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Digital Tools and Personalization in the Learning Process

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Abstract: Modern technologies involved in the education process have led to significant changes in the approach to the educational process. The development of information and communication technologies has enabled the emergence of various digital tools that can contribute to easier and more efficient transfer and acquisition of knowledge. The purposeful integration of digital tools into the teaching and learning process is a current issue in the education system. The fact is that students have different levels of prior knowledge and motivation, which gives digital tools the opportunity to contribute to the quality of education when used appropriately. In this paper, we analyze the use of personalized tools in the teaching and learning process.
Keywords: digital tools, personalization, teaching, learning.

Introduction

The development of information and communication technologies over the past decades has led to fundamental changes in the field of education. The most noticeable change is the emergence of electronic learning. E-learning has introduced new forms of interaction between students, teachers and educational content and has significantly changed the traditional way of transmitting and acquiring knowledge [1]. While in the classroom the interaction between students and teachers is direct, humane, in electronic learning there is no such interaction. Therefore, the learning dynamics in e-learning must be carefully designed and modeled to be purposeful. A quality educational process requires active student participation and full involvement in the process of acquiring knowledge [2]. Numerous studies have been conducted focusing on student activities in the e-learning process, which have formulated a theoretical framework for improving student engagement during the learning process [3]. Systematic monitoring of student engagement allows teachers and course designers to adapt instruction to the diverse needs of students [4]. Numerous researchers into the role of student engagement in electronic learning (e-learning) have attempted to develop a conceptual integration of student engagement theory [5]. This is still an under-researched area that requires additional and comprehensive research that would include students' insights into their own motivation and their actual activity in e-learning [6]. Student engagement is a key factor in achieving success in e-learning environments, which imposes the tendency of modern educational technologies to integrate advanced solutions, such as artificial intelligence. The integration of artificial intelligence and learning analytics offers the possibility of improving the efficiency of digital education [7]. Artificial intelligence is increasingly emerging as a key tool in predicting student engagement and designing personalized e-learning environments [8].

Research Methodology

Research on the role of digital tools and personalization in the learning process was conducted through a systematic literature review. The desk research method was used, based on published articles on modern technologies in education, digital tools, and personalized digital learning. The study is based on the Google Scholar web search engine database, which provides a reliable list of published research papers covering a wide range of topics. In addition to the desk research method, analysis and synthesis methods were used during the research.

Smart Technologies in Education

The twenty-first century has brought significant changes to the teaching and learning process. Generally speaking, change is the driver of development and progress. In the context of human population, they are the driving force behind the development of society throughout all time periods [9]. The development of information and communication technologies in recent decades has significantly influenced all spheres of society, including education. In the process of transferring and acquiring knowledge, digital tools, online learning platforms, and specialized applications for individual teaching content are increasingly being used. The goal of their implementation is to improve the quality of teaching, encourage motivation and active participation of students in the learning process, as well as personalize learning [10].

Smart technology encompasses the use of digital devices and software solutions that enable interactive, engaging, and personalized learning. It includes the use of computers, tablets, smart boards, mobile applications,

and virtual labs. Smart technologies enable access to a large number of educational resources that complement traditional teaching, such as interactive simulations, digital textbooks, and quizzes. The goal of smart technology in education is to improve the teaching process, encourage active learning, and enable better understanding of abstract concepts through visualization and experimentation [11].

In addition, modern technologies are changing the role of teachers in the teaching process. The teacher becomes a mentor who directs the student to sources of information and guides him through the process of learning and acquiring knowledge [12].

The use of modern technologies in education allows for the adaptation of teaching content to different learning styles. Students can progress in their learning at their own pace. They can repeat parts of the lesson multiple times until they fully master the material. At the same time, the teacher receives feedback on the progress of each student [13].

Smart technologies contribute to the personalization of teaching, increasing student motivation, developing digital skills, and connecting theoretical knowledge with real contexts. They also allow teachers to adjust the pace and method of work according to the individual needs of students.

By examining the research results of numerous researchers in contemporary teaching, it can be concluded that the successful integration of smart technology into the teaching process requires threefold support: pedagogically thoughtful implementation by teachers, active student participation, institutional and systemic support in the form of resources and equipment, and teacher training. Only in this way can digital tools realize their full potential. But they are not recommended as a replacement for teaching, but rather as a reinforcement and supplement that allows students to master certain teaching content in an easier and more interesting way.

Personalized Digital Learning

In the previous period, in traditional educational systems, teaching was based on a universal principle. The teaching content is presented to all students in the classroom in the same way regardless of differences in their abilities or interests. However, there are evident differences in the way students learn the material most easily. Some people prefer visual content, images, and graphs, while others prefer the spoken word or written text. Some students show more independence and motivation in learning while others need clear guidance to progress. Some show the best results when they are actively involved in the learning process through discussions and practical application of knowledge, while others systematically collect knowledge before applying it [14]. The concept of personalized learning takes into account individual differences among students and adapts teaching courses and educational strategies according to the needs of the students. Personalizing learning allows for: different learning paces (students progress at their own pace without being required to follow the group), customized explanation methods (using visuals, concrete examples), different levels of demands in questions or tasks to determine the material [15]. The implementation of a personalized learning system has a great advantage. Students have the opportunity to use multi-layered adaptive mechanisms by using modules that they can master at their own pace [16].

Personalized digital learning is supported by personalized digital tools, which are a set of software solutions that adapt to the knowledge, interest, and learning pace of each individual student. Personalized digital tools provide access to a large number of interactive materials that allow multiple explanations of the same concept. They also enable monitoring of student progress using statistics and analytics, which gives the teacher clear information about who needs additional help and who is ready to make further progress in learning.

Personalized digital tools have great potential to improve teaching, especially when they are integrated into a broader pedagogical framework and when the teacher actively guides the learning process. Their application can increase motivation, student engagement in the learning process, and help develop skills necessary for the 21st century. However, successful implementation requires thoughtful planning, technical support, and the willingness of teachers to adapt to new educational paradigms [17].

In addition to the benefits it brings, personalized digital teaching also has its drawbacks. It requires additional time for lesson planning and adaptation of teaching materials, as well as the teacher's willingness to explore new methods. Although digital tools significantly facilitate this process, success depends on the teacher's ability to fit them into a pedagogically meaningful context. One of the challenges to personalized digital learning is the lack of adequate equipment and stable internet connections, especially in smaller places, which can significantly limit the application of personalized digital tools. Effective implementation of digital tools requires a teacher who is digitally competent and willing to continuously learn about new tools. An additional problem is created by the multitude of digital tools on the market, some of which are not adapted to the curriculum and are of insufficient quality. There is also a risk that students will develop a passive approach to learning if they rely too much on software instead of their own effort. It is also known that the use of online tools involves the processing and storage of students' personal data, which raises issues of security and privacy protection [18].

The results of research into the effectiveness of digital personalized learning indicate a moderate to favorable effect on achievement, with the effect being greater when the tool is not an end in itself, but rather a support for clearly defined teaching goals and strategies. Significantly greater efficiency was obtained with hybrid teaching models that combined digital learning with traditional teaching [19].

Conclusion

A lot of effort is needed to integrate personalized digital learning. Most of the educational content available is designed to suit all learners, thus simplifying the process of producing digital learning resources. From educational content intended for all students to personalized content, a long and arduous development journey lies ahead. Skepticism towards the unknown, which is present in human nature, further complicates and slows it down. There are numerous objections to personalized e-learning. One of them is the absence of basic pedagogical methods [20]. There are noticeable indications that personalized e-learning is causing over-reliance and dependence on technology, and that there are concerns about preserving interactions between students and teachers.

Personalized learning in the 21st century has its origins in 20th century technologies, when there were also attempts to personalize learning through the use of technology [21]. Time will tell whether new attempts in that direction will have more success.

It takes more time to see the effects achieved by personalizing e-learning. The results of numerous studies indicate the beneficial impact of personalization in the learning process, but there is also debate about the degree of accuracy of this claim. There is a concern about removing the human factor from the process of acquiring and transferring knowledge. However, everything indicates that course designers and teachers are a key element for the successful implementation of personalization. Instead of completely excluding them from the learning process and replacing them with technology, their additional knowledge and engagement are necessary to create effective e-learning environments. Intelligent personalization techniques are not yet developed enough to replace the human factor. Currently, they serve as quality support for course designers and administrators in managing the learning process and maintaining the system.

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