БЪЛГАРСКА АКАДЕМИЯ НА НАУКИТЕ • BULGARIAN ACADEMY OF SCIENCES

ПРОБЛЕМИ НА ТЕХНИЧЕСКАТА КИБЕРНЕТИКА И РОБОТИКАТА, **71**
PROBLEMS OF ENGINEERING CYBERNETICS AND ROBOTICS, **71**

София • 2019 • Sofia

Multimedia in education

Ava Chikurteva

Institute of Information and Communication Technologies, BAS

Email: hawa_@abv.bg

Abstract: *With the advent of multimedia and the use of computers in a person's daily life, a new phase of society's growth begins. In education, multimedia technologies support the learning process by improving the interaction between teachers, students and teaching material. They present innovative approaches for dynamic, long-term and applied learning, even outside the classroom. The article discusses the role of multimedia products in education. The main problems and challenges of multimedia as part of ICT are presented. The role of multimedia as an innovation and educational technology is explored.*

Keywords: *multimedia, ICT, education, e-learning*

1. Introduction

In the modern information society, based on knowledge and intelligence, education plays a fundamental role in the professional training of every individual. The rapid development of information and communication technologies (ICT) has

completely changed the educational context globally and provoked the search for ways to achieve better quality in education.

Modern research has clearly shown that ICT significantly improves academic achievement, and students learn more willingly and quickly acquire learning content [8]. An important issue related to the use of multimedia technology in educational and upbringing is the question of their potential advantages over traditional educational technologies in optimizing learning [7].

A key feature of multimedia is its interactivity, which is essential to the learning process. It is the interactivity that enables the student to move in the information array according to their goals, individual capabilities and needs. Peytcheva points out that "the technology whose construction contains mechanisms and strategies for interaction with the user" is interactive [1]. Usually, the term interactivity is related to interface management - the student performs a certain action and the computer responds to that action by sound, animation, or new text. Interactivity is achieved through the use of hyperlinks in structuring information that transform the presentation of linear learning material, as in books and television programs, into non-linear ones. Multimedia capabilities are greatly enhanced by the use of a network of connections that allow this non-linear structure to be explored.

F. Loncke defines multimedia as a highly productive learning tool, which can confidently assert that enhances learning outcomes [2]. Interactive multimedia allows the learner to control aspects of the environment. It is widely accepted that interactive multimedia technology enables anyone to acquire knowledge in a model that best fits their learning style. F.Loncke identifies the child's interaction with multimedia as a key aspect of her role in education.

According to Peytcheva, "the potential of a technology to be interactive hides its potential for improving the effectiveness of training." A characteristic feature of multimedia is the ability to provide a high level of visualization of educational content. The integration of static illustrations and dynamic video accompanying the text makes it possible to observe and explore changes in different phenomena from different angles. Undoubtedly, this supports learning and makes the learning process more efficient.

One of the major benefits of using multimedia resources in the classroom is the degree of control they offer to trainees. According to C. Jones, despite the disagreement among scholars regarding the definition of interactivity, it is essential that it implies at least the student's control over the rate and consistency of mastering the course material, and ideally over the content [3]. The degree of interactivity of each program, however, depends on the options inherent in the program, the degree of free choice enshrined in the network of connections.

S. McMillan states that "the most important thing in exploring the degree of interactivity is not the technological characteristics, but how consumers perceive or experiment with their experience of these characteristics" [4].

In addition to the benefits of multimedia interactivity in learning, a number of authors also analyse the barriers it places to learning. The main obstacle is that the nonlinearity of information realized through technology can also make it difficult for trainees and in many cases, they may not play the role of active participants. L. Plowman is of the opinion that often children "happily click" and make "arbitrary decisions", in which case interactivity cannot guarantee educational value and effect [5, 6].

2. Multimedia technologies

Information and communication technologies cover all known means and resources of presenting and exchanging information, such as: computer software and hardware; computer networks; satellite systems; radio and television; mobile phones, etc., as well as the types of services and applications related to them - video conferencing, distance learning, etc.

Multimedia Systems and Technologies (MSTs) are intended to provide tools for combining information arrays on a classic database with that of audio and graphic information into a single whole. Adding sound or interactivity to an information product is necessary for it to be classified as multimedia. Multimedia is a kind of information product that combines two or more of the following basic elements: textual information, graphics (still illustrations), interactivity (ability to determine the course of action by the user), sound (speech, music), animation, digital video (moving pictures).

The term computer multimedia (CM) is defined as a collection of software, hardware and information tools that integrate different types of data into one common interactive environment. As an information product, CM contains at least two of the following elements: text information, graphic information, sound, animation, and video.

Information about the outside world is perceived by man with the five senses: sight, hearing, touch, taste and smell. These are reports of heterogeneous nature, spreading on different roads in different environments. The more common channels are when communicating with your computer, the more naturally we will understand it. For this purpose, the computer itself must handle this heterogeneous information. These capabilities of the Computer that are combined in the concept of multimedia (multi - many, media - environment). Of the five information streams mentioned above, three are currently available to computers: vision, hearing and touch.

Through these channels, the computer learns what's going on and remembers what it has learned. Conditionally accepted and stored information is grouped into four categories: text, graphics, sound and video. Multimedia computers can input, process, store and output any kind of media - text, two-dimensional and three-

dimensional graphics (2D, 3D), sound, animation and video. Creating multimedia information using a computer is called a multimedia project (multimedia application).

Depending on the development of multimedia streams over time and the relationship with the user, there are three main groups of applications: linear, interactive and hypermedia.

- For linear projects, multimedia information is provided continuously and consistently over time, without the user being able to interfere in the process.
- When the end user has the ability to control project elements, interact with the application and determine the course of action, then we talk about interactive multimedia.
- By creating a user-managed structure of connected elements, interactive multimedia becomes hypermedia. Hypermedia is a nonlinear organization of the elements of the individual media, providing the same opportunity for the user as in hypertext. The purpose of hypermedia is to immerse the user in a rich and diverse information environment in which text, sound, animation and video are connected in various ways.

3. Multimedia in education and learning

Scientific studies show that when training with sounds alone, the learner absorbs 20% of the information presented. When using audio and visuals in an audio-visual approach, the percentage of acquired knowledge increases to 40%. And if the learner is motivated to perform certain actions, the absorption reaches 80-90%. A multimedia personal computer that offers the ability to work with the listed media is an ideal tool for creating a dialog learning system that motivates the learner to take different actions.

Generally, the term e-learning means computer-aided education via the Internet and / or LAN. More clearly, the application of ICT and multimedia in education is presented with a description of the types and technologies for implementing e-learning. Several types of e-learning are distinguished according to the technology used for conducting electronic training:

Computer-Based Training/Teaching

A structured environment where computer systems are used to achieve the learning objectives. It is usually distributed via CD or DVD-ROM or via a computer network. It is a training course that includes all the training information. It is carried out without the participation of a teacher.

Computer-Assisted Learning/Teaching

Provides aids to support and complement the traditional way of learning. It is often used to guide and assist teachers in presenting teaching materials and conducting exercises, and teachers can provide explanations to students during class or online sessions.

The advantages and disadvantages of both technologies are given in Table 1.

Table 1. Advantages and disadvantages of e-Learning technologies

Technology	Advantages	Disadvantages
Computer-Based Training/Teaching	- time independent; - modularity; - flexible timetable; - low operating costs.	- no need of teacher; - requires PC; - platform dependency; - no direct control of the results.
Computer-Assisted Learning/Teaching	- complements traditional training; - flexible timetable; - modularity; - immediate feedback; - different ways of learning; - higher control of learning; - flexible teaching; - individualization of training; - standardization of the course.	- limited interaction; - platform dependency.

Several types of e-learning are distinguished according to the technology used for conducting electronic training:

Web-Assisted Training/Teaching

This is training in which WWW is used as a virtual environment for the presentation of educational materials. Like computer-aided training, the main purpose here is to support the traditional form.

Web-Based Training

Training via a computer connected to a network (Internet). WWW is used as a virtual environment to provide training materials and / or to deliver the learning process. The process can take place anytime, anywhere in the world where the Internet is available.

M-learning

Mobile learning is a collection of approaches, tools, hands-on, user applications and resources with access to knowledge anytime, anywhere. The basis is mobile technologies (mobile phones, laptops and handhelds, music and video players), which have long been everywhere and are part of people's daily lives.

Table 2. Advantages and disadvantages of training types.

Training type	Advantages	Disadvantages
Web-Assisted Training/Teaching	- time independent; - optionality of the training modules;	- requires PC and Internet; - network costs; - secure network;

	- independence from geographical location; - relevance of courses; - easy to use; - flexible timetable.	- high speed connection; - virus dependency.
Web-Based Training	- free software. - independence from geographical location. - time independence. - relevance of courses. - platform independence. - links to additional resources. - use of existing infrastructure. - centralized verification of results.	- requires PC and Internet; - secure and fast connection; - virus dependency; - sometimes you get a "network loss"; - electronic material is required; - Copyright; - lack of standards; - infrastructure maintenance.
Mobile learning	- free software. - time independence. - easy to use; - relatively inexpensive media of communication. - relevance of courses. - access to knowledge anytime, anywhere.	- requires mobile device; - access to a network; - security; - not always a fast connection.

4. The problems and challenges of multimedia.

The use of multimedia as an educational technology has some problems. For example, a teacher needs to have at least a medium level of computer literacy. On the other hand, the demands of modern multimedia products are high on the resources of computers, which leads to a more expensive configuration.

The problems and challenges of multimedia as a learning tool vary over a wide range - from satiety to lack of multimedia, from indiscriminate use of it to no attempt to integrate multimedia into the educational process. The use of multimedia in education should not replace traditional teaching methods, but should assist and enrich them. Such a balance can only be achieved after training the teaching staff to work with multimedia. Undoubtedly, the diversity and capabilities of multimedia products are enormous, but they become inaccessible if the teacher is unable to work with them. This is also a major cause for scepticism on the part of some traditionalist teachers. Innovative information technologies do not break the link between teacher and student, but enrich and present it in a new light.

The composition of information parts, combined by a certain logic, creates a fundamentally new educational environment. Computer interactive multimedia achieves the important, in our education, active feedback between the user (student,

learner) and the information environment. The user of the eLearning package can adjust and manage the individual components by himself.

The problems related to the multimedia in the education and learning could be classified in three point of view.

Teachers' point of view

- lack of competence of teachers to work with multimedia;
- many teachers are sceptical about e-learning and the use multimedia as a learning tool;
- the need for personalized training for educators to work with multimedia products;
- difficulty or inability to refresh and edit multimedia content.

Students' point of view

- too many sources of multimedia content;
- difficult selection of useful information;
- restrictions on the state of interactivity.

ICT point of view

- large volumes of data;
- content management of materials;
- creating standardized applications and formats.

5. Conclusion

Multimedia is one of the keys to developing and improving education and training around the world. Thanks to ICT and multimedia, the boundaries and limitations of teaching and learning can be overcome or eliminated. The development and implementation of multimedia in schools and universities will contribute to the improvement of educational systems and facilitate the work of teachers and students.

References

[1] Peytcheva-Forsyth, Roumiana, and Blagovesna Yovkova. "How students' experience in e-learning affects their judgements about the quality of an online course." International Journal of Human Capital and Information Technology Professionals (IJHCITP) 6.1 (2015): 14-25.

[2] Loncke, Filip T., et al. "Multimodality: A basis for augmentative and alternative communication–psycholinguistic, cognitive, and clinical/educational aspects." Disability and Rehabilitation 28.3 (2006): 169-174.

[3] Jones, Chris, and Ruslan Ramanau. "Collaboration and the Net generation: The changing characteristics of first year university students." Proceedings of the 9th

international conference on Computer supported collaborative learning-Volume 1. International Society of the Learning Sciences, 2009.

[4] McMillan, Sally J. "Interactivity is in the eye of the beholder: Function, perception, involvement, and attitude toward the web site." Proceedings of the conference-American academy of advertising. Pullman, WA; American Academy of Advertising; 1999, 2000.

[5] Plowman, Lydia, Christine Stephen, and Joanna McPake. Growing up with technology: Young children learning in a digital world. Routledge, 2010.

[6] Plowman, Lydia, and Christine Stephen. "A 'benign addition'? Research on ICT and pre-school children." Journal of computer assisted learning 19.2 (2003): 149-164.

[7] Paunova-Hubenova, Elena, et al. "Trends in the Application of Educational Games in Bulgaria in the Last Five Years." (2018).

[8] de Sousa, Luiza, Richter, Barry, & Nel, Carisma. (2017). The effect of multimedia use on the teaching and learning of Social Sciences at tertiary level: a case study. *Yesterday and Today*, (17), 1-22**.** https://dx.doi.org/10.17159/2223-0386/2017/n17a1

Мультимедиа в образовании

Ава Чикуртева

Institute of Information and Communication Technologies, BAS

Email: hawa_@abv.bg

Аннотация: *С появлением мультимедиа и использованием компьютеров в повседневной жизни человека начинается новый этап развития общества. В образовании мультимедийные технологии поддерживают учебный процесс, улучшая взаимодействие между учителями, учениками и учебными материалами. Они представляют инновационные подходы к динамическому, долгосрочному и прикладному обучению даже за пределами класса. В статье рассматривается роль мультимедийных продуктов в образовании. Представлены основные проблемы и проблемы мультимедиа как части ИКТ. Исследована роль мультимедиа как инновационной и образовательной технологии.*

Ключевые слова: *мультимедиа, ИКТ, образование, электронное обучение*