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Future Educator's Digital Learning Assets: Global Challenges of our Time

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Abstract: The rapid development of digital tools for education, their use in the teaching process for different purposes leads to the need for teachers to create pedagogical digital assets. Digital pedagogical assets are forms, means of interaction, the use of digital tools by the teacher for self-educational and educational purposes. This study presents the results of a survey of teachers regarding the characteristics of teaching with digital resources, the problems encountered and the characteristics of the educational digital assets of the teacher of the future. The survey was made with the help of Google forms.

The results of the study show that the most frequently selected by teachers, regardless of the subject matter they presented were the time spent on learning the features of digital applications, creating content to work in them. For the teacher of the future teacher highlighted such qualities - the ability to use digital applications to improve the quality of teaching, the short time of application of digital tools (if possible during training), and a combination of the pedagogical skill of teachers with the effective use of digital tools.

According to the results of the survey, the digital educational assets of the teachers of the future can be identified as mastering a small number of applications, but with maximum compliance with the subject that the teacher teaches (obviously, for teachers of drawing, it is effective to use some applications, while for teachers of mathematics - quite different), creating quality content for teaching students with regard to age-specific perception, compliance with norms of screen time and teaching students information literacy.

Keywords: digitalization, learning, school, teachers.

Introduction

The modern learning environment for students of all ages assumes a high level of development of skills in working with digital applications in teachers and the ability to teach with their help. The use of digital technology is becoming increasingly common in the educational process, and when used rationally can be an effective tool for learning (Aidarbekova et al., 2021). In addition, students are much better able to function effectively in today's society when digital technology is integrated into the learning process (Schnackenberg, 2019). The learning process has become more dynamic, demanding, and despite the introduction of digital tools that should simplify processes, much more complex than before (OECD, 2018). The application of learning materials in a digital environment, the improvement of their skills and knowledge by teachers involves the teacher's operation of educational digital assets. Digital learning assets are the teacher's resources for carrying out pedagogical activities in a digital environment. The authors noted the necessity of providing the digital learning environment with the ability to implement learning productivity and an effective tool for managing the quality of educational programs. The use of digital technology in the educational process is largely dictated by educational institutions. At the same time, the study of Yolcu and Akar-Vural (2021) indicated that teachers with a higher level of teaching autonomy achieve better learning outcomes for their students (Drobotenko et al., 2019). The school climate and the teacher-student relationship pattern also strongly influence students' motivation to learn (Dincer, 2021). The type of high school has been shown to influence motivation to work effectively in the future (Aydin & İşlek, 2021).

Studies on the impact of tools to improve student learning show students' positive attitudes toward various new techniques, digital tools, and the need for thorough preparation for using various digital applications (Setiawan et al., 2019). In particular, experts have researched that videos should be shorter, should contain more animation to improve comprehension (Sahin, 2020).

Consequently, creating an effective learning environment is necessary for students' future success is critical to students' future performance. There is an ongoing debate in research about tablet-based assessment or traditional paper-based assessment, but there is much doubt that these works can be compared to each other (Blumenthal & Blumenthal, 2020). The problem of educating today's children can be effectively addressed with digital resources, developing tools, techniques, and practices that will increase student attention, interest (Akhmetshin et al., 2019). By intelligently combining the use of learning tools with the pedagogical skill of the teacher, it is possible to achieve high success in learning. So, the teacher of the future must perform such tasks to use educational web resources - to search for web resources, create their own resources (assets), evaluate and select the best web resources taking into account the characteristics of different students, develop personal educational web resources, place assets in the local or global network, effectively use web resources in the learning process. It is necessary to constantly follow the latest changes and developments and to develop their knowledge and skills (Şimşek et al., 2021). At the same time, we should not forget the basics of teachers' pedagogical skills, because they are decisive for the success of students' learning. Another important task for teachers is to teach students how to use digital applications effectively and how to observe screen time standards (Bull et al., 2020). According to technological trends, areas such as cloud storage and Big Data, virtual and augmented reality, artificial intelligence and machine learning, cybersecurity and secure social media, the Internet of Things, and crowdsourcing will be crucial in the future (Tsankov & Damyanov, 2019). To ensure the quality of learning, the educational digital environment should be a communication space for all participants in the educational process, a tool for managing the quality of educational programs, teachers' productive work, and students' learning (Bulturbayevich, 2021). It is also important to match the high technical characteristics of computers, smartphones, and other devices to the learning platform (Latipov et al., 2019).

Research Problem

In view of the numerous studies of the effectiveness of various digital tools in the learning process, the rapid development of these tools, the increase in their number, and at the same time heterogeneous use of digital tools in different schools, different teachers, the problem of studying the need to master digital applications by teachers, the need to use various applications in the learning process, the accumulation of a certain digital asset by teachers as a resource for learning. It is necessary to investigate such problems as the relevance and needs of the use of digital tools in the learning process, the choice of effective tools for teachers and students (considering age, the ability to operate digital tools), features of perception of educational material with digital tools, compliance with the norms of screen time, teaching students literacy and digital diet. In accordance with this, it is possible to explore the digital pedagogical assets of future teachers, allowing the use of digital tools with maximum benefit.

Research Focus

The focus of the study is to explore teachers' views on the use of digital applications and the development of their own digital assets for pedagogical activities with students of all ages.

Research Aim and Research Questions

The purpose of the study is to explore teachers' competencies for future teaching activities with the effective use of digital tools.

Objective:

1. Explore the variety of digital tools that are fashionable for teaching general education students;
2. Investigate educators' attitudes toward digital apps, and the use of apps in the learning process;
3. Explore teachers' opinions on the development of their own digital assets for teaching students of all ages.

Research Methodology

This study consists of an examination of the development of their own digital asset for the educators of the future. Theoretical and empirical methods were applied to solve the tasks of the study. In the process of research, a survey of teachers was carried out based on such questions:

General Background

For the study, teachers were invited to answer the questionnaire, which consisted of selecting "Yes" or "No" answers to some questions. Teachers filled out the questionnaire anonymously using Google Forms. The survey was administered during the 2020-2021 school year on teacher forum sites in Poland.

Sample / Participants / Group

The study involved 156 general education teachers aged 26-37 who were invited to participate in the experiment by filling out questionnaires on online teacher forum sites. The composition of the respondents is presented in Table 1:

Table 1

Number of teachers who participated in the study

Groups of teachers according to the age of their students	Teachers of Grades 1 - 4 (n = 52)		Teachers of Grades 5 - 8 (n = 49)		Teachers of Grades 9 – 12 (n = 55)	
	Humanities (n = 32)	Exact Sciences n = 20)	Humanities (n = 26)	Exact Sciences (n = 23)	Humanities (n = 29)	Exact Sciences (n = 26)
Type of subjects taught						

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Instrument and Procedures

For this study, a questionnaire was developed, consisting of two parts, the first studied the frequency of responses to questions about the problems encountered by teachers when using digital tools in the learning process. The questionnaire consisted of closed questions, the answers consisted of a choice of Yes, No. The questions of the questionnaire are presented in the results obtained.

Data Analysis

The data obtained were quantified using Google Tabs.

Research Results

Results of a survey of teachers on the global challenges of our time

The analysis of the survey allows us to understand the challenges of our time to the skills and abilities of teachers of the future. The survey provided answers to open questions, so teachers' answers to the first question about access to communication technologies are as follows:

In terms of digital competencies, an important issue for teachers was the quality use of online platforms for educational purposes. Virtually all of the teachers who participated in the study had problems or difficulties with accessing devices that would provide full app-based learning during the learning process using digital technologies (whether they started actively using technology through the Covid- 19 pandemic or some apps were used in the pandemic to improve the quality of the teaching process). Also relevant is the issue of developing digital competence in teachers and students and their parents while working online, completing teacher tasks, and learning with digital apps. One of the components of a high level of professionalism of the teacher is the organization of training using digital tools, taking into account their own capabilities, the capabilities of students and parents to access and use digital tools. If their own, the student's, or parent's level of competence is insufficient, it is necessary to use such tools that they possess perfectly, or learn and teach other participants in the learning process the digital competence skills necessary for learning. The problem of digital access and proficiency is more about teaching students in grades 1 - 8, at least as evidenced by the interview data, and interviews with high school teachers show that the bigger problem is the digital proficiency of the teachers themselves.

These data are presented in Table 2

Table 2

The results of a survey of teachers on the use of digital applications in the classroom

Teachers of students of certain age groups	Teachers of grades 1 - 4 (n = 52)		Teachers of grades 5 - 8 (n = 49)		Teachers of grades 9 - 12 (n = 55)	
Question	Humanities (n = 32)	Exact Sciences n = 20)	Humanities (n = 26)	Exact Sciences (n = 23)	Humanities (n = 29)	Exact Sciences (n = 26)
Please indicate the problems you encounter in your digital learning experiences						

The problem of accessing applications	6,25%	10,00%	19,23%	13,04%	13,79%	15,38%
The problem of using digital tools	37,50%	25,00%	19,23%	13,04%	51,72%	46,15%
Problem with the quality of digital learning materials	37,50%	70,00%	42,31%	52,17%	44,83%	53,85%
The problem of student comprehension of learning materials from a digital environment	78,13%	60,00%	46,15%	60,87%	75,86%	88,46%
Overloading the number of digital resources needed in the learning process	90,63%	85,00%	96,15%	82,61%	93,10%	92,31%
The time commitment required to prepare for digital learning	96,88%	95,00%	84,62%	82,61%	82,76%	80,77%
Time-consuming organizational costs of online learning	84,38%	85,00%	80,77%	82,61%	82,76%	84,62%
Inability to verify the veracity of a task performed by a student without assistance	78,13%	90,00%	96,15%	78,26%	75,86%	80,77%
How often do you use digital applications in the classroom						
Learning Digital Resources:						
Digital Academic Content Tools	68,75%	85,00%	92,31%	78,26%	58,62%	80,77%
Tools for productivity	68,75%	70,00%	80,77%	91,30%	86,21%	84,62%
Tools for communication	15,63%	20,00%	19,23%	26,09%	13,79%	23,08%
Features to support learning in the digital space						
Visual support features	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
Listening tools	37,50%	60,00%	53,85%	60,87%	48,28%	38,46%
Translation tools	75,00%	60,00%	46,15%	60,87%	51,72%	53,85%

Collaboration support tools	46,88%	75,00%	46,15%	60,87%	48,28%	57,69%
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Created by the authors.

The studied problems encountered by teachers during their experience of use allow us to summarize that the time consumption, the peculiarities of the applications on various digital devices, the overload of the number of digital resources needed for the educational process, the inability to check the veracity of the task completed by the student without outside help was noted almost all teachers. who took part in the survey, despite the age of the students they teach and the subjects they teach. This suggests the need for, first, purposeful training of teachers, improving their skills on a global scale, and secondly - simplification, reduction of a load of digital devices in the learning process if possible.

The second part of the questionnaire was a question about what pedagogical assets a teacher needs for effective teaching in the future. The results are presented in Table 3:

Table 3

Exploring the characteristics of the teacher of the future with the use of digital tools in teaching

Teachers of students of certain age groups	Teachers of grades 1 - 4 (n = 52)		Teachers of grades 5 - 8 (n = 49)		Teachers of grades 9 - 12 (n = 55)	
Question	Humanities (n = 32)	Exact Sciences n = 20)	Humanities (n = 26)	Exact Sciences (n = 23)	Humanities (n = 29)	Exact Sciences n = 26)
What are the criteria for choosing digital apps?						
Relevance of digital tools to learning objectives	87,50%	85,00%	84,62%	73,91%	62,07%	84,62%
Simplicity	87,50%	90,00%	84,62%	78,26%	72,41%	84,62%
Accessibility	75,00%	120,00%	92,31%	95,65%	86,21%	80,77%
Ease of use	87,50%	85,00%	80,77%	91,30%	82,76%	84,62%
Synchronization across devices	90,63%	90,00%	92,31%	95,65%	86,21%	88,46%
Time consumption for learning functions and results of using digital tools in teaching	65,63%	90,00%	88,46%	78,26%	86,21%	80,77%

The efficiency of using a digital tool for learning materials and for testing the level of knowledge on the topic being taught	71,88%	75,00%	53,85%	78,26%	75,86%	96,15%
Mastery of multiple applications, however, with the highest level	93,75%	95,00%	96,15%	95,65%	82,76%	96,15%
Possibility of using the educational material in different forms (video, audio, text versions, flashcards)	87,50%	85,00%	96,15%	91,30%	82,76%	88,46%
Possibility of a high-quality check of the level of knowledge of students	87,50%	85,00%	92,31%	91,30%	86,21%	84,62%
What do you think will contribute to effective student learning?						
Combining the effective use of pedagogical skills with the use of digital tools	87,50%	85,00%	80,77%	91,30%	82,76%	80,77%
Using a large number of digital tools in teaching	3,13%	25,00%	19,23%	13,04%	13,79%	15,38%
Learning to use digital applications as a supplement, an aid to learning	56,25%	85,00%	57,69%	65,22%	75,86%	88,46%
Learning to be information literate	90,63%	90,00%	92,31%	91,30%	82,76%	84,62%
Learning to observe an infodiet (not using digital devices)	96,88%	95,00%	92,31%	91,30%	86,21%	100,00%

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The findings confirm all of the aforementioned factors for the effectiveness of using digital tools to teach students of all ages. Despite what subjects teachers teach, their responses to the questions did not vary much. Important results are the answers of almost all respondents that it is necessary to teach students to observe infodiet (to give up digital devices for a certain time), to master several applications, but with the highest level, to combine the effective use of pedagogical skills with the use of digital tools.

Based on the data obtained in this study, we believe that the digital educational assets of teachers of the future is the mastery of a small number of applications, but with maximum compliance with the

subject that the teacher teaches (obviously, for teachers of drawing, it is effective to use some applications, while for teachers of mathematics - quite different), creating quality content for teaching students with regard to age-specific perception, compliance with the standards of screen time and teaching students informational grammar.

Discussion

The work of the teacher in today's environment requires a certain level of development of skills with digital tools, despite the subjects they present. This study did not examine the use of certain applications, because this is often the choice of the educational institution, but general questions about how the teacher of the future can use digital tools to effectively teach students. To date, everyone involved in the educational process has some experience with using digital tools in part or all of their instruction (during distance learning). However, along with the preferences and help, the use of digital tools also has a number of emerging challenges (Schnackenberg, 2019). The learning process has become more demanding on the one hand (OECD, 2018) and less efficient in some aspects on the other. The use of digital tools in teaching requires a long preparation time on the part of the teacher, which sometimes does not guarantee an effective learning experience for the student. For example, long instructional videos are not effective (Sahin, 2020), and long sitting times with digital devices negatively affect students' health (Bull et al., 2020).

Given the findings of the study, teachers need to master a small number of digital applications but maximize the need to teach instructional material in specific subjects, promote student attention, and interact effectively. Teachers need to plan an individualized approach to student learning, implement innovative methods, and improve their teaching methods (OECD, 2018). It is also necessary to combine the pedagogical skill of the teacher with the use of digital tools and it is possible to highlight the need to introduce such an expression in teaching practice as teacher mastery in the use of digital tools.

Conclusions and Implications

The Covid-19 pandemic has forced teachers, students, and parents to adapt to the distance learning environment at an accelerated pace. Now that the basics of use have already been mastered by most participants in the educational process, it allows us to explore the problems of using digital tools and the vision of digital educational assets of educators of the future. The main results of the survey are the need for teachers to master certain applications that most effectively help them learn exactly the subject they teach, to combine their teaching skills with supplementing rather than replacing digital tools, and to train students in infodietary skills. This will encourage students to think about the information they receive, to absorb it correctly, and not just be overwhelmed with all sorts of information (from what they read on social media or the news to what they were taught in school).

Teachers who participated in the study noted significant problems with the time spent mastering digital apps, students' comprehension of learning material, and the truthfulness of students' responses. Future research should focus on the effectiveness of apps in the learning process for specific subjects, the amount of time children of all ages use digital tools in the classroom, and the amount of digital assets educators have.

The resulting research findings allow school leaders and teachers to plan the use of certain digital tools in the classroom, shorten teachers' time to master the basics of digital tools and improve the

overall effectiveness of instruction. It is possible to develop model digital assets for teachers at the school level, taking into account the age of the children being taught, the capabilities of the school and students in access to digital devices, with the possibility of personal development of the teacher with the mastery and effective use of digital tools.

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