements: the source of service requests (ships, passengers), public transport, etc., application queuing rules (standards, rules, orders, etc.) and the service system itself (port, public transport, etc.) that executes these requests.

As you know, SMO optimization is a difficult task. The service elements of the system, on the one hand, need to be further organized to increase the throughput of the system. In this case, the queue

of applications can be minimized, it is necessary to wait for the service and minimize malfunctions. However, additional system backups often unreasonably require additional costs to maintain them. This leads to the need for a global assessment to find the system based on maintaining a balance between the flow of applications and service elements.

AS Bondarevsky analyzed the description and structure of imitation models in the research work of AV Lebedev "Imitational modeling: definition, application and technical realization."

There are seven types of features of all modeling operations that are technically feasible and of practical importance, three of which are imitations. Based on the given definition of imitation, the modeling coordinates and the physicality of the parameters of its image models mean that their corresponding result is scaling, detailing. As it turns out, there are five types of imitation features. Of these, imitation is becoming the only means of implementing coordinate control of complex objects.

Currently, imitation is used in various areas of human activity: including industry, transport, economy, ecology, information security and services, as well as in public, state and military relations. However, the range of tasks to be solved is very wide, ie:

- in scientific research (planning of experiments, determination of statistical properties of random factors, testing of statistical hypotheses);

V.S.Smorodin, A.V. Klimenko's research work on "Imitation modeling and means of optimization of technical systems" analyzed the results of the use of imitation models in the optimization of complex technical systems.

In order to solve the multidimensional problems of optimizing the performance of the technological production cycle, a method of imitating complex technical systems represented by a graphical structure is proposed. The theoretical basis of the research method and the technology of its application based on the dynamic change in the composition of the imitation model in the process of its implementation are presented. Based on the possibility of using the proposed approach to evaluate new technical solutions in seeing the optimal structure of the technological cycle and the presence of potentially hazardous elements.

E.P.Bocharov, O.N.Aleksentseva, D.V. GPSS World was used to create an imitation model of the production process in Ermoshin's research work on "Imitation model of production process of the control system of the industrial enterprise."

The article discusses the use of imitation models in the management cycle of enterprises on the example of JSC "Saratov wallpaper". The GPSS World tool was used to create an imitation model of the production process. Preparation of the initial data for modeling (according to the authors - the most difficult part of the work) was carried out using a set of statistical analysis STATISTICA. The data for the simulation was provided by the corporate information system Galaktika, which operates at the enterprise in question.

The history of the development of simulation modeling is more than 40 years. However, only in the last decade, due to the emergence of object-oriented visual aids and high-performance personal computers, IM will cease to be a "terrible dalekim at naroda", will gradually become the norm GPSS World transport, industry, medicine, military and other based on engine computing for developers of different projects.

The results of the application of production planning at the Metallurgical Plant on the basis of imitation models are analyzed in the research work of AG Dyomin "Production planning at the metallurgical enterprise on the basis of imitation modeling."

The most effective and relevant approach today is the creation of decision support systems or a

digital approach based on imitation models.

The customer, a large pipe metallurgical plant located in the south of the Russian Federation, is looking for solutions to a number of production problems:

- A plan designed to meet the barriers of production lines can be partially fulfilled due to the barriers that are constantly emerging spontaneously;
- When transferring the plan to the workshop, the decision is made based on the experience of the artisans in each individual case where the order routes are not drawn up and specified, which poses a risk to the human factor;

R.X. Niyazov, Yu.M. Monaxov, I.S. Bednyatskiy, V.I. Balashov, A.P. Kuznetsova (Vladimir) 's research work "Dorabotkaimitatsionnoymodelialgorithmovprioritizatsiivsetyax TCP / IP" analyzed the results of the application of imitation models in the field of Internet technology.

Currently, the basis of the global Internet is TCP / IP protocols, a set of protocols for data exchange in applications and services, which can be roughly divided into two classes in terms of delay sensitivity: asynchronous and synchronous. Asynchronous applications include programs that are not sensitive to data transfer delays for a few seconds, and all other applications are called synchronous programs, whose performance is greatly affected by delays.

The use of traffic priority algorithms allows the separation of synchronous traffic and the allocation of guaranteed bandwidth to it. Thus, the urgent task is to develop algorithms for determining the priority of traffic, to allow synchronous traffic to provide acceptable delays.

The above-mentioned research shows that little attention is paid to the methodology of teaching the subject of information technology on the basis of computer simulation in higher education institutions in the field of technology. In some special cases, the solution to the problem is indicated.

This article presents the imitation models created on the main topics of teaching the subject of information technology in higher education institutions in the field of technology on the basis of computer simulation models.



Image - 1 Raster image.

The image shows that the basis of raster graphics is pixels, using simulation models. A pixel is the smallest logical two-dimensional element of a digital image in raster graphics, or an element of the display matrix that forms the image. As a disadvantage of raster graphics, the image quality may deteriorate as the image size increases as a result of the image scaling process.



Figure - 2 View of a raster image using an imitation model.

When we increase the image size in raster graphics, its quality may be lost. When we enlarge an image using imitation models, we can clearly see that the image is made up of pixels. The higher the number of pixels in an image, the better the image will look, and demonstrating such processes to students using imitation models will make it easier for them to understand the subject.



Figure – 3 Vector image

In vector graphics, the line is considered as the main element of the image. A straight line or a curved line can be taken as a line. In true graphics, such lines are created using dots (pixels), while in vector graphics, lines that are more general than a point are used to create images, and therefore the images are more clearly visible. The advantage of vector graphics is that the image takes up less space in memory, because in this case the space in memory is independent of the line size.



Figure – 4 View of a vector image using an imitation model

In this image, we can use simulation models to show that the basis of vector graphics is formed by lines. In vector graphics, the quality of an image does not change when we enlarge or decrease the image size.

The scientific article shows the types of computer graphics and their elements using computer simulation models to give students a broader understanding.

In short, there is a lack of research on the introduction of computer simulation models in the educational process, especially in technical higher education institutions. Therefore, this article examines the organization of teaching raster, vector graphics on the basis of simulation models on the topics of computer graphics.

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