

Impact of digitalization for students with disabilities: A comprehensive structured review

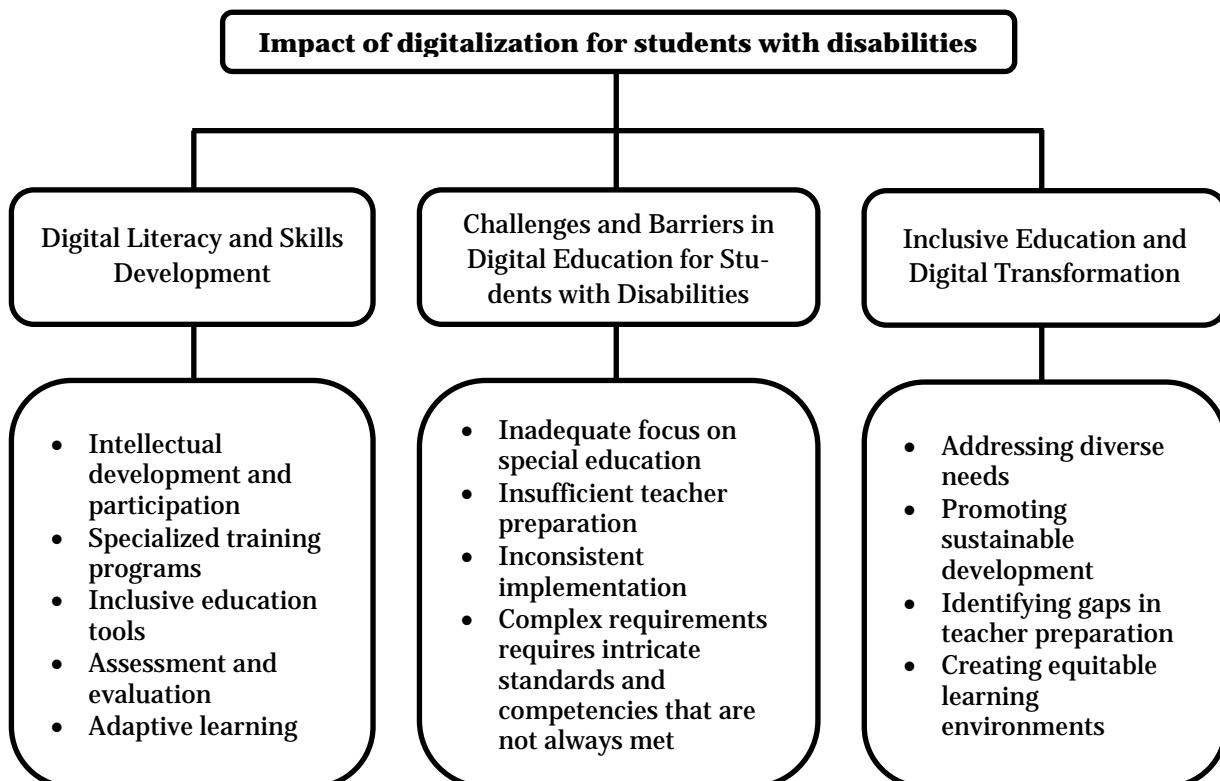
Nur Maslina Mastam and Rozniza Zaharudin*

Universiti Sains Malaysia, Malaysia

Abstract: This structured review explores the interaction of digital education and students with disabilities through an extensive search of Scopus and WoS databases, generating 23 related papers. The following three central ideas are the focus of the synthesis: (i) Digital Literacy and Skills Development, elucidating the strategies and tools employed to enhance digital competency among students with disabilities; (ii) Challenges and Barriers in Digital Education, delineating the multifaceted obstacles encountered in the digital learning environment, spanning technological, pedagogical, and socio-cultural dimensions; and (iii) Inclusive Education and Digital Transformation, exploring the transformative potential of digital technologies in fostering inclusive educational practices. This review highlights the potential and challenges inherent in digital education programs within this environment. It does so by conducting careful analysis, highlighting the need to address digital inclusivity to develop fair educational opportunities for students with disabilities.

Keywords: digitalization, digital literacy, special education, students with disabilities

Correspondence: roz@usm.my



1 Introduction

In recent decades, digital technologies have permeated every aspect of modern society, revolutionizing how we communicate, learn, work, and interact (Plowman, 2016; Rohner et al., 2021). Amidst this digital revolution, special education has seen a profound transformation (Arısoy, 2022; Ronzhina et al., 2021). Incorporating digital tools and technologies into special education programs has brought about a new era of possibilities, offering innovative solutions to longstanding challenges and fundamentally reshaping the educational landscape for students with diverse learning needs (Almekhalfi & Tibi, 2012; Carmo Rodrigues Almeida et al., 2021; Young, Gabrielle; MacCormack, 2020). As educators, policymakers, and researchers navigate this rapidly evolving terrain, there is an increasing recognition of the need for a comprehensive understanding of the multifaceted implications of digitalization on special education. This recognition stems not only from the potential benefits that digital technologies promise to bring but also from the complexities and nuances inherent in their implementation and utilization within the special education context (Gay, 2023; Project, 2023).

Against this backdrop, this article embarks on a rigorous examination of the effect of digitalization on students with disabilities through the existing literature's structured review. By adopting a comprehensive approach, we aim to provide insights that transcend individual studies and offer a holistic understanding of the opportunities, challenges, and implications associated with the digital transformation of students with disabilities. Central to our review is the exploration of how digital technologies are being harnessed to enhance learning experiences, foster inclusivity, and empower students with disabilities to achieve their full potential. We delve into the diverse array of digital tools and interventions that have emerged, ranging from assistive technologies and educational software to virtual reality and teletherapy platforms, each with its unique affordances and applications in special education settings.

Moreover, we scrutinize the broader societal, institutional, and pedagogical implications of digitalization on students with disabilities, considering factors such as equity, access, privacy, and ethical considerations. By critically examining both the opportunities and challenges that digitalization presents, we seek to inform educators, policymakers, and stakeholders about the complexities and strategies needed to navigate this rapidly evolving landscape effectively. In synthesizing and analyzing the existing body of literature, this structured review not only aims to contribute to scholarly discourse but also seeks to inform evidence-based practices and policy decisions that can shape the future of students with disabilities in the digital age. Through our comprehensive exploration, we endeavor to shed light on the transformative potential of digitalization while advocating for an inclusive and equitable approach that ensures all students, regardless of ability, can benefit from the opportunities afforded by digital technologies.

2 Literature review

Digitalization in education refers to the integration of digital technology to enhance teaching, learning, and research in educational institutions. It has significantly transformed the education landscape by improving access to information, personalizing learning experiences, and promoting effective communication among stakeholders (Arinushkina et al., 2023; Arisoy, 2022). In special education, digitalization has a substantial effect on the ways in which interactions occur, particularly for students with special educational needs (Bagga & Agrati, 2023). It provides opportunities for personalized learning, improved accessibility, and enhanced communication with teachers and parents (Arinushkina et al., 2023). Digital tools and resources can help students achieve more in school overall, especially in math and science, and help some students—including those with disabilities to overcome their obstacles (Bai, 2022; Cumming & Strnadova, 2020; Pandy, 2023).

A literature review pertaining to the digital technology significantly aids in reducing deficits in social and communication skills for students with disabilities by providing innovative tools and platforms that enhance interaction, engagement, and learning (Arisoy, 2022; Lazou & Tsinakos, 2023). Digital technologies can also enhance parental engagement and improve the efficiency of the education system by increasing teachers' efficiency in preparing for teaching and enabling better communication with parents (Brazal et al., 2022; Mosher, 2022). Digital technologies such as virtual reality (VR) and augmented reality (AR) create immersive environments where students can practice social interactions in a controlled setting. For instance, VR can simulate real-world scenarios—like navigating a crowded hallway or participating in group discussions—allowing students with autism spectrum disorder (ASD) to develop coping strategies and social skills without the stress of real-life situations (Bai, 2022; Subramaniam et al., 2022).

However, digitalization also presents challenges, such as shallow learning in addition to impaired reasoning abilities as a result of excessive reliance on visualized information (Starks & Reich, 2023). Moreover, the implementation of digital technology in education requires training and support for teachers to use digital tools and resources effectively to achieve positive results for learners with additional support needs or who are disadvantaged in other ways (Al-Huthali & Talafha, 2022; Evmenova et al., 2020; Gay, 2023). Therefore, digitalization can create barriers for students with disabilities, particularly when digital tools are not designed with accessibility in mind, limiting their ability to fully engage with learning materials (Budnyk et al., 2022; Cain & Fanshawe, 2021). Additionally, students with disabilities may struggle with the cognitive demands of navigating complex digital interfaces, further widening the gap in educational outcomes.

3 Methodology

3.1 Identification

To select a substantial quantity of pertinent papers pertaining to this inquiry, three key stages of the systematic review technique were used. Keywords were chosen in the initial stage, and related terms were sought using dictionaries, thesaurus, encyclopedias, as well as previous research. Following the creation of search strings for the databases Scopus as well as Web of Science, all pertinent terms were selected (please refer to Table 1). Pertaining to the present study project, 379 publications were successfully gathered from both databases in the first phase with respect to the systematic review approach.

Table 1. The search string

Scopus	TITLE-ABS-KEY (("digital skill*" OR "digital literacy" OR "digital competence*" OR "digital proficiency" OR "digital education" OR "digitalization" OR "digital transformation") AND ("special need students" OR "student with disabilities" OR "special education" OR "special need teachers" OR "inclusive practice" OR "inclusive education" OR "inclusive classroom" OR "inclusive student*")) AND (LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2024)) AND (LIMIT-TO (DOC-TYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (PUBSTAGE, "final"))
WoS	(("digital skill*" OR "digital literacy" OR "digital competence*" OR "digital proficiency" OR "digital education" OR "digitalization" OR "digital transformation") AND ("special need students" OR "student with disabilities" OR "special education" OR "special need teachers" OR "inclusive practice" OR "inclusive education" OR "inclusive classroom" OR "inclusive student*")) (Topic) and Preprint Citation Index (Exclude – Database) and 2024 or 2023 or 2022 or 2021 (Publication Years) and Article (Document Types) and English (Languages)

3.2 Screening

During the screening step, the collection of potentially pertinent research items is reviewed for content that aligns with the predetermined research question or questions. The screening phase often employs content-related criteria, such as the categorization of research items according to digital literacy levels, in order to improve work readiness. Each duplicate paper were excluded from the list of papers searched in this step. Note that 260 publications were eliminated in the first screening stage, and 119 papers were reviewed in the second stage of the screening process using various inclusion and exclusion criteria from this study (refer to Table 2). Since research papers are the main source of pertinent recommendations, this criterion was applied before any other. In addition, meta-synthesis, books, book series, reviews, meta-analyses, as well as chapters omitted from the most recent research are included. Moreover, only publications written in English were included in the review. It is crucial to note that the strategy was limited to April 2024 through the year 2021. Due to duplication criteria, a total of 28 publications were disapproved of.

Table 2. The selection criterion is searching

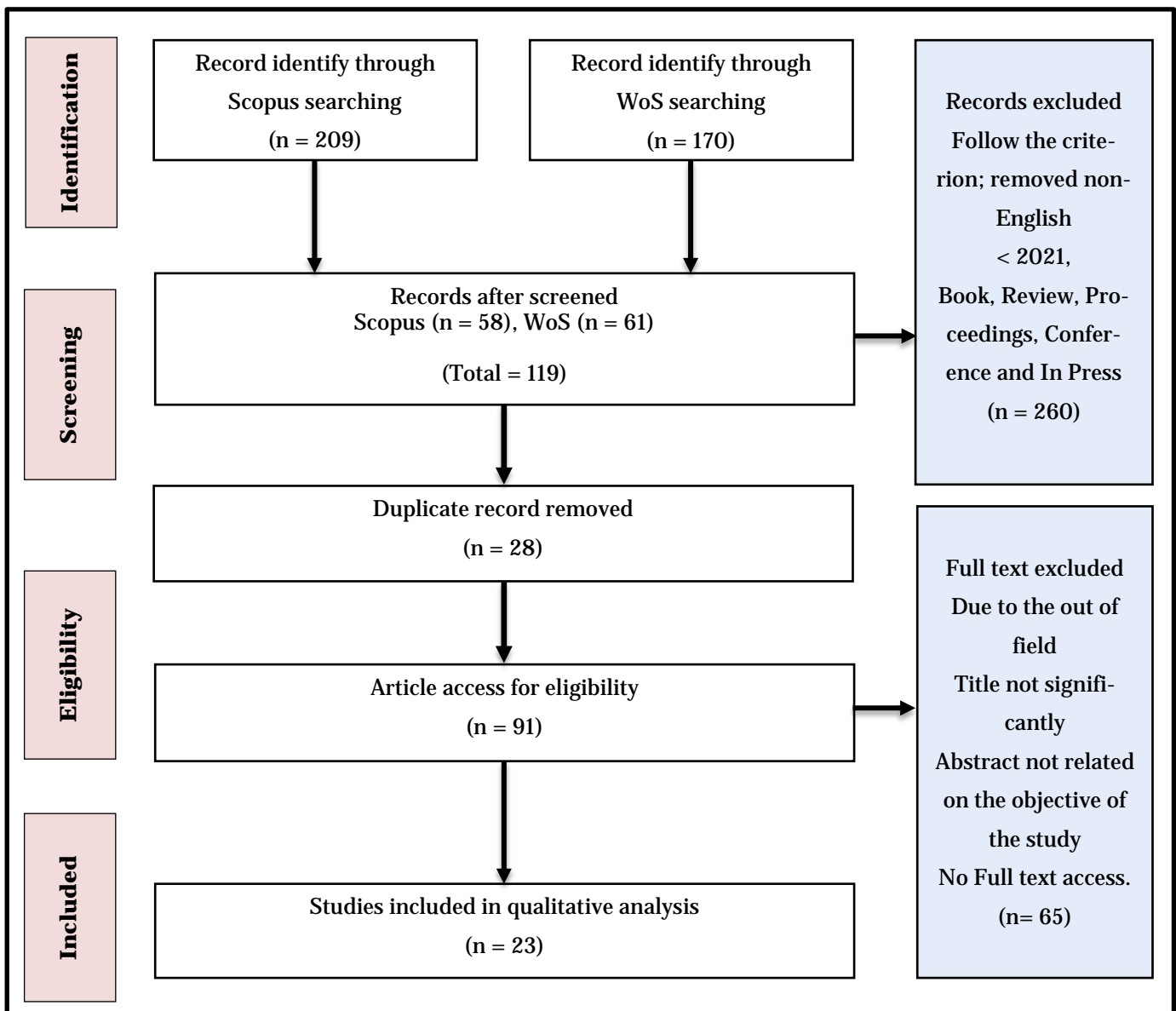
Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	April 2024 - 2021	< 2021
Literature type	Journal (Article)	Book, Review, Conference, Proceeding
Publication Stage	Final	In Press

3.3 Eligibility

Pertaining to the third phase, which is recognized as the eligibility evaluation, 91 papers were generated. During this step, each of the articles' titles and main bodies underwent a thorough examination to ensure that they fulfill the inclusion criteria and were pertinent to the current research objectives. Consequently, 61 papers, articles, and conferences were rejected because they were out of the field, the title was not noteworthy, the abstract was unrelated to the study's purpose, and there was no full-text access based on empirical data. As a result, there are now 30 articles left for the future review.

3.4 Data abstraction and analysis

An integrative analysis utilizing distinguished research designs as well as an emphasis on quantitative methods were employed as major assessment strategies in the present research. The primary objective was to comprehensively examine and synthesize relevant topics and subtopics. Initiating the thematic development and the data collection stages was crucial. Figure 1 illustrates the meticulous analysis of 30 publications, where the authors scrutinized assertions and material pertaining to the research's topics. Following that, the authors assessed significant studies about how digitalization affects special education. The methodology and research findings across all studies are under investigation. Collaborating with co-authors, the authors derived themes as per the evidence within the study's context. Here, a log was established during the data analysis process to document analyses, suggestions, queries, as well as other ideas that were relevant for interpreting the data. The outcomes were compared to find any discrepancies in the theme design procedure. When there are conceptual differences, the authors engage in discussions to reconcile differences. To validate the validity of the problems, two experts, one specializing in special education and the other in computing industries, conducted the analysis selection. The expert review phase aimed to guarantee each subtheme's clarity, significance, as well as appropriateness, establishing domain relevance.

Figure 1. Flow diagram of the proposed searching study (Moher D, Liberati A, Tetzlaff J, 2009)

4 Results and discussion

The research demonstrates that 23 articles were retrieved and subject to analysis through thorough advanced search procedures with the evaluation of digital education for students with disabilities. Three themes have been identified: 1) Digital Literacy and Skills Development, 2) Challenges and Barriers in Digital Education for Students with Disabilities, and 3) Inclusive Education and Digital Transformation.

4.1 Digital literacy and skills development

Our systematic review identified eight studies, as reported in Table 3, on Digital Literacy and Skills Development for Students with Disabilities. It is essential to foster digital literacy in students with disabilities, especially those with hearing impairments, to

enhance their intellectual development and participation in various activities (Yerimbetova et al., 2022). A study in Kazakhstan sought to improve the digital literacy of students with hearing impairments by providing a specialized computer science training course. The course emphasized computer graphics, mobile application development, and research to enhance the students' engineering and technical abilities and promote creativity (Ibraimkulov et al., 2022). Research from Portugal emphasized the benefits of digital technologies for children with particular needs in education but noted deficiencies in teacher preparation and attitudes towards inclusion (Martins et al., 2023). A different research project investigated the application of digital technology to assist in the education of students with impairments, emphasizing the significance of pedagogically well-rounded methods to effectively involve these students in the learning experience (Aleksandrova et al., 2021). A concept named "braille corner" was created to enhance digital literacy for visually impaired pupils, with the goal of fostering inclusivity in education using innovative digital tools (Suherman et al., 2022). Subsequent investigation revealed efficient digital instruments for evaluating the academic accomplishments of children with impairments, demonstrating the capacity of digital technologies to improve educational methods and learning encounters in inclusive settings (Shumilova et al., 2022). Post-secondary education programs emphasize the need to incorporate digital literacy skills and assistive technologies into transition plans for students with intellectual disabilities to prepare them for college and adulthood (Baxter & Reeves, 2023). Research on Eye-Gaze Tracking Technology (EGTT) for students with Profound and Multiple Learning Difficulties (PMLD) showed that it could be useful for communication, assessment, and guiding decisions on educational technology investments (Gill & Younie, 2021). The research highlights the significance of encouraging digital literacy as well as skills development among students with disabilities to enhance their academic and social results through inclusive education.

Table 3. Digital Literacy and Skills Development

Authors	Journal	Objectives	Methodologies	Findings
Yerimbetova A.; Ibraimkulov A.; Khalikova K.; Skabayeva G. (2022)	World Transactions on Engineering and Technology Education	Develop and enhance digital literacy among students with hearing impairments through a modified computer science course in special needs schools in Kazakhstan.	Creation of a modified training course focusing on computer graphics, 3D software, mobile application development, and research activities.	The modified course improved engineering, technical skills, and creative abilities among students with hearing impairments, contributing to their overall engagement in activities.
Ibraimkulov A.; Khalikova K.; Yerimbetova A.; Gromaszek K. (2022)	European Journal of Contemporary Education	Develop a model of digital literacy components for students with hearing impairments and assess their level of digital literacy.	Proposed a two-component model: (1) digital user component focusing on basic engineering training and (2) digital correction-intellectual component aimed at improving cognitive, logical,	Identified a need to address digital literacy challenges faced by special schools, highlighting the importance of both engineering training and cognitive skill development among students

			critical, creative, and communication skills.	with hearing impairments.
Martins R.; Mendes H.; Carvalho A.I.; Paulo E.; Costa E.; Pascoinho J.; Rodrigues A.I. (2023)	Journal of Information Systems Engineering and Management	Investigate the importance attributed by teachers regarding the use and training in digital technologies for students with specific needs.	A quantitative study involving 108 special education teachers in Portugal utilizing exploratory factor analysis.	Teachers noticed that employing digital technologies to teach students with particular needs could be beneficial, but gaps in training were evident, indicating a need for further professional development.
Aleksandrova I.B.; Vorobyova K.I.; Gileva N.V.; Livson M.; Cheprasova T.V.; Bazhin G.M. (2021)	International Journal of Early Childhood Special Education	Determine the possibilities of utilizing digital technologies to support the education pertaining to students who have disabilities as well as explore the effectiveness of these technologies.	Combined theoretical, empirical, and numerical methods, including online surveys of IT specialists, teachers, as well as network administrators from six Russian universities.	It has been discovered that students with disabilities can develop unique learning strategies as well as participate fully in the educational process when digital technologies are employed in a pedagogically balanced manner.
Suherman Y.; Juhanaini J.; Maryanti R.; Rochyadi E. (2022)	Journal of Engineering Science and Technology	Provide a "braille corner," a digital literacy-based learning innovation model, for students who are visually impaired in an inclusive educational setting.	Utilized a design-based research approach and conducted empirical validation through Focus Group Discussions with practitioners.	The "braille corner" model addressed the significance of providing support systems for visually impaired students, as well as advocating for equality as well as accessibility pertaining to education.
Shumilova E.A.; Kuzma L.P.; Makuha L.S. (2022)	Perspektivy Nauki i Obrazovania	Analyze existing practices of assessing the educational achievements of children with disabilities and identify effective digital tools for inclusive education.	Employed methods such as analysis of scientific literature and interpretation of works by Russian and foreign scientists and practitioners.	Identified effective digital tools for assessing educational achievements, highlighting the possibility of digital technologies to improve educational pedagogical methods as well as learning experiences in an inclusive educational space.
Baxter, Abigail; Reeves, Linda M. (2023)	Journal of Special Education Technology	Highlight the importance of including digital literacy skills and assistive technology in the plans for transitioning students who have intellectual disabilities into post-secondary education.	Described the importance of involving technology approaches, assistive technology, as well as digital literacy skills in Individualized Education Program (IEP) transition plans.	Emphasized the significance of preparing high school students with intellectual disabilities for post-secondary education by including digital literacy skills and assistive technology in their transition plans, thus better equipping them for college and adulthood.
Gill R.; Younie S. (2021)	Pixel-Bit, Revista de Medios y Educacion	Investigate the use of Eye-Gaze Tracking Technology (EGTT) as an assessment tool for learners with Profound and Multiple Learning	Utilized qualitative methodology, including analysis of learners' heat maps, parent questionnaires, and video observations.	EGTT provided valuable insights for teacher assessment of PMLD students' abilities, offering a more accurate method and increasing teachers'

		Difficulties (PMLD) and its impact on teacher assessment.		confidence by providing robust evidence. The technology also facilitated decision-making regarding investment in educational tools for special needs schools.
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4.2 Challenges and barriers in digital education for students with disabilities

This present systematic review identified six studies, outlined in Table 4, on Challenges and Barriers in Digital Education for Students with Disabilities. Recent research provides evidence that digital education encounters a multitude of challenges and barriers when it comes to students with disabilities. Concerns encompass inadequate attention given to special education in more extensive initiatives to integrate technology (Montenegro-Rueda & Fernández-Cerero, 2023; Starks & Reich, 2023), further widening opportunity gaps for students with disabilities as a result of technology implementation in educational institutions (Starks & Reich, 2023), psychological and academic challenges encountered by students with special needs while participating in online instruction (Bachtsis et al., 2024), insufficient preparation and proficiency of special education instructors in digital tools (Gallardo Montes et al., 2023; Montenegro-Rueda & Fernández-Cerero, 2023), and disruptions precipitated by the COVID-19 pandemic that brought attention to these disparities (Möhlen & Prummer, 2023). Furthermore, although there are favorable perceptions of digital tools, their implementation varies among special education practitioners, underscoring the intricate standards and proficiencies necessary to employ digital technologies efficiently in special education environments (Holmgren, 2023). The aforementioned results emphasize the critical nature of providing special education instructors with enhanced training and support, enhancing digital infrastructure, and developing individualized approaches to guarantee equal access to and efficient use of digital resources for students who have disabilities in academic environments.

Table 4. Challenges and Barriers in Digital Education for Students with Disabilities

Authors	Journal	Objectives	Methodologies	Findings
Starks A.C.; Reich S.M. (2023)	Computers and Education	Describe enablers and barriers for SPED teacher use of technology in K-12 before and during remote learning, understand factors influencing SPED teachers' opportunities for teaching with technology, and emphasize novel challenges in technology-enabled learning for SPED populations	In-depth interviews (N = 20) with special educators during remote learning	Structural factors significantly influence technology use in special education, impacting accessibility of technology-enabled instruction due to inadequate teacher training and resource allocation, in addition to decision-making processes

Montenegro-Rueda M.; Fernández-Cerero J. (2023)	Societies	Analyze the level of digital competence of special education teachers through perceptions of the Andalusian school management team in Spain	Interviews with 62 members of school management teams	Low digital competence of special education teachers attributed to insufficient training and awareness, necessitating enhanced professional development and institutional involvement in promoting digital competencies
Bachtsis R.; Perifanou M.; Economides A.A. (2024)	Education Sciences	Investigate psychological, educational, and technological difficulties faced by primary education students with special needs during online teaching	Interpretative phenomenological analysis of semi-structured interviews with 22 primary education teachers	Students with disabilities experience negative emotions and behavior during online teaching, attributed to difficulties in concentration, limited digital skills, and lack of infrastructure
Gallardo Montes C.D.P.; Rodríguez Fuentes A.; Caurcel Cara M.J. (2023)	Heliyon	Examine training in ICT for educators working with people who have autism, frequency of use, as well as types of digital resources utilized	A questionnaire was administered to 310 educators located in Granada (Spain), followed by descriptive and inferential analyses	Educators have ICT training but lack sufficient competence, highlighting the need for enhanced training and practical experience, with significant correlations between training and frequency of use
Möhlen L.-K.; Prummer S. (2023)	Social Inclusion	Explore inclusive as well as digital education in Austria when the COVID-19 pandemic occurred	Conduct four focus groups having a range of diverse stakeholders, as well as analyze data using the Grounded Theory method	Challenges during the pandemic include a lack of digital infrastructure, educational inequality, and disrupted inclusive education, emphasizing the need for comprehensive qualitative studies to address the situation
Holmgren, Martin (2023)	Journal of Special Education Technology	Investigate the impact of digitalization on Swedish municipality's implementation of special education	Conduct a mixed-method study exploring special education practice	Special education professionals in Sweden hold favorable opinions of digital tools but exhibit variations in their frequency of use, highlighting complex expectations and necessary competencies for handling digital teaching and learning activities

4.3 Inclusive education and digital transformation

The current review identified nine studies on Inclusive Education and Digital Transformation, presented in Table 5. The convergence of inclusive education and digital transformation aims to meet the varied requirements of students, which also includes those who have disabilities, in the context of technology becoming more prevalent in

educational environments (Carrim & Bekker, 2022). The research delves into several facets of this interaction with the goal of improving educational results and promoting sustainable development (Ari et al., 2022; López Bueno et al., 2023). Studies underscore the significance of diverse groups, inclusive strategies, and digital literacy in promoting cognitive and mental growth, demonstrating the efficacy of digital tools in enhancing speech abilities and social interactions (Abdullina & Zolotovitskaya, 2023). The incorporation of digital education requires a reevaluation of educational paradigms, focusing on values, beliefs, and systematic organization (Mytsyk & Pryshliak, 2022). Evaluations of teachers' digital competencies show deficiencies in training and emphasize the necessity for thorough support, including customized training plans (Cabero-Almenara et al., 2022). Studies highlight how immersive technology may create educational environments that cater to the various requirements of students with disabilities, encouraging inclusivity and improving learning results (Baxter & Reeves, 2023). Suggestions involve creating adaptable and universally available spaces, enabling students with disabilities to manage their learning experiences, and promoting social interactions beyond limitations imposed by disabilities (Holmgren, 2023). By working together, inclusive education and digital transformation can establish fair and empowering learning environments for all students.

Table 5. Inclusive Education and Digital Transformation

Authors	Journal	Objectives	Methodologies	Findings
Abdullina K.; Zolotovitskaya A. (2024)	Education and Information Technologies	Evaluate cognitive and mental development of children with hearing loss in mixed groups, considering digital literacy	Battelle Developmental Inventory, Temple, Dorkey, and Amen test	Mixed groups showed improved cognitive and mental development, with slightly lower digital literacy levels for children with implants and hearing loss.
Carrim N.; Bekker T. (2022)	South African Computer Journal	Explore the intersection of inclusive education and digital education	Conceptual analysis	Increased use of digital education requires redefining education, aligning with inclusive principles, and addressing deep-seated values and beliefs.
Worthy J.; Daly-Lesch A.; Tily S.; Godfrey V.; Salmerón C. (2021)	Journal of Literacy Research	Analyze the quality of dyslexia information on the internet	Disability critical race studies, disability studies, as well as Bakhtin's construct of ideological becoming	Majority of internet sources on dyslexia lack credibility, contain inaccurate information, and convey an authoritative discourse.
Lopez Bueno, Helena; Val, Sonia; Gaeta Gonzalez, Martha Leticia (2023)	Revista Internacional De Educacion Para La Justicia Social	Assess digital competencies of future teachers and their impact on inclusive education	SELFIE tool-based questionnaire	Future teachers lack specific digital training, hindering their ability to bridge the digital gap and support inclusive education effectively.

Mytsyk, Hanna M.; Pryshliak, Mykhailo I. (2022)	Information Technologies and Learning Tools	Examine the contribution of student self-government to improving the future special education teachers' digital competence	Online survey, qualitative analysis	Student self-government can enhance digital competence among future special education teachers through creative cooperation and extracurricular activities.
Cabero-Almenara, Julio; Guillen-Gamez, Francisco D.; Ruiz-Palmero, Julio; Palacios-Rodriguez, Antonio (2022)	British Journal of Educational Technology	Analyze the teacher's digital competency in ICT application for diversity	Descriptive cross-sectional study	Teachers in the Canary Islands lack adequate digital training for applying ICT to cater to diversity, with special education teachers showing higher levels of training.
Carrillo-Lopez, Pedro Jose; Hernandez-Gutierrez, Ana Adela (2023)	Revista Latinoamericana De Tecnologia Educativa-Relatec	Examine problems related to inclusive education and propose suggestions for digital transformation	Qualitative analysis	Inclusive education faces challenges in financing, training, and self-improvement opportunities, necessitating digital transformation for sustainability.
Ari, Refia; Altinay, Zehra; Altinay, Fahriye; Dagli, Gokmen; Ari, Engin (2022)	Electronics	Explore the use and accessibility of animation technology in special education	Literature review, suggestions	Animation technology supports various skills and behaviors in individuals with special needs, offering accessibility and enhancing learning outcomes.
Baglama, Basak; Evcimen, Emirali; Altinay, Fahriye; Sharma, Ramesh Chander; Tlili, Ahmed; Altinay, Zehra; Dagli, Gokmen; Jemni, Mohamed; Shadiev, Rustam; Yucesoy, Yucehan; Celebi, Menil (2022)	Sustainability	Propose creating an experiential educational environment using immersive content for students with disabilities	Study of immersive content, educational effects, and current status	Immersive content provides realistic educational experiences, emphasizing the need for flexible modifications for students with disabilities.

5 Significance of study

This study underscores the transformative potential of combining inclusive education principles with digital technologies. It highlights the opportunity to create more accessible, engaging, and effective learning environments for students with disabilities. The significance lies in the potential to not only improve academic outcomes but also to foster greater social inclusion, independence, and overall quality of life for students with disabilities. However, the findings also emphasize the need for continued research,

development of appropriate pedagogical approaches, and investment in teacher training to fully realize the benefits of this digital transformation in inclusive education. By addressing these challenges, educational institutions can work towards creating truly inclusive digital learning environments that empower all students, regardless of their abilities or disabilities.

6 Conclusion and recommendation

Ultimately, the influence of digitalization on students with disabilities is crucial in transforming educational models, presenting unique possibilities as well as significant obstacles. By incorporating digital technologies, students who have disabilities can benefit from personalized learning experiences, enhance their digital literacy skills, and participate more effectively in the educational process. The digital transformation worsens existing gaps, especially in terms of accessibility, equity, and inclusivity. To fully utilize digitalization and ensure fair benefits, educators, policymakers, technologists, and stakeholders must work together. Recommendations involve giving importance to accessibility standards in digital learning platforms, offering thorough training for educators on inclusive digital teaching methods, investing in assistive technologies, and promoting collaboration among stakeholders to create and enforce effective policies and practices. By tackling these obstacles and putting these suggestions into practice, we can create a more inclusive and empowering educational environment that fully utilizes the potential of digitalization to support all students, regardless of their abilities.

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