World of Science: Journal on Modern Research Methodologies

Volume 2 Issue 10, Year 2023
ISSN: 2835-3072
https://univerpubl.com/index.php/woscience

Description of Virtual Resources Based on Computer Simulation Models Using Frame Technology

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Article Information

Received: Aug 23, 2023
Accepted: Sep 26, 2023
Published: Oct 12, 2023

Keywords
computer simulation models, WEB application, method, system, frame, virtual resources.

ABSTRACT

This research paper describes the structure and formalization of virtual resources based on computer simulation models used by the WEB attached. To formalize the structure and formalization of virtual resources, frame technology is used.

Relevance of research. The development of theory, methodology, and practice for applying information technology (IT) in the educational process in general, and in higher education institutions in particular, is one of the main and pressing problems of implementation in the educational process.

A method is, in the broadest definition, an organized action that leads to a certain aim. Technical teaching aids are well-known to have a significant role in the system of teaching techniques. It is also well recognized that fresh data from contemporary science may be introduced to pupils and that students can receive an ever-increasing amount of instructional content thanks to technology teaching aids. Furthermore, information technology allows for the educational process to be conducted without overload students with additional hours of classes.

An examination of how contemporary information technologies are used in the educational system reveals a trend toward the display of information through figures and images in a wide range of innovations.

Simultaneously, a large number of computer programmers come up with fresh visual-figurative, virtual interpretations of scientific and instructional content, frequently in their own unique way, working independently and in tandem.

Degree of problem development. The use of new computer technologies in relation to the process of teaching mathematics is considered in the works of A.N. Burov, M.N. Maryukov, M.I. Ragulin, O.P. Solobuto, A.V. Yudakov and others. An is a means of developing creative direction. [1-8]

From these works it can be seen that the use of IT in the education system is of a private nature. The authors do not consider the theoretical, scientific, methodological and pedagogical aspects of the problem in a generalized form [1-9].

Reading through republican scientific and methodological works on pedagogy and information technologies reveals that researchers like S.S. Gulyamov, M. Aripov, L.N. Shibarshova, A.A. Abdukadirov, and A.H. Abdullaev investigated the problems of setting up virtual stands for virtual resources and distance learning [1–10].

The issue of developing and using electronic learning aids is covered in the research of L.H. Zainutdinova, G.V. Ivshin, D.F. Lazarev, V.V. Serikov, A.Yu. Uvarov, S.G. Shapovalenko, and others [1–14]. Specifically, the phases involved in developing electronic textbooks and their classifications are covered.

For instance, L.Kh. Zainutdinova's study examined and investigated the many kinds of electronic textbooks as well as the concepts behind their development [1–8].

The connection between conceptual and figurative thinking should be altered, and the status and degree of development of figurative thinking should be greatly elevated through the employment of contemporary information technology in conjunction with figurative information presentation. This tendency may indicate the start of a new phase in the evolution of human civilisation and intellect. The use of metaphors in information presentation will aid in the development of global communication processes by lowering language barriers.

Today's computers are far more capable of doing numerical calculations than humans are. On the other hand, a person may easily and swiftly solve difficult tasks involving the perception of external data, such as identifying oneself in a crowd or comprehending the speech of many individuals; a skilled physician, on the other hand, can identify an illness from a patient's look. Even a contemporary supercomputer finds it extremely challenging to do all of these tasks. Why are there these kinds of big differences? Modeling things that are functions of several factors presents challenges. However, someone is skilled at modeling a field of study where these functions are present.

The capacity to model a subject helps someone make predictions about different kinds of processes, events, and occurrences. The biological neural network, which is used for human modeling, has an architecture that is entirely distinct from that of a computer, which has a substantial impact on the kinds of tasks that each of these models can carry out more effectively. These systems differ in terms of their architecture, problem-solving capabilities, and the standards by which their output is evaluated. One of the primary ways that scientists and researchers are currently able to comprehend the world around them is via the use of computer modeling technologies. The growth of analytical secondary schools that practice creating student-oriented and research-based types of teaching can be greatly impacted by the usage of such technology for educational objectives. The use of computer modeling technology in the educational system has the potential to greatly raise educational standards. Development of various technologies, such as virtual laboratories, will be important in order to use IT to improve education [1–14].

Through the use of a virtual laboratory, users who lack the necessary sophisticated computing equipment may perform experiments and can use the application without having to buy it. This method has a lot of potential applications in teaching as well as pure science.

A virtual laboratory's computer simulations give the user, or student, more flexible, convenient, and visible capabilities than applets or computer models, which simply let you alter certain experimental settings.

Systematizing teaching techniques is crucial in higher education because well-built methodological systems yield high-caliber knowledge. These systems have an educational impact and aid in the growth of ideas and abilities as well as the strength and awareness of information. As a result, the issue of developing a single methodological framework for all stages of the educational process comes up.

In light of the aforementioned, it is prudent to create a methodical virtual resource system based on computer simulation models in order to address these issues.

The purpose of this research is to develop a methodological system of virtual resources based on computer simulation models to improve the efficiency of the educational process in higher education. [8]

We provide a methodical framework of computer simulation modeling in order to improve the effectiveness of ongoing multi-level education. This system's job is to create online resources for continual multilevel education at every level. This means that a single knowledge base of virtual resources based on computer simulation models that offer lectures, practical, and laboratory lessons should be developed, starting with preschool education and concluding with higher education. Every aspect of the educational system is included in this methodological approach's construction of virtual resources, which are based on computer simulation models. Research at every level of the educational system is necessary for the creation of virtual resources within the parameters of this methodological approach. [8]

It should be mentioned that study on every topic taught in a specific higher education institution is necessary for the creation and application of virtual resources in higher education.

A methodical system of virtual resources based on computer simulation models may now be developed and used in the educational process using contemporary information technology instruments.

From elementary school to higher education, every aspect of the educational system is covered by this methodological framework. This methodological system's job is to create and apply virtual resources at all educational levels that are based on computer simulation models [8–12].

This research work describes the structure and formalization of virtual resources based on computer simulation models used by WEB applications

Research objectives:

To develop the theoretical foundations and practical application of virtual resources developed on the basis of computer simulation in higher education institutions and their use for the development and creation of:

1) Forms and methods of teaching;
2) Methods of practical and laboratory classes;

3) Methods for conducting virtual laboratories and independent work of students;
4) Training base for distance learning;

The goal of the project is to determine how to improve the efficacy of theoretical, practical, and laboratory instruction in higher education by using a systematic system of virtual resources that was created using computer simulation models.

The process of creating virtual laboratories at higher education institutions using computer simulation models is the focus of this study [1–9].

Methodology. Virtual resource organization and algorithmization were codified through the use of frame technology.

A data structure called a frame is used to depict prototypical circumstances. There are several kinds of information connected to each frame. Its three parts are as follows: the first describes how a particular frame should be used, the second suggests what its implementation would involve, and the third suggests what to do in the event that these expectations are not met [8].

You may think of a frame as a network made up of nodes and connections. Since these notions are always fair in regard to the intended circumstance, the "upper levels" of the frame are well defined. Numerous unique terminal nodes, or "cells," at lower levels need to be populated with illustrative cases or data [13].

Every terminal can establish requirements that its jobs need to meet. Markers can be used to specify simple requirements, such as requiring that the terminal task be a given subject, an object of a certain size, or a reference to a specific sort of subframe. The links between the ideas included in different terminal vertices are specified by more complicated requirements.

We provide the following notation to represent the architecture of virtual resources represented as frames:

BD - Database

KNWD - Knowledge Base

Web-P -Web applications

SER - Server

PCST - Student Personal Account

PCTCH - Personal account of the teacher

TQ - test questions

LMD - educational material base

KSM - Computer simulation model

CQ - control questions

MOD – problem model

ALG - problem algorithm

SOFTW – software

NUMSUBJ - number of academic subjects

TQ – test questions

CQ – control questions

In our case, the use of frame technology has the following form.

In this case, the KSM for each subject are determined by the following frame:

$$\mathrm{KSM}_{i,j} = (\mathrm{MOD}_{к} + \mathrm{ALG}_{к} + \mathrm{SOFTW}_{к})$$

$MOD_к$-KSM to that subject $ALG_к$-algorithm to-that simulation model, $SOFTW_к$_to-software for that algorithm.

Таким образам для каждого предмета разрабатывается совокупность KSM фреймов и их обозначим $\text{KSM}_{i,j} - \overline{i = 1, n}, \overline{j = 1, k} KSM_{i,j}$- означает,i-KSM j-того предмета/ Далее введем обозначение $NUMSUBJ_l$- количество учебных предметов где, l=$\overline{1, m}$. Тогда справедливо следующая равенство KNWD= $(\text{KSM}_{i,j} + \text{TQ})$, BD= $(\text{NS}_{\text{k}} + \text{CQ})$. Если учесть, что KNWD и BD составляет основу интеллектуальной системы (IS) тогда справедливо равенство в виде IS=$\{KNWD - BD + \text{TQ} + \text{CQ}\}$. Теперь рассмотрим KSM для к- того предмета $\text{KSM}_{\text{к}}$-к того предмета состоит из содержания к- темы к -того предмета, например, имеются $1, k$ предметов темы. Каждая тема может состоит из $\overline{1,3}$- моделей в зависимости их содержания. Эти модели может быть объединены в один модель. Таким образом, мы имеем $\text{MOD}_{e,k,n}$- относящийся к- тому предмету n-ой темы.фрейма $\text{MOD}_{e,k,n}$-состоит из $\overline{1, \text{к}}$-предметов и $\overline{1, \text{к}}$ темы. Для разработки $\text{MOD}_{e,k,n}$ требуется определить от каких параметров зависит $\text{MOD}_{e,k,n}$ для каждой темы. Совокупность параметров обозначим $d_e - \overline{1, e}$гдеd_e-означает количество параметров фрейма KSM для к -ого предмета, таким образом $d_{e,k,l,n}$-означает количество параметров к того модели l-того предмета, к-той темы.

In this way, for each subject, a set of KSM frames is developed and we denote them $\text{KSM}_{i,j} - \overline{i = 1, n}, \overline{j = 1, k} KSM_{i,j}$- means i-KSM j-subject/ Next, we introduce the notation $NUMSUBJ_l$-number of educational subjects where, l=$\overline{1, m}$. Then the following equality is valid: KNWD= $(\text{KSM}_{i,j} + \text{TQ})$, BD= $(\text{NS}_{\text{k}} + \text{CQ})$. If we take into account that KNWD and BD form the basis of the intelligent system (IS), then the equality in the form IS=$\{KNWD - BD + \text{TQ} + \text{CQ}\}$. is valid. Now consider the KSM for the k-subject $\text{KSM}_{\text{к}}$-that subject consists of the content of the k-topic of the k-subject, for example, there are $1, k$ subjects of the topic. Each topic may consist of (1,3)¯-models depending on their content. These models can be combined into one model. Thus, we have $\text{MOD}_{e,k,n}$-related to the subject of the n-th topic. frame $\text{MOD}_{e,k,n}$-consists of $\overline{1, \text{к}}$ −subjects and $\overline{1, \text{к}}$ topics. To develop $\text{MOD}_{e,k,n}$ it is necessary to determine which parameters $\text{MOD}_{e,k,n}$depends on for each topic. We denote the set of parameters as $d_e - \overline{1, e}$whered_e-means the number of parameters of the KSM frame for the k-th object, thus d_(e,k,l,n)-means the number of parameters for that model of the l-th object, which Topics.

We denote virtual resources through the frame $VR_i = \overline{1, n}(i = 1,2, \dots n)$ each subject area of specialty corresponding to the curriculum may consist of a set of D real objects.

Тогда фрейм $VR_i \in D$ где D специальности по учебному плану образования. Тогда имеют место утверждения $VR_i \neq (i = \overline{1, n})$подлежат в области D и они могут быть скорректированы по времени tтаким образом $VR_i \in D(t)$. Теперь определим принадлежность VR_i каждому либо предмету в области D(t).

Then the frame $VR_i \in D$ where D is a specialty according to the education curriculum. Then the statements $VR_i \neq (i = \overline{1, n})$are valid in the domain D and they can be adjusted in time tthus $VR_i \in D(t)$. Now let us determine that VR_ibelongs to each object in the domain D(t).

Поскольку фрейм VR_i принадлежат к определенному предмету $\in NUMSUBJ_l$- и их зависимость определяются следующим образом $VR_i \in D_i(t)$и фрейм $VR_i \in P_j \in D(t)$тогда как фрейм KSM для каждого фреймаVR_i определяются как: KSM $\in VR_i \in P_j \in D(t)$.

Since frame VR_i belong to a specific subject $\in NUMSUBJ_l$- and their dependency is defined as follows $VR_i \in D_i(t)$ and frame $VR_i \in P_j \in D(t)$ whereas frame KSM for each frameVR_i are defined as: KSM $\in VR_i \in P_j \in D(t)$.

Research results. Thus, virtual resources based on KSM utilized in (VebP) Web applications are described using frames of different levels. A frame system, for instance, is made up of collections of frames that are semantically related to one another. Transformations across system frames represent the outcomes of important acts. This enables the modeling of ideas like attention and information value, improves the efficiency of some computations, and demonstrates the usefulness of frames in IS systems.

Note that the schemes proposed in this work, the relationship of KNWD and BD frames with other elements having relationships in the form of "The topic of the subject chosen by the teacher", "Electronic versions of subjects in HTML or DTML formats", "KSM developments on selected topics of the subject" have the following view:

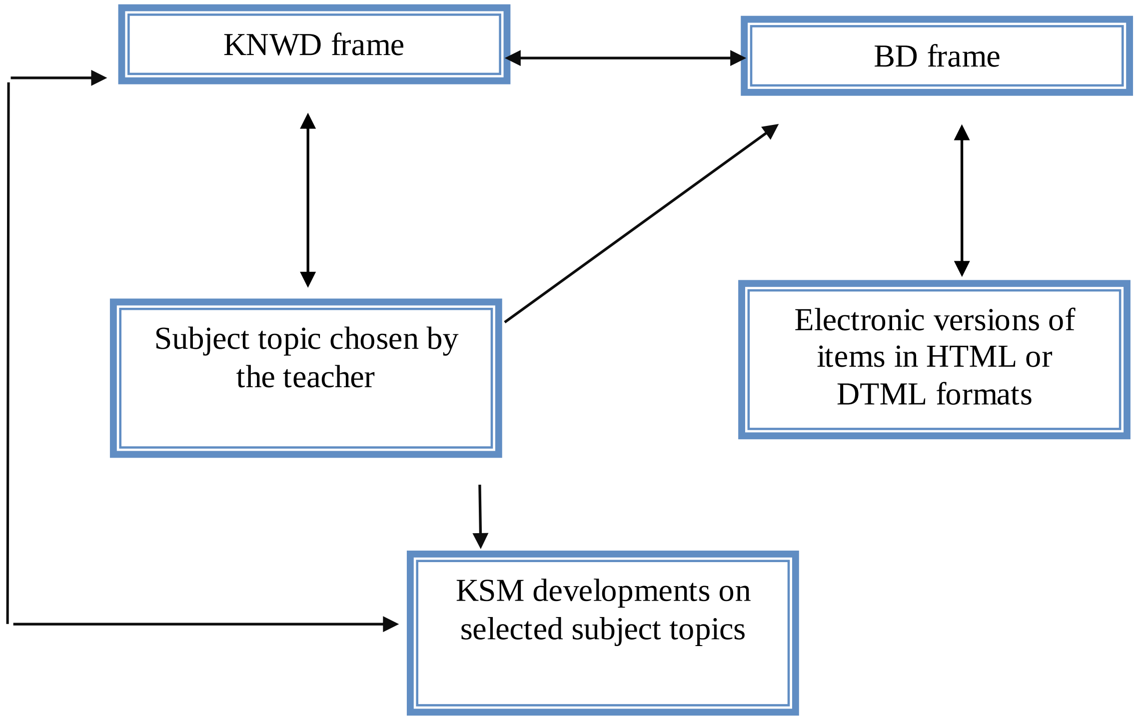

Figure 1. Structure of KNWD and BD frames

The relationship between the TQ and PCTCH frames is arranged in the following way, with other elements having relationships in the form of "Using literature (LBR)", "Electronic library (ELBR)", "PCST", "Result of control and student progress (RCAPS)", "Electronic version of the subject (EVO)", "Scenario for lectures and practical classes with the participation of ICT specialists (SLP)",

These structures make it evident that the substance of virtual resources in the form of connections is appropriately described by frame technology. In these ways, an intelligent virtual resource system built from computer simulation models in Web applications is based on the structure of frames [7].

The structure and contents of intelligent systems are discussed in the following works.

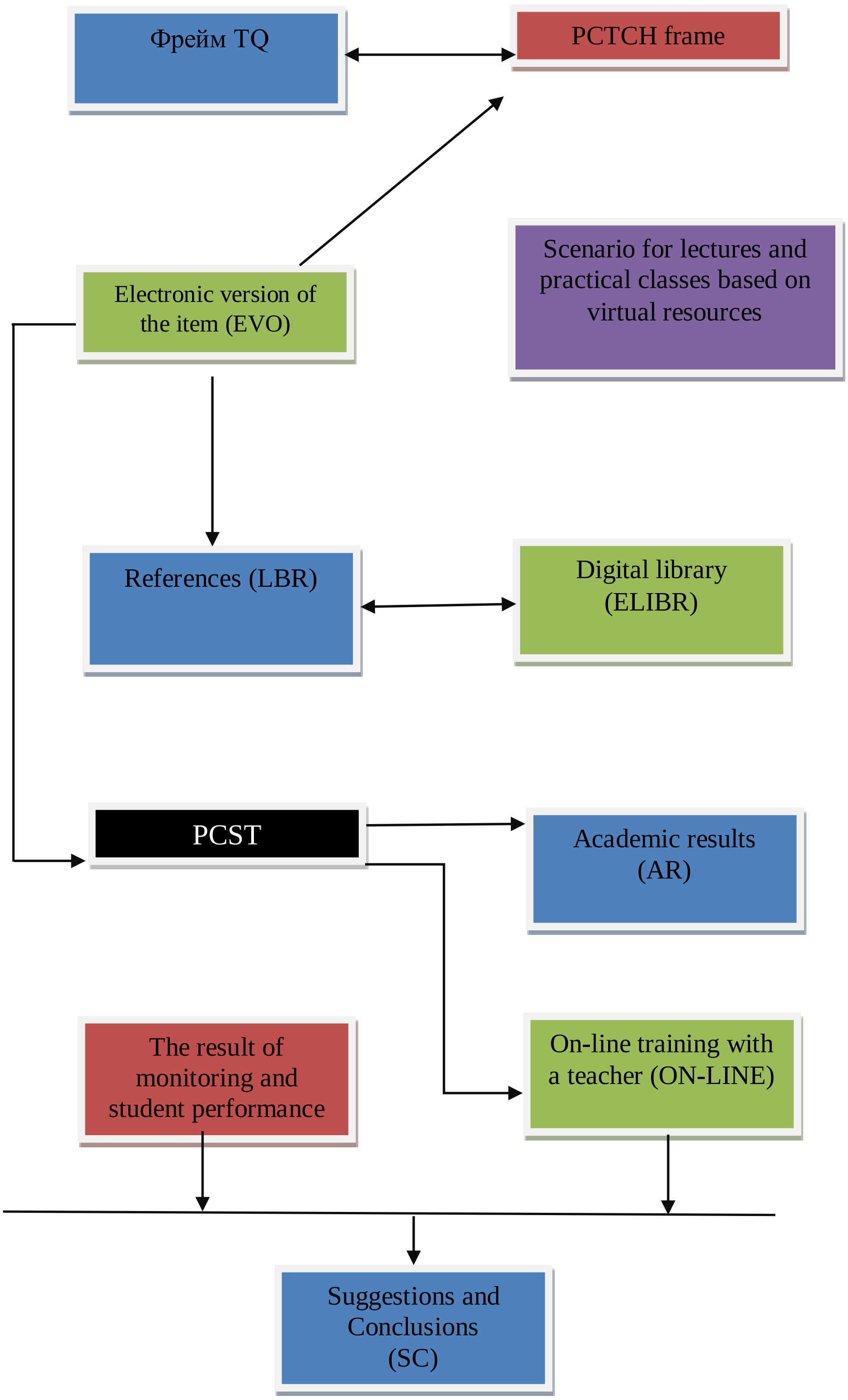

Figure 2. TQ and PCTCH frame structure

In light of this, this paper looks at the framework and structure of virtual resources created using computer simulation models in Web applications. It is also proven that it is feasible to structure the learning process around a methodical virtual resource system built on computer simulation models of commonly used Web applications.

References

1. Гусева Е.Н., Ефимова И.Ю., ВарфоломеевТ.Н. "Методика формирования навыков имитационного моделирования у ИТ-специалистов" Открытое образованиеТ. 23. № 1. 2019. DOI: http://dx.doi.org/10.21686/1818-4243-2019-1-4-13
2. Митрофанов Д.В. "Педагогические возможности информационных технологий в формировании интеллектуальной культуры студентов. Психолого-педагогический журнал. Т. 17, № 1, 2018. doi: 10.20310/1810-231X-2018-17-1-25-36
3. Константинов Е.В., Тимченко В.С. "Применение имитационного
4. моделирования в учебном процессе транспортного ВУЗа. Мир
5. науки Выпуск 3-2015 июль—сентябрь. URL статьи: http://mir-nauki.com/PDF/42PDMN315.pdf
6. Зайнутдинова Л.Х. Создание и применение электронных учебников на примере общетехнических дисциплин. –Астрахан: 1999. – 357 с.
7. Гаряев Н.А., Рыбина А.В. "**Имитационная модель материально-технического обеспечения строительных объектов**". Системные технологии (№26) 2018
8. Смородин В.С., Клименко А.В. "Имитационное моделирование и средства оптимизации сложных технических систем". ISSN 1028-9763. Математически машини и системи, 2014, № 4
9. Лутфиллаев М.Х. Разработки методической системы виртуальных ресурсов на основе компьютерных имитационных моделей Ж, "Казахский журнал новости науки" научно-технический журнал 2015 №1. 9-19 С.
10. Лутфиллаев М.Х. Разработка и внедрение виртуальных лабораторий на основе компьютерных имитационных моделей (на примере предмета "зоология беспозвоночных") Современные тенденции развития науки и технологий Периодический научный сборник по материалам XI Международной научно практической конференции г» Белгород, 2016 №2-1 с. 57-61
11. Лутфиллаев М.Х., Лутфиллаева Ф.М. Разработка виртуальных ресурсов для учебной литературы для инклюзивного образования на основе компьютерных имитационных моделей. Материалы 15-й международной конференции "Образование через всю жизнь: Непрерывное образование в интересах устойчивого развития" Астана,2017, С. 126-130
12. Минский М. «Фреймы для представления знаний» 1974 год, США, книга, 152 стр.
13. Мартин (Martin W.). Memos on the OWL System, Project MAC, MIT, Cambridge, Mass., 1974.