

Kudek Mirošević, Jasna**THE SIGNIFICANCE OF DIGITAL EDUCATIONAL CONTENTS IN WORKING WITH STUDENTS WITH DISABILITIES FROM THE TEACHER'S PERSPECTIVE****Introduction**

Inclusive education within the framework of Universal Design for Learning prepares students for the challenges and opportunities awaiting them in the 21st century. Through a differentiated approach to teaching, the aim is to create an inclusive learning environment where every student can succeed and progress according to their abilities and capacities. For students to be successful and motivated in class, traditional methods of learning and teaching – solely relying on lectures by teachers, textbooks, and other supporting written assignments – are insufficient to adequately motivate and engage students or prepare them for the evolving and future world.¹

The *Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning* identifies eight fundamental competences crucial for lifelong learning: communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science and technology, learning to learn, social and civic competences, cultural awareness and expression, and digital competence. To develop communication, critical thinking, and problemsolving skills, students' digital competences focus on the ability to use information and communication technology (hereafter ICT) safely and critically in their personal and social lives, as well as in communication.²

The European Framework for Digitally Competent Educational Organizations (*DigCompOrg*) identifies the key elements of digitally competent educational institutions and emphasizes the importance of adapting to the specific needs of each educational context.³ According to the *DigCompOrg* framework for digitally mature educational institutions, the adoption and integration of ICT into school systems are considered an educational innovation, entailing changes in three core dimensions: pedagogical, technological, and organizational. This includes the level and quality of ICT application in teaching and learning, the digital maturity of educational staff and students, awareness of the benefits and various levels of ICT use, planning and achieving educational goals, and designing

¹ Timothy W SIMPSON–Christopher B WILLIAMS–Michael HRIPKO: *Preparing industry for additive manufacturing and its applications: Summary & recommendations from a National Science Foundation workshop*. Additive manufacturing, 2017/13. 166–178.

² European Commission. "Directorate-General for Education, Youth, Sport and Culture". *Key competences for lifelong learning*. Publications Office, 2019.

³ Panagiotis KAMPYLIS–Yves PUNIE–Jim DEVINE: *Promoting Effective Digital-Age Learning – A European Framework for Digitally-Competent Educational Organisations*. EUR 27599 EN, Publications Office of the European Union, Luxembourg, 2015.

studentcentred lessons. Digital learning has proven to be a sustainable approach in education, enabling students to learn in an innovative and comprehensive way.^{4,5}

Learning how to use technology in education prepares students for future life and work, where technology will play a significant role. Therefore, e-learning skills are of great importance. There are many definitions of e-learning. E-learning, or electronic learning (hereafter referred to as e-learning), is a type of learning that utilizes any form of computer technology and electronic media to enhance the quality of learning. E-learning is an interactive relationship between teachers and students supported by the use of various technologies, and it can also be a self-directed learning process. E-learning is part of the e-Europe initiative and action plan.⁶ Some key elements for developing basic information and communication skills and competencies include assessing, storing, creating, presenting, and sharing information.⁷

Within the framework of e-learning, digital educational contents refer to materials designed for use in education, teaching, and learning. These contents are developed with modern educational design that focuses on selecting technologies that combine complex media, utilizing the features of multiple technologies to create effective tools.⁸ They are categorized as e-content, as they can take the form of interactive video lessons that cover educational topics using a correlation-integrative approach. Interactivity is the main advantage of e-learning in general, as it enables students to interact with the contents, teachers, and fellow students.⁹ Digital educational contents can be used both online and offline, on mobile and desktop devices. It fosters active learning in an innovative, effective, motivating, and personalized manner, especially for students who find it easier to follow the curriculum in this way. These materials are prepared for teachers to use in the classroom and for students to engage in e-learning innovatively, including self-assessment, independent study, homework, and classroom activities.¹⁰ Digital educational contents come in various forms and features. Tools like simulation software can be adapted to the time a student needs to absorb and understand the material. These tools can slow down the reproduction process and allow active

⁴ José BIDARRA–Ellen RUSMAN: *Towards a pedagogical model for science education: Bridging educational contexts through a blended learning approach*. Open Learning: The Journal of Open, Distance and E-Learning, 2017/1. 6–20.

⁵ Chrysi RAPANTA–Luca BOTTURI–Peter GOODYEAR–Lourdes GUÀRDIA–Marguerite KOOLE: *Balancing technology, pedagogy and the new normal: Post-pandemic challenges for higher education*. Postdigital Science & Education, 2021/3. 715–742.

⁶ Irena VUKSANOVIĆ: *Mogućnosti za e-učenje u hrvatskom obrazovnom sustavu*. Napredak, 2009/3–4. 451–466.

⁷ Recommendation of the European Parliament and of the Council on key competences for lifelong learning. 18 December 2006./962./EC.

⁸ Matt BOWER: *Affordance analysis – Matching learning tasks with learning technologies*. Educational Media International, 2008/1. 3–15.

⁹ Josip MIHALJEVIĆ: *E-učenje i hrvatski jezik*. Hrvatski jezik, 2016/3. 24–27.

¹⁰ Nina BEGIČEVIĆ REĐEPI–Igor BALABAN–Marina KLAČMER ČALOPA–Bojan ŽUGEC: *Okvir za digitalnu zrelost osnovnih i srednjih škola u Republici Hrvatskoj s pripadajućim instrumentom*. Carnet – Hrvatska akademska i istraživačka mreža, Zagreb, 2018.

student participation. Therefore, digital educational contents are highly significant in online learning.¹¹

In the context of using digital educational content and technology, some studies examine the importance of creative thinking in the digital educational environment and its connection to other cognitive skills, such as logical reasoning and analytical abilities.¹² These interrelations complement and enrich the educational process, contributing to the development of complex thinking in students. The use of digital educational contents in teaching students with disabilities have a significant positive impact on the quality of learning and educational inclusion. A specific application of digital educational contents in teaching might involve an activity where students create a webpage to present their work (e.g., term papers, homework, or research projects). Teachers and other students can comment on these works, providing feedback and guidance. This activity can be individual or conducted in groups through collaborative learning.

Digital educational contents allow for material adaptation according to the specific needs of students with disabilities. Teachers can use tools that offer personalized tasks, customized learning paces, and various formats for presenting information, making it easier for students with diverse challenges (e.g., dyslexia, attention disorders, intellectual disabilities, sensory impairments, etc.) to acquire knowledge. Teachers and students can use these contents comprehensively for entire subjects and classes or in smaller standalone units or modules. They also support the planning of differentiated and individualized approaches for students with disabilities. By using digital educational contents, students with disabilities benefit from access to materials outside the classroom. They can work at their own pace and review the material as often as needed, reducing pressure and increasing learning autonomy. The use of digital educational contents provides teachers and students with disabilities a powerful tool for enhancing learning, adapting materials and activities to educational needs, and achieving better learning outcomes, making it an essential resource in inclusive education.

The Purpose of the Research, Aim and Hypothesis

We cannot ignore the fact that children today live in a digital age. Traditional toys, books, and albums have been replaced by tablets, smartphones and computers. While we cannot stop this trend, we can harness it for the benefit of current and future generations. One of the teacher's roles is to guide children toward positive possibilities and concepts of digital citizenship. Digital educational contents can also be created in digital formats, utilizing the educational needs of students to express themselves and learn in the virtual world, thus merging all the positive aspects of digital technology usage.

In the Republic of Croatia, as part of the e-Schools program, *Comprehensive Informatization of School Business and Teaching Processes for the Creation*

¹¹ Shieh MENG-DAR–Hsie HSIN-YIN: *Study of Influence of Different Models of E-Learning Content Product Design on Students' Learning Motivation and Effectiveness*. *Frontiers in Psychology*, 2021/12. 1–4.

¹² Alina MOTUKEEVA–Ainura AZHIBAEVA–Danar KULBACHAEV–Zhyldyz ABDYRAKUNOVA–Maksatbek TOLOEV: *Formation of creative thinking among students in the digital educational environment*. *E-Learning and Digital Media*, 2024.

of *Digitally Mature Schools for the 21st Century*, digital educational contents were developed, representing a significant step forward and innovation at the time of its creation.¹³ These materials are tailored to the Croatian educational system and are based on subject curricula. They emphasize interactivity, multimedia, accessibility, and adaptability for students with special educational needs. The interaction between digital educational contents and students positively influences their motivation to learn.¹⁴ Since students with disabilities have diverse educational needs and learning styles, digital educational contents can include audio materials, video content, interactive simulations, images, and text, enabling multiple modes of presenting information. For example, a student with reading difficulties can use audiobooks, while visual learners benefit from graphical representations. Simple images, animations, text, and language in digital educational content can enhance students' attention and motivation to learn, allowing them to build upon prior knowledge.¹⁵

Modernizing and making teaching content accessible is crucial for assessing the digital maturity of schools, monitoring the potential progress of inclusive education, and ensuring effective use of ICT. Digital educational contents provide teachers and students with disabilities a powerful tool for improving learning and achieving better educational outcomes, making it an essential resource in inclusive education. Computer-supported approaches and content in teaching offer students an adaptable learning platform. For example, students with intellectual disabilities can experience real-life scenarios through interactions in simulated settings. Students with dyslexia and dysgraphia benefit from text tailored for readability, enabling greater societal inclusion.

The use of digital educational contents in teaching involve planning and selecting materials appropriate for the context of the subject and activities, aiming to maximize student engagement and independence. Challenges in using these tools include the need for a reliable internet connection. In such cases, it is often most practical for teachers to create their digital content or adapt pre-existing materials to suit their specific context and teaching activities.

During student evaluation, it is essential to combine simple online tests with more complex forms of assessment while maintaining continuous feedback on student progress. The way students independently use digital content to support their learning enhances the learning process and reflects their level of digital maturity. For instance, just as a portfolio represents a collection of work accumulated over time to showcase progress, development, and achievements, its application in teaching offers teachers a method for ongoing monitoring and evaluation of student outcomes. Portfolios also help students become more aware of their work and progress in a specific area. Creating portfolios and digital contents requires systematic and consistent work from teachers, as it reflects the chronological development and progress of students. Accessibility can be a challenge, as

¹³ Carnet „e-Škole”: *Razvoj sustava digitalno zrelih škola (II. faza)*. 2019.

¹⁴ Özden DEMIRKAN: *Pre-Service Teachers' Views about Digital Teaching Materials*. Educational Policy Analysis and Strategic Research, 2019/1. 40–60.

¹⁵ Shieh MENG-DAR–Hsie HSIN-YIN: *Study of Influence of Different Models of E-Learning Content Product Design on Students' Learning Motivation and Effectiveness*. *Frontiers in Psychology*, 2021/12. 1–4.

some tools include features that are not free, limiting their full use. Additionally, some tools are complex and require additional skills for effective use.¹⁶

In line with these points and the conducted research, this paper focuses on teachers' opinions about e-learning and the use of e-content or digital educational materials. Accordingly, the *goal* of this paper is to examine the extent to which teachers consider digital educational contents significant in the teaching and learning process for students with disabilities.

The *hypothesis* is that there is a statistically significant difference in the opinions of class and subject teachers regarding the importance of applying digital educational contents in the teaching and learning process for students with disabilities, as well as a correlation with years of their work experience.

Methods

The research was conducted in regular primary schools in the Republic of Croatia on a sample of 183 teachers from first to eighth grade (*class teachers*: 59.56% and *subject teachers*: 40.44%). The majority of participants (29%) have up to five years of work experience, while the smallest proportion (7.7%) have between 26 and 30 years of experience. Additionally, 13.7% of participants have 6 to 10 years of experience, 10.9% have 11 to 15 years, 15.8% have 16 to 20 years, 10.9% have 21 to 25 years, and 12% have more than 30 years of work experience.

For the purpose of the research, a questionnaire was developed to gather teachers' opinions on the importance of applying digital educational contents in teaching students with disabilities. The first part of the questionnaire collects demographic data about the participants (gender, position—*class* or *subject teacher*, years of work experience). The second part focuses on statements related to the use of digital educational contents in teaching and its application in working with students with disabilities. For this study, eight variables were selected that reflect teachers' opinions on the importance of using digital educational contents with students with disabilities. For each statement, teachers rated their level of agreement on a Likert scale (1—strongly disagree, 2—disagree, 3—agree, 4—strongly agree). The statements addressed topics such as the use of digital educational contents, its perceived impact on facilitating teacher-student communication, whether its use increases the engagement and motivation of students with disabilities, and whether it encourages students to actively participate in the learning process instead of remaining passive observers. The selected variables also examine monitoring and evaluating improvements in teaching quality. Digital educational contents were also identified as a tool for adapting to different learning styles, which can enhance the achievement of educational goals and outcomes and simplify the handling of large volumes of relevant information.

Before the research was conducted, teachers were informed about the purpose of the study, their guaranteed autonomy, and their right to skip questions or withdraw from completing the questionnaire at any time. They were also asked to

¹⁶ Özden DEMIRKAN: *Pre-Service Teachers' Views about Digital Teaching Materials*. Educational Policy Analysis and Strategic Research, 2019/1. 40–60.

complete the questionnaire in the context of researching inclusive practices. Therefore, all ethical principles of research conduct were upheld.

In addition to descriptive statistics (mean, standard deviation, minimum, maximum) (Table 1), a t-test was used to calculate statistically significant differences in the opinions of *class* and *subject teachers* regarding the importance of using digital educational contents in the teaching and learning process for students with disabilities. Additionally, Spearman's rank correlation coefficient was employed to examine statistically significant correlations between teachers' years of work experience and their opinions on the statements.

Results and Discussion

Variables	Mean	Standard Deviation
The significance of applying digital educational content for students with disabilities lies in:		
Enabling them to progress at the same pace as their peers	2.80	0.869
Improving task performance in class	3.13	0.799
Serving as support during lessons	3.59	0.603
Providing an alternative for interaction between students and teachers	2.92	0.864
Increasing students' motivation to work	3.40	0.770
Achieving greater creativity	2.79	0.814
Offering opportunities to create individualized and customized content	3.19	0.790
Acquiring new competencies, especially in the field of ICT	3.27	0.825
Total – minimum	2.79	
Total – maximum	3.59	

Descriptive values (Table 1)

The results show that the average score on the Likert scale is 3, meaning *agree*. Teachers most frequently selected their agreement with statements on the scale of *agree* and *strongly agree*, indicating an overall positive attitude among participants regarding the importance of using digital educational contents in the teaching and learning process for students with disabilities. The results show the lowest values in the variables related to achieving greater creativity and enabling students to progress at the same rate as their peers. Teachers also consider the importance of digital educational contents most in terms of their use as support during lessons and in increasing student motivation, as indicated by the mean values.

To find statistically significant differences in teachers' views on the importance of applying digital educational contents in the teaching and learning process for students with disabilities, a t-test was used. The results from the t-test show that there are no statistically significant differences in teachers' views on the importance of using digital educational content in this process. Since the results show that class and subject teachers perceive the importance of digital educational contents equally in the teaching and learning process for students with disabilities.

To find the correlation between teachers' views on the importance of applying digital educational contents in the teaching and learning process for students with disabilities and their years of experience, Spearman's rank correlation coefficient revealed a statistically significant correlation ($\rho = -0.267$). Specifically, the results show that teachers with more years of experience consider the

application of digital educational contents less important in the teaching and learning process for students with disabilities than teachers with fewer years of experience. Teachers with less work experience have more positive views on the importance of digital educational contents in the teaching and learning process for students with disabilities. According to the overall results, it can be concluded that the hypothesis, suggesting a statistically significant difference in the views of class and subject teachers on the importance of applying digital educational contents in the teaching and learning process for students with disabilities, as well as its correlation with years of experience, is partially supported. It can be concluded that younger teachers, with fewer years of experience, perceive digital educational contents as more important in enabling students with disabilities to participate equally in the educational process with other students.

Since digital educational contents and tools allow teachers to monitor student progress, for example through quizzes, tasks of varying difficulty, and data analysis, they provide more detailed insights into the educational needs of students with disabilities. This allows teachers to adapt their teaching methods and support. This is particularly important for students with disabilities as it helps them develop self-confidence and a sense of accomplishment. In virtual environments, it is easier to organize collaborative activities, and students with disabilities can participate without fear of stigmatization or isolation. Furthermore, many digital educational contents and tools offer features that facilitate access for students with disabilities, such as font enlargement, colour adjustments, text-to-speech functions, subtitles, or customized interfaces for students with motor disabilities, enabling a higher quality of the inclusive learning and teaching process.

Conclusion

Since one of the most important features of digital educational contents is placing the student at the centre of the learning process, which represents a step towards lifelong learning, the goal of this paper was to examine to what extent teachers consider digital educational contents significant in the teaching and learning process for students with disabilities. The results showed that class and subject teachers equally perceive the importance of applying digital educational contents in the teaching and learning process for students with disabilities. Additionally, teachers with more years of work experience consider the application of digital educational content less important in the teaching and learning process for students with disabilities than teachers with fewer years of experience.

Due to the rapid development and increasing importance of information and communication technologies in education, the advantages of analysing the results of this study are evident through the potential, which is one of the main catalysts for quality education in line with the vision and strategic guidelines for the development of the school system. These results must also be considered with caution, as, alongside part of the analysis of the research, which this paper addresses, there is also a small sample size. The paper emphasizes the need for systematic and regular planning, preparation, and use of the latest technology in learning and teaching, adequate infrastructure and computer equipment in all schools in Croatia, as well as the need for the development of digital educational contents and e-learning, alongside professional development programs for teachers' digital competencies.

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Absztrakt

A DIGITÁLIS OKTATÁSI TARTALOM JELENTŐSÉGE A FOGYATÉKKAL ÉLŐ TANULÓKKAL VALÓ MUNKÁBAN A TANÁROK SZEMSZÖGÉBŐL

A digitális oktatási tartalom célja, hogy támogassa a tanárokat az oktatásban, és elősegítse a tanulók aktív tanulását innovatív, hatékony, motiváló és személyre szabott módon. Mivel a digitális médián keresztüli tanulás lehetővé teszi a fogyatékkal élő tanulók számára, hogy fejlesszék a modern világban nélkülözhetetlen készségeiket és kompetenciáikat, miközben az adaptált és egyénre szabott tanítási megközelítések révén követik a tantervi tantárgyakat, a kutatás célja annak vizsgálata, hogy a tanárok milyen mértékben tartják jelentősnek a digitális oktatási tartalmat a fogyatékkal élő tanulók oktatási és tanulási folyamatában. Az eredmények azt mutatják, hogy a tanárok pozitív véleménnyel vannak a digitális oktatási tartalomnak a fogyatékkal élő tanulókkal való munkában történő alkalmazásáról. A fiatalabb tanárok nagyobb hangsúlyt helyeznek a digitális oktatásra, mint azok, akik hosszabb tanári tapasztalattal rendelkeznek. Az eredmények rámutatnak a tanárok által a digitális oktatási tartalomnak tulajdonított jelentőségre, amely lehetővé teszi a fogyatékkal élő tanulók számára, hogy egyenlőbb módon vegyenek részt az oktatási folyamatban társaikkal, valamint arra, hogy ez milyen szerepet játszik a modern világban nélkülözhetetlen készségek és kompetenciák fejlesztésében.

Kulcsszavak: digitális oktatási tartalom, egyénre szabott tanítási megközelítés, fogyatékkal élő tanulók, tanárok.