Anatolian Journal of Education
e-ISSN: 2547-9652

April 2026 ● Vol.11, No.1
www.e-aje.net
pp. 1-20

Teachers' Views on Digital Transformation Tools in Mathematics Education

Mohammad Ali Ghunaimat
Yarmouk University, Department of Curricula and Teaching Methods, Jordan, *m_ghnemat@hotmail.com*

This research aims to conduct a descriptive study on mathematics teachers' perspectives on digital transformation in mathematics education at schools. It also explores its advantages, challenges, and recommendations. The researcher used a 21-item questionnaire, which was distributed to 243 male and female mathematics teachers teaching mathematics at the Irbid Education Directorate in Jordan. The results showed that the most prominent advantages of digital transformation tools, from the mathematics teachers' perspective, and to a high degree, were the enhancement of collaboration between students through collaborative activities, a clear improvement in students' understanding when using digital tools, and their contribution to enhancing their thinking skills. The most prominent challenges, from the mathematics teachers' perspective, and to a high degree, were the lack of training on digital tools and the difficulty of integrating them into school mathematics curricula. The mathematics teachers offered their recommendations in this regard, including the need to provide an integrated infrastructure for integrating digital transformation tools and the need to provide periodic training on their use. The results showed no differences in mathematics teachers' response averages attributable to academic qualifications.

Keywords: digital transformation, mathematics teachers, digital tools, technology, mathematics

INTRODUCTION

The current era is witnessing a qualitative leap in progress in all areas of life. The third millennium began with the age of technology and the discovery of the computer and then entered the era of globalization with the emergence of a communications network spanning the globe via the Internet. Time and space barriers have vanished. This is confirmed by AlOmari (2020), who argues that societies in the current era are facing the changes and challenges of the transition to an information society, forcing them to turn the page on the industrial era and open a new page called the "digital age." This era is characterized by its repercussions on people in various aspects of their economic, cultural, and social lives. This has resulted in the emergence of what is known as the digital society.

Among the sectors affected by the technological and electronic transformations taking place in societies is the education sector (Kandemir & Bay, 2024), where the development of the educational system has become a major issue (Tawfiq & Shahata, 2021). It is noteworthy that the field of education has witnessed numerous transformations and changes toward digital transformation tools. This is in line with education's efforts to keep pace with social and cultural changes in societies following the spread of social media, digital learning platforms, and the internet, in addition to the development of digital transformation tools. Digital transformation is closely linked to the so-called Fourth Industrial Revolution, a process in which digital technologies shape future social and economic development in a manner similar to the steam-powered development of the First Industrial Revolution (Schwab, 2016). The digital revolution has produced significant improvements in life, leading to social change in the lives of individuals and communities, necessitating the inculcation of new ideas toward digital transformation and the digital learning that resulted from this transformation.

Citation: Ghunaimat, M. A. (2026). Using group drawings activities to facilitate the understanding of the systemic aspects of projects. *Anatolian Journal of Education*, *11*(1), 1-20. https://doi.org/10.29333/aje.2026.1111a

Digital education is considered non-traditional education, operating without paper and time limits. It also teaches students to break from traditional structures or outdated working methods. It is an extension of the development of administrative thought and theories, intertwined with the digital revolution. All of this has led to fundamental changes in the educational process and made education accessible to all within a framework of flexibility and ease that accommodates all ages and all levels and supports lifelong learning (Al-Silawi, 2024). Digital learning is an educational method that relies on the use of digital technology and electronic tools to enhance the learning process. This type of learning aims to improve understanding and engagement through technological means such as tablets, computers, smartphones, and educational software. Digital learning is flexible, allowing students to learn anytime, anywhere.

Digital learning aims to achieve several goals at the individual and societal levels, including It helps students understand and delve deeper into the lesson by allowing them to consult a teacher at any time. It also helps students complete their homework by referencing electronic material provided by the teacher, supported by audio, video, and other engaging tools, or various information sources on the internet. It also works to connect schools with educational and governmental institutions in an organized and formal manner. The introduction of digital learning tools into education raises students' practical cultural level and increases awareness of how to utilize time to develop their creativity, rather than wasting it on websites that only lead to a decline in moral and cultural standards. Digital transformation also allows access to information sources, images, and videos via the internet and their use in explaining and clarifying the educational process, as well as providing educational material in electronic form to students and educators. This helps improve students' effectiveness and increase their expertise in preparing educational materials (Ali, 2019).

There are many ways in which digital transformation can help educational institutions improve their operations and meet their requirements in line with sustainable development needs. For example, the use of online tools such as cloud storage or video conferencing enables teachers to access educational materials from anywhere in the world. This gives them greater flexibility when planning and delivering lessons and helps them use technology to track and evaluate student progress (Bilyalova, Salimova & Zelenina, 2020). Digital transformation tools in education include online learning platforms (e.g., distance learning platforms), interactive educational applications, video content and digital educational materials, educational games, and artificial intelligence-based technologies.

The characteristics of educational digital transformation tools (Al-Silawi, 2024) are as follows: 1) Universality: Their services can be accessed anytime, anywhere, without barriers. 2) Generality: They are not limited to any group. 3) Interactiveness: They provide information for users to interact with from one part to another. 4) Individuality: They are tailored to the needs of each user. Malkawi (2022) believes that digital learning faces a number of challenges, including technical difficulties related to the strength and effectiveness of the information network in schools, the lack of full readiness for digital transformation tools and technologies, and a lack of technological expertise necessary to implement digital transformation in schools, such as the use of electronic devices, programs, and applications.

In Jordan, the Ministry of Education is striving to integrate digital transformation tools into education by adopting a set of measures and plans aimed at developing the educational environment and improving the quality of education. These measures include 1) providing a strong technical infrastructure by equipping schools with modern devices and internet networks; 2) training teachers on the use of digital transformation tools in education; 3) converting textbooks into interactive digital versions; and 4) encouraging innovation by supporting student projects in the field of technology. 5) Collaborating with technology companies to introduce new tools that facilitate the educational process.

The Ministry of Education in Jordan has also made efforts to promote digital transformation by: 1) Launching e-learning platforms: Designing platforms such as "Darsak" to deliver educational content online. 2) Expanding the use of technology in higher education: Working to adopt blended learning in universities and encouraging universities to develop integrated digital education programs. 3) Integrating artificial intelligence and virtual reality technologies to make the educational process more interactive and engaging for students. 4) Enhancing international cooperation by signing agreements with international organizations to obtain technical and financial support for the development of digital education. 5) Launching awareness initiatives: To raise awareness among students and parents about the importance of digital education and how to use it. 6) Digital assessment: Conducting electronic exams to assess student performance in various subjects in a more efficient and accurate manner.

Mathematics is a core subject in school education in Jordan, and all mathematics curricula have been updated since 2019. The curricula focus on developing students' critical thinking and problem-solving skills. The curricula are designed to include diverse topics such as numbers and operations, geometry, statistics, and algebra, with an emphasis on real-life applications of mathematics. Technology has also been integrated into mathematics education, such as the use of educational programs and applications. The Ministry is also offering training courses for teachers to improve mathematics teaching methods and make them more interactive (Alzoebi et al., 2023).

Therefore, the current study aims to investigate the role of digital transformation in mathematics education based on the perspectives of mathematics teachers, particularly following the recent update and development of mathematics curricula for the primary school level in Jordan and the efforts made by the Ministry of Education to integrate digital transformation into education. The study also explores the advantages of using digital transformation tools in mathematics education, identifies some of the challenges facing mathematics teachers when implementing digital transformation tools in mathematics education, and reviews their recommendations in this regard. The study also takes into account the impact of the highest academic qualification (educational specializations, non-educational specializations) obtained by teachers on the use of digital transformation tools in mathematics education.

Research Problem

The world is witnessing rapid developments in various fields, including education, due to the rapid advancement of technology. Digital transformation tools have emerged as one of the technological applications whose implementation has become inevitable, especially given the technologies, methods, and tools they contain that can be employed in the field of school education. Therefore, there is an urgent need for a deep understanding and awareness of the impact of digital transformation tools on the educational process and to ensure their role in improving students' academic achievement and their effectiveness at various educational levels. The areas of use of digital transformation tools in school education have varied, perhaps the most prominent of which are interactive education programs, personalized learning applications, assessment and testing platforms, planning and curriculum development tools, and educational video and presentation design tools. The researcher also noted, through his work as a mathematics teacher, the urgent need to adopt modern teaching and assessment strategies in school mathematics education that keep pace with emerging developments in educational technology, including the emergence of some modern tools based on digital transformation. After reviewing the previous literature, the question remains about the extent to which digital transformation tools reflect mathematics education and whether they actually contribute to achieving the desired educational goals. Therefore, the current study aims to provide a descriptive study of the reality of using digital transformation tools in mathematics education, based on the perspectives of mathematics teachers.

Study Objectives

The research aimed to answer the following questions:

1. What are the advantages of using digital transformation tools in mathematics education, from the perspective of mathematics teachers?

2. What are the challenges of using digital transformation tools in mathematics education, from the perspective of mathematics teachers?

3. What are the recommendations related to the use of digital transformation tools in mathematics education, from the perspective of mathematics teachers?

4. Are there statistically significant differences at the level ($\propto$=0.05) between the averages of mathematics teachers' perspectives on digital transformation tools in mathematics education, attributable to academic qualification?

Study Terminology

Perspective: Mathematics teachers' views on the use of digital transformation tools in mathematics education, highlighting their use, advantages, challenges, and recommendations.

Digital Transformation: The study adopted the definition of digital transformation as stated in AlQarni's (2021) study: "The transition from current traditional educational trends to future educational trends that emphasize knowledge production, innovation, and openness to global culture."

Significance of the Study

The importance of the study lies in providing a deep understanding of the reality of using digital transformation tools in mathematics education and their impact on the school educational process. The importance of the study also stems from conducting a descriptive study of one of the core subjects in school education, mathematics, which is taught at all levels from first to twelfth grade. The study will investigate mathematics teachers' perspectives on the use of digital transformation tools and their impact on the educational process related to mathematics from all aspects. This may enable teachers, researchers, and decision-makers to develop a general framework that includes effective strategies to improve the use of digital transformation tools in mathematics education. The study also currently serves as an assessment of newly developed mathematics curricula in Jordan, highlighting the degree to which these curricula are aligned with digital transformation and how to enrich these curricula with techniques and strategies that enhance and support the use of digital transformation tools in mathematics education. The study seeks to provide new insights into the use of digital transformation tools in school education in general and in mathematics teaching in particular.

Study Limits

- Spatial Limits: The study was conducted in all public schools affiliated with the Directorate of Education in the Qasaba District of Irbid Governorate, Jordan.

- Time limits: The second semester of the 2024-2025 academic year.

- Objective limits: The study was limited to a questionnaire prepared by the researcher based on the study's literature and data and information provided by mathematics teachers teaching in public schools.

- Human limits: Mathematics teachers teaching at the pre-school level in public schools.

Theoretical Framework and Previous Studies

Digital Transformation

According to the ODLIS dictionary, digital transformation refers to "the process of converting data into digital form for processing by an electronic computer." In the context of information systems,

digitization usually refers to the conversion of printed text or images into binary digital signals using some type of scanning device that allows the results to be displayed on a computer screen (Dalia et al., 2014).

Al-Shamrani (2019a, 120) defined digital transformation as "the use of modern techniques and technologies in various businesses and activities, in communication between individuals, and in conducting transactions entirely electronically, based on protected databases and within a secure digital technology environment." Grand-Clemet (2017) defined it as "the replacement of traditional teaching methods with technology-enhanced teaching methods that enable instant communication between students and teachers electronically via the internet, such that the educational institution becomes a networked institution. This transformation provides teachers with the opportunity to explore digital technologies and design engaging methods in academic courses." While AlDhafiri (2014, 14) defined digital transformation as "the process of eliminating old traditional methods and restrictions in the educational process and replacing these methods with a modern approach based on the use of the latest images and techniques that have emerged with the development of technology, which opens horizons for students to think, experiment, and learn remotely."

Tawfiq and Shahata (2021, 9) defined digital transformation in education as "the process of eliminating old traditional methods and restrictions in the teaching process and replacing these methods with a modern approach based on the use of images and tools that have emerged with the development of technology, which opens new horizons for students to think." AlQarni (2021) defined it as "the transition from current traditional educational trends to future educational trends that emphasize knowledge production and innovation and openness to global culture." Al-Hajilan (2019, 33) asserts that digital transformation is “the transformation of administrative processes and educational practices into processes that rely entirely or partially on technology (hardware and software), focusing on reducing costs and improving work quality, and aiming to develop educational processes and facilitate access.” Norton (2020) defined it as “the process of changing the way operations are conducted using digital technology and innovative businesses. It may appear to be merely implementing a technological solution, but in reality, it is the combination of digital technology and human factors.”

Tawfiq and Shahata (2021) identified several elements or components related to digital transformation in the education sector, including: 1) The educational component: This includes students, teachers, educational materials, administrators, libraries, research centers, and examinations. 2) The technological component: This includes the website, personal computers, the internet, communications, and the digital transformation of the educational component. 3) The administrative component: This includes the objectives of digital education, the philosophy of digital education, plans, programs, and budgets for digital learning, and timetables for digital transformation.

Bahar et al. (2022) summarized the advantages of digital transformation in the education sector with several benefits, including 1) developing innovative teaching and learning strategies. 2) Increased communication between teachers, students, those responsible for the educational process, and parents. 3) Increased student participation and interaction. Computer technology and artificial intelligence can enable more interactive learning and shift approaches from outdated methods of copying and reading. 4) Improving students' access to various educational resources allows for the integration of technology into learning environments at much higher levels of student accessibility.

Al-Silawi (2024) noted that many researchers agreed that there are many justifications for digital transformation in schools, which can be summarized as follows: 1) The acceleration of the digital and knowledge revolution that has imposed itself on various areas of human life, including the education sector. 2) Adapting to the requirements of the school's environment, avoiding isolation and lagging behind in keeping pace with the challenges of the times, and thus striving to achieve qualitative and quantitative sufficiency appropriate to contemporary technical thought. 3) Openness and integration

among human societies, an openness created by the globalization of the media through the digital revolution, and attempts to connect members of human society as a whole through the internet, cyberspace, and other digital tools. 4) The shift towards digital education and the emergence of so-called smart schools, which require the computerization of all processes within these schools, including administrative aspects. 5) Governments are under constant pressure from citizens and beneficiaries in general to meet the growing demand for educational services. This is due to population growth, the desire to improve service quality, expediting administrative services related to educational institutions, and eliminating red tape and bureaucracy.

Balaj (2024) summarized the benefits of digital transformation in education, including: 1) Stimulating interest and engagement: Digital images contribute to capturing students' attention and motivating them to participate in the educational process, as attractive images attract and arouse curiosity. 2) Visually clarifying concepts: Digital images help clarify concepts and topics visually and directly, facilitating students' understanding and better recall of information. 3) Enhancing interaction and engagement: Digital images can be used to create interactive activities that encourage students to actively participate and engage with educational content. 4) Promoting diversity and inclusivity: Digital images allow information to be presented in diverse and inclusive ways that suit the needs of all students, including students with special needs. 5) Providing realistic experiences: Digital images can be used to create realistic experiences and simulate different learning environments, helping to broaden students' horizons and motivate them to acquire more knowledge. 6) Enhancing memory and comprehension: Digital images help enhance memory and comprehension processes, contributing to better retention of concepts and information than traditional texts.

Here, it is essential to emphasize the need to prepare and train teachers on how to employ digital transformation tools in education and to possess appropriate teaching and assessment strategies for the digital transformation era. Therefore, in light of the digital transformation, the teacher's role has shifted from information provider to student mentor, trainer, and facilitator; from a skilled teacher to an academic advisor for their students; from an individual worker to a member of a collaborative team; and from a source of information to an information advisor. The teacher's roles can be summarized as follows (Ali, 2019): 1) The role of the explainer, using technical means, such as the internet and various technologies to present the lesson. Students then rely on this technology to solve assignments and conduct research. 2) The role of the facilitator of interaction in the educational process, by encouraging students to ask questions and communicate with other students and teachers. 3) The role of the catalyst for knowledge generation and creativity, encouraging students to use technical means and create the educational programs they need. 4) The role of the educational mediator, organizing communication, limited to tasks that cannot be performed with equal efficiency by other media, including striving to organize effective communication between the teacher and his students. 5) The role of the supervisor in developing students' higher-order thinking skills, providing them with life skills, supporting the knowledge economy, using and managing educational technology, and developing critical thinking skills.

Previous Studies

Previous literature has revealed a number of studies and research related to the role of digital transformation in education and its impact on the educational process. Among these studies was AlNamri (2023**)** examined the impact of digital transformation on public schools from the perspective of teachers in the Makkah Al-Mukarramah region, using a descriptive-analytical approach. Data were collected via a 30-item questionnaire covering five domains and administered to a random sample of 628 teachers. Findings indicated a high overall impact of digital transformation, with the domain of "teachers and students" receiving the highest mean score (3.99), followed by teaching methods (3.82), assessments (3.75), technical skills (3.69), and curriculum (3.58). The study also found significant differences based on educational qualification, favoring postgraduate degree holders, while no significant differences were observed based on years of experience.

Sharir (2023) examined the extent of digital transformation in governmental higher education institutions in Palestine's southern governorates, based on faculty perspectives. Employing a descriptive survey method, a 30-item questionnaire covering four domains was distributed to a random sample of 123 faculty members. The findings indicated a high level of digital transformation across institutions, with no statistically significant differences in responses based on gender, years of service, academic degree, or specialization.

Assaf (2023) explored the role of digital transformation in fostering digital literacy among female public-school students, based on the perspectives of female teachers in Amman's University District Directorate. Using a descriptive survey approach and two tailored questionnaires, the study found that teachers highly valued the impact of digital transformation on digital literacy development. However, they perceived the obstacles to this development as minimal. No significant differences were found based on teachers' academic qualifications or teaching experience. The study recommended empowering students to design educational platforms.

Malkawi (2022) examined digital learning in private schools in northern Jordan from the viewpoint of school principals. Using a descriptive-analytical approach, a 26-item questionnaire was administered to 140 principals (50 male, 90 female). The study assessed both the current practices and activation mechanisms of digital learning. Results indicated that principals perceived both areas to be at a moderate level. No significant differences were found based on gender or the school system (national vs. international).

Abdo (2022) investigated the possibility of implementing digital transformation to address educational loss in primary schools. The study used a descriptive approach to analyze and explain the phenomenon through a questionnaire administered to 271 primary school principals and teachers in Dakahlia Governorate, Egypt. The study concluded that there are some obstacles preventing the implementation of digital transformation in primary schools, such as the lack of integrated digital systems that work together without conflict, the limited use of modern technologies and modern educational methods and strategies, and the lack of technical skills and adequate training for teachers in the use of technology.

Al-Sayed (2022) investigated digital transformation in Jordanian universities through the perspectives of faculty and administrators. Using a descriptive survey approach, two questionnaires covering digital culture, institutional support, infrastructure, and vision were distributed to 155 faculty members selected via stratified random sampling. Results indicated a moderate level of digital transformation across all domains, with infrastructure receiving the highest rating. No significant differences were found based on experience, academic rank, or specialization. The study recommended enhancing institutional support through continuous development and innovation.

Alhubaishy and Aljuhani's study (2021) aimed to identify the challenges facing teachers and students regarding digital transformation and its impact on the educational process. Twenty-five teachers and students from various educational institutions in the Kingdom of Saudi Arabia were selected. The results showed that learning performance, difficulty accessing resources, and fear of change were the most significant factors hindering students from adopting digital transformation. On the other hand, fear of change, followed by lack of experience and privacy concerns, were the most significant factors hindering teachers from adopting digital transformation.

AlMutref (2020) investigated the potential and actual state of digital transformation in Saudi universities, particularly during global crises. Employing a descriptive-analytical method, the researcher developed a readiness scale applied to 200 faculty members equally divided between public and private institutions. Findings revealed significant differences favoring private universities in three areas: availability of material resources, faculty digital competencies, and the capacity for digital transformation during crises.

Al-Shamrani (2019) investigated the impact of employing digital education on the educational process and its outcomes and revealed the extent to which digital learning patterns were applied in the educational process. To achieve the research objectives, the researcher used the descriptive-analytical approach, relying on the questionnaire as the primary tool for collecting research data. The research was conducted on a sample of 150 male and female teachers in schools in the Kingdom of Saudi Arabia, who were randomly selected. The most prominent findings revealed the impact of digital learning on the educational process in Saudi Arabia and the degree of application and employment of digital learning models in the educational process in the Kingdom of Saudi Arabia. The results also revealed apparent differences between the average responses of the research sample members for all axes of the impact of employing digital learning on the quality of the educational process and improving its outcomes.

Balyer and Oz's study (2018) examined the opinions of 20 faculty members working in colleges of educational sciences regarding the digital transformation in education in terms of programs and management processes. The researchers used structured interviews, and the results revealed that in the digital transformation process, administrators must first develop a vision for creating an effective learning environment and manage it accordingly. They must also engage university administration in the digital transformation process by enabling them to access the appropriate space and time through content support and technically appropriate infrastructure.

Maksimovic and Dimic (2016) investigated teachers' attitudes toward the effectiveness of using digital technology in primary grades. The researchers used a descriptive-quantitative approach by distributing a questionnaire to a study sample of 100 teachers. The results of the study showed that teachers' effectiveness in using digital technology was low. The study also showed no differences in the use of digital technology in teaching attributable to gender, years of service, or academic qualifications.

Al-Zain's (2016) study, which used a descriptive approach, revealed the benefits and obstacles of digital education in the age of digital learning. The study concluded that digital learning will flourish and spread more widely due to the convenience and flexibility it provides to students and teachers through digital tools such as social media. This allows for a broader cultural exchange of knowledge than any specific traditional curriculum.

Despite the growing body of research on the role of digital transformation in education across different levels and educational settings, there are still many limitations and unexplored dimensions. Most studies (e.g., AlNimri, Shurair, and Al-Sayed) have adopted descriptive or survey-based methodologies to assess perceptions or readiness, often focusing on institutional infrastructure, public attitudes, or the broader digital environment. However, few studies have addressed the actual pedagogical integration of digital transformation tools—particularly in mathematics education—and the tangible impact of these tools on teaching quality, learner outcomes, and long-term academic development.

Furthermore, while studies such as Abdo (2022) and Al-Habishi and Al-Jahni (2021) have addressed challenges and barriers, there is still a lack of intervention-based empirical research that evaluates strategies for overcoming these barriers in practice. Little is known about how specific digital tools (e.g., adaptive learning platforms, gamified applications, and data-driven assessment tools) impact student engagement and learning in mathematics, nor about how teacher training or collaborative models support their sustainable use.

Additionally, few studies compare public versus private educational contexts or explore the longitudinal effects of digital transformation initiatives over time. There is also a notable absence of studies using mixed methods that can combine qualitative insights (such as classroom dynamics or teacher reflections) with quantitative performance data.

The research gap is evident in the fact that these studies were conducted at different school levels and did not cover the entire school level (grades 1 to 12). Based on the above, this study investigated mathematics teachers' perspectives on digital transformation tools in mathematics education, including the positives, challenges, and recommendations. These previous studies did not examine the impact of teachers' academic qualifications in educational and non-educational specializations.

METHOD

The study followed a quantitative survey (descriptive) research methodology to examine teachers' perspectives on digital transformation tools, highlighting their advantages and challenges. A questionnaire was used to collect data. Quantitative survey research, used in field and descriptive research, helps accurately and clearly determine mathematics teachers' perspectives on digital transformation tools in mathematics education. Furthermore, the study population comprised 558 teachers. Abu Saleh and Awad (2012) indicated that quantitative data can be generalized to all members of society and that the study results are highly reliable.

Study Population

The study population comprised all primary school mathematics teachers in public schools affiliated with the Irbid Education Directorate in Jordan, totaling 558 teachers, including 256 male and 302 female teachers. The study variables were determined based on academic qualifications. The highest academic qualification obtained by the mathematics teacher was considered, and these were classified as follows: educational specializations and non-educational specializations.

The study population was chosen because it is located in Irbid Governorate, one of the most important and prominent governorates in the Hashemite Kingdom of Jordan after the capital, Amman. Irbid Governorate is characterized by its cultural, educational, and urban development. It boasts five public and private universities, granting degrees ranging from diplomas to doctorates in various humanities and sciences. There are seven education directorates in Irbid Governorate, with the Irbid Qasaba Education Directorate (formerly the First Education Directorate) responsible for monitoring and supervising the educational process within the city and its suburbs. This directorate is distinguished by its large teaching staff and the large number of schools affiliated with it. It also has a suitable infrastructure for school education, including learning resources, libraries, and modern educational facilities. The directorate seeks to improve school learning environments and develop its teaching staff in coordination with the Jordanian Ministry of Education. Therefore, the Irbid Qasaba Education Directorate can be considered a suitable educational environment for the purposes of this research.

Study Sample

145 schools were randomly selected (by lottery). A simple random sample of 243 male and female teachers was then selected using the simple random sample method, representing 43.5% of the study population. Abu Saleh and Awad (2012) indicated that a simple random sample should ideally be no less than 23% for a population of 500-1,000 individuals. The higher the sample percentage, the better its representation of the population. Table 1 shows the number of individuals in the research sample according to the highest academic qualification obtained by the mathematics teachers.

Table 1
Frequencies and percentages according to academic qualification

Categories	Repetition	Percentage
Educational Qualification	80	32.9
Non-Educational Qualification	163	67.1
Total	243	100.0

Table (1) shows that the research sample consisted of (243) mathematics teachers. The number of mathematics teachers with non-educational qualifications was 163, representing 67.1%, while the number of mathematics teachers with educational qualifications was 78, representing 32.9%. It is clear that the largest number of mathematics teachers had non-educational qualifications. The characteristics of the sample members include teachers, both male and female, teaching in public schools, aged over 24 years, and holding various academic qualifications ranging from a bachelor's degree to a doctorate.

Participants completed the study questionnaire anonymously and with complete confidentiality. They were clearly informed that the data would only be used for academic research and would never be revealed.

Study Variables

The research adopted the educational qualification variable for mathematics teachers. The highest academic qualification obtained by mathematics teachers was considered, and this was classified as follows: 1) Educational specializations, such as studying educational mathematics at any university level or any branch of humanities, education, or teaching specializations; 2) Non-educational specializations, such as studying mathematics at any university level or any branch of scientific specializations.

Research Tool

After reviewing previous literature related to the application of digital transformation tools in education in general and mathematics in particular, a questionnaire was developed as a research tool. The questionnaire consisted of three axes: the first axis, the advantages of digital transformation tools in mathematics education; the second axis, the challenges facing mathematics teachers when using digital transformation tools in mathematics education; and the third axis, mathematics teachers' recommendations for using digital transformation tools in mathematics education. (7) sub-items were included under each axis, bringing the total number of questionnaire items to (21). The questionnaire used a five-point Likert scale.

Questionnaire Validity

To evaluate and verify its validity in achieving the research objectives, the questionnaire was presented to a group of expert referees, including university professors from Jordanian universities specializing in curriculum, teaching, and educational technology, as well as a number of educational supervisors from Jordanian education directorates. The evaluation criteria included the degree to which paragraphs fit the main themes, the relevance of paragraphs to their themes, and linguistic integrity. All referees' suggestions were taken into account, including modifying the linguistic wording of some paragraphs, deleting paragraphs that were not mutually agreed upon, and standardizing the number of paragraphs for each theme. This resulted in the final research instrument consisting of 21 paragraphs instead of 31.

Construct Validity

To extract the construct validity of the scale, correlation coefficients of the scale's items with the total score were extracted from a pilot sample outside the research sample consisting of 40 mathematics teachers. The scale's items were analyzed, and the correlation coefficient for each item was calculated. The correlation coefficient here represents an indication of validity for each item in the form of a correlation coefficient between each item and the total score, on the one hand, and between each item and its correlation with the axis to which it belongs and between each axis and the total score, on the other hand. The correlation coefficients of the items with the instrument as a whole ranged between 0.45 and 0.82, and with the axis, 0.48 and 0.85**.**

Questionnaire Reliability

To ensure the reliability of the research instrument, the test-retest method was verified by applying the scale and re-administering it a week later to 40 mathematics teachers. The Pearson correlation coefficient was then calculated between their assessments. The reliability coefficient was also calculated using the internal consistency method using Cronbach's alpha equation. Table 2 shows the internal consistency coefficient according to Cronbach's alpha equation and the test-retest reliability for the components and the instrument as a whole. These values were deemed appropriate for the research purposes.

Table 2
Internal consistency coefficient Cronbach's alpha, test-retest reliability for the components, and total score

test-retest	consistency coefficient	Scope
Advantages of Using Digital Transformation Tools	0.79	0.82
Challenges of Using Digital Transformation Tools	0.82	0.91
Recommendations for Using Digital Transformation Tools	0.85	0.87
Themes as a Whole	0.86	0.82

Table 2 indicates that all values of the Cronbach's alpha internal consistency coefficients, the retest reliability of the axes, and the total score are acceptable, as the total test reliability coefficient reached 0.82, and the total internal consistency coefficient reached 0.86, and this indicates the effectiveness of the research tool when it is reapplied.

Statistical Processing

The five-point Likert scale was used to correct the research instrument, assigning each item a score out of five (very large, large, medium, small, very small), represented numerically (5, 4, 3, 2, 1), respectively. The following scale was adopted for the purposes of analyzing the results:

1.00-1.8: Very little, never, or strongly disagree

1.81-2.6: Slightly, rarely, or disagree

2.61-3.4: Medium, sometimes, or neutral

3.41-4.2: High, often, or agree

4.21-5: Very high, always, or strongly agree

Thus, the scale was calculated using the following equation:

((The upper limit of the scale (5) - the lower limit of the scale (1)) ÷ The number of required categories (5) =

= 0.8, and then adding the answer (0.8) to the end of each category.

The following equation was used: Descriptive statistics were used to answer the research questions, by extracting the values of arithmetic means and standard deviations. To answer the fourth question, the T-test was used.

FINDINGS AND DISCUSSION

Results related to the first question, which reads: "What are the advantages of using digital transformation tools in mathematics education from the perspective of mathematics teachers?"

To answer this question, the arithmetic means and standard deviations related to the advantages of using digital transformation tools in mathematics education from the perspective of mathematics teachers were calculated, as shown in Table 3.

Table 3
Arithmetic means and standard deviations related to the advantages of using digital transformation tools in mathematics education from the perspective of mathematics teachers

Number	Ranking	Paragraphs	Arithmetic mean	standard deviation	degree
1	3	Digital transformation tools help improve the interaction between me and the students.	3.90	.71	High
2	2	I notice a clear improvement in students' understanding when using digital tools.	3.92	.76	High
3	4	I believe that digital transformation contributes to enhancing students' thinking skills.	3.90	.73	High
4	5	Using digital transformation tools helps customize education to suit students' needs.	3.89	.72	High
5	6	Digital transformation tools provide accurate and effective assessment tools for students' academic performance.	3.88	.77	High
6	7	Digital transformation tools facilitate the process of evaluating students and accurately analyzing their results.	3.89	.75	High
7	1	Digital transformation tools enhance student collaboration through collaborative activities.	3.93	.72	High
		Total of advantages	3.83	0.76	High

Table 3 shows that the arithmetic means ranged between (3.93 - 3.88), with the three highest scores being (7, 2, and 3). Mathematics teachers indicated that one of the advantages of digital transformation tools in mathematics education is that they help increase interaction between teachers and students. Mathematics teachers believed that digital transformation tools enhance students' understanding and thinking skills, provide accurate assessment tools, and accurately analysed their results, free from bias. Mathematics teachers also believe that digital transformation tools enhance student collaboration through collaborative activities.

The most prominent advantage of digital transformation tools from the perspective of mathematics teachers was item (7), which scored highly. This is attributed to the fact that digital transformation tools provide a range of features, such as communication and collaboration platforms, such as applications like Microsoft Teams, Slack, or Google Workspace, which allow students to conduct discussions and share files. Digital transformation tools also include interactive tools such as JamBoard, smart boards, and others, through which students can express their mathematical ideas and solutions. Digital transformation tools also include educational games and educational applications such as Kahoot and Quizizz, which offer group challenges and competitions.

Mathematics teachers' perspectives also showed another positive trend, with item (2) coming in second and with a high score. It appears that mathematics teachers observed an improvement in students' level of mathematical understanding and an improvement in their academic performance compared to their performance before using these tools. This is attributed to the fact that mathematics teachers noticed students' comprehension of mathematical concepts through digital tools such as graphing programs or interactive applications, which help students grasp difficult concepts more quickly than traditional methods.

Meanwhile, item (3) came in third and with a high score. The mean score was 3.90. Mathematics teachers believe that digital transformation tools play a role in enhancing students' thinking skills by developing analytical thinking skills and the use of graphing software and advanced calculators. Digital transformation also enhances creative and critical thinking skills, with the ability to link concepts to real-world mathematics.

The arithmetic mean for the advantages aspects of digital transformation tools in mathematics education from the perspective of mathematics teachers as a whole was 3.90, a high score. This is attributed to several reasons, including access to educational content, enhanced interaction and participation, and consideration of individual student differences. Mathematics teachers also believe that digital transformation tools may provide solutions to some of the traditional challenges facing the educational process, such as time constraints, the density of the mathematics curriculum, and the large number of students in the classroom.

Results related to the second question: "What are the challenges of using digital transformation tools in mathematics education from the perspective of mathematics teachers?"

To answer this question, the means and standard deviations related to the challenges of using digital transformation tools in mathematics education from the perspective of mathematics teachers were calculated, as shown in Table 4.

Table 4
Arithmetic means and standard deviations related to the challenges of using digital transformation tools in mathematics education from the perspective of mathematics teachers

Number	Ranking	Paragraphs	Arithmetic mean	standard deviation	degree
8	4	Poor infrastructure (such as internet or hardware) hinders the implementation of digital transformation tools in teaching.	3.90	.72	High
9	1	Lack of training on digital tools affects my ability to use them effectively.	3.97	.72	High
10	2	I find it difficult to integrate digital transformation tools into my school mathematics curriculum.	3.92	.72	High
11	5	Technical challenges affect the educational process.	3.88	.78	High
12	3	Lack of technical support in schools hinders the effective use of digital transformation tools.	3.91	.73	High
13	7	Sometimes, technology capabilities are limited to certain mathematics subjects and not others.	3.84	.83	High
14	6	I encounter resistance from some students or parents toward digital education.	3.85	.81	High
		Total of challenges	3.83	.75	High

Table 4 shows that the arithmetic means ranged between (3.97 - 3.84), with the three highest scores being (9, 10, and 12). Mathematics teachers indicated that they face challenges when using digital transformation tools in mathematics education. These challenges included poor infrastructure, a lack of training on effective use, an inability to integrate digital transformation tools into the mathematics

curriculum, the presence of some technical challenges, and the lack of conviction of some students and parents regarding the use of digital transformation tools.

The highest challenge cited by mathematics teachers was item (9), with a high score. This is attributed to the fact that mathematics teachers lack adequate training in using digital transformation tools, which impacts their performance in teaching mathematics and the loss of educational productivity. Therefore, official educational authorities should provide the necessary courses and workshops and engage teachers in these workshops to increase their efficiency in using digital transformation tools in mathematics education. Mathematics teachers should also participate in online courses or in-person training by watching educational videos, as learning digital learning skills can be easily developed with time and practice.

Mathematics teachers indicated difficulty in integrating digital transformation tools with the school mathematics curriculum, as stated in paragraph (10), which ranked second with an arithmetic mean of (3.92). This is due to a lack of training and limited resources for implementing digital transformation tools, such as computers and technologies dedicated to teaching mathematics. Using digital transformation tools also requires time for planning and implementation.

Mathematics teachers' perspectives also revealed another challenge, paragraph (12), which ranked highly with the paragraph: "The lack of technical support in schools hinders the effective use of digital transformation tools." This paragraph, with an arithmetic mean of (3.92). This challenge can manifest itself in several ways, including delays in resolving technical problems and failure to maximize the use of tools. The lack of technical support can lead to negative feelings among teachers and students, making them less willing to rely on digital tools in mathematics education. Furthermore, some schools may be unable to provide an equal learning experience for all students due to a lack of technical support.

The mean score for the challenges of digital transformation tools in mathematics education, as perceived by mathematics teachers as a whole, was 3.89, which is a high score. This is attributed to the fact that the nature of mathematics relies on skills, concepts, and abstract thinking. Therefore, some digital tools may not be able to provide sufficient or detailed explanations compared to traditional explanations. Furthermore, the use of digital transformation tools may make it difficult to assess students' deep understanding, as some tools focus on final answers rather than assessing the steps involved in the solution. Integrating digital tools into the mathematics curriculum requires a long time for planning and implementation, which is a significant challenge for teachers with busy teaching schedules.

Results related to the third question: "What are the recommendations related to the use of digital transformation tools in mathematics education from the perspective of mathematics teachers?"

To answer this question, the arithmetic means and standard deviations related to the recommendations for using digital transformation tools in mathematics education from the perspective of mathematics teachers were calculated, as shown in Table 5i

Table 5
Arithmetic means and standard deviations related to mathematics teachers' recommendations for using digital transformation tools in mathematics education

Number	Ranking	Paragraphs	Arithmetic mean	standard deviation	degree
15	2	Poor infrastructure (such as internet or hardware) hinders the implementation of digital transformation tools in teaching.	3.81	.84	High
16	1	Lack of training on digital tools affects my ability to use them effectively.	3.86	.79	High
17	4	I find it difficult to integrate digital transformation tools into my school mathematics curriculum.	3.78	.85	High
18	5	Technical challenges affect the educational process.	3.77	.85	High
19	7	Lack of technical support in schools hinders the effective use of digital transformation tools.	3.65	.94	High
20	6	Sometimes, technology capabilities are limited to certain mathematics subjects and not others.	3.75	.86	High
21	3	I encounter resistance from some students or parents toward digital education.	3.80	.82	High
		Total of recommendations	3.77	.85	High

Table 5 shows that the arithmetic means ranged between (3.93 - 3.88), with the three highest items being (16, 15, and 19). Mathematics teachers provided their recommendations regarding effective digital transformation tools in mathematics education. These recommendations included providing the necessary infrastructure and providing ongoing training on the use of digital transformation tools in mathematics education, as these tools are constantly evolving. Among the recommendations indicated by mathematics teachers was the need to integrate digital transformation tools extensively into mathematics curricula and provide them with the necessary knowledge about the types of digital transformation tools that can be used in mathematics education. They also emphasized the need for teachers to collaborate to exchange experiences in the field of digital education, which would enhance its effectiveness. Among the most prominent recommendations from the perspective of mathematics teachers was paragraph (16), which scored highly, stating, "The need to provide an integrated infrastructure for integrating digital transformation tools," with an arithmetic mean of 3.86. Providing an infrastructure for integrating digital transformation tools into mathematics education enables keeping pace with technological developments in the field of education and enhancing communication and interaction. The necessary infrastructure includes developing strong, high-speed internet networks, adopting privacy protection systems for student and teacher data, ensuring that data is not compromised, and providing the necessary human resources, including technicians, designers, and specialists in the field of digital learning.

Mathematics teachers also indicated the importance of providing periodic training on the use of digital transformation tools, as stated in paragraph (15), which scored highly, with an arithmetic mean of 3.81. This result is consistent with the challenges highlighted by mathematics teachers. Mathematics teachers see a need for periodic training, as digital transformation tools are constantly being updated. Periodic training also helps improve efficiency and productivity, reduces errors in use, enhances

mathematics teachers' digital skills, reduces operational costs, and prepares them for the future. Regular training on the use of digital transformation tools can be achieved by designing customized training programs, providing practical exercises, workshops, and discussion sessions, and maintaining digital references such as a digital guide or digital library that mathematics teachers can access when needed.

Among the recommendations cited by mathematics teachers was the one in paragraph (19), which read, with a high score. This supports mathematics learning by providing innovative learning experiences, improving student comprehension, making the educational process more engaging, and facilitating assessment and progress tracking. Learning mathematics using digital tools helps students develop the technical skills they need in their future lives and careers. The process of developing digital transformation tools in mathematics education is achieved by designing interactive educational programs, using artificial intelligence, virtual and augmented reality technologies, incorporating practical experiments, and integrating them with mathematics curricula.

The mean score for the field of mathematics teachers' recommendations regarding the use of digital transformation tools in mathematics education as a whole was 3.77, a high score. This is due to mathematics teachers' belief that digital transformation tools provide visual and interactive ways to explain mathematical ideas. Digital transformation tools make learning mathematics more engaging and enjoyable, especially for students who find mathematics challenging. Furthermore, mathematics teachers can customize mathematics instruction based on each student's ability. Mathematics teachers also believe that digital transformation tools provide assessment methods that help teachers accurately and quickly track student progress. Mathematics teachers realize that the use of digital transformation tools in mathematics education has become a necessity to keep pace with the development of modern education.

Results related to the fourth question: "Are there statistically significant differences at the level ($\propto$=0.05) between the averages of mathematics teachers' perspectives on digital transformation tools in mathematics education attributed to academic qualifications?"

To answer this question, the arithmetic means of mathematics teachers' perspectives on digital transformation tools in mathematics education were extracted according to the categories of the academic qualification variable. To demonstrate the statistical differences between the arithmetic means, a t-test was used, as illustrated in the table below.

Table 6
Arithmetic means and t-test for the effect of academic qualifications on mathematics teachers' perspectives on digital transformation tools in mathematics education

Fields	Academic Qualification	Number	Arithmetic Mean	Value (t)	Degrees of Freedom	Statistical Significance
Advantages of Using Digital Transformation Tools	Educational qualification	80	27.46	.23	241	.76
	Non-educational qualification	163	27.30			
Challenges of Using Digital Transformation Tools	Educational qualification	80	27.27	.56	241	.64
	Non-educational qualification	163	27.31			
Recommendations for Using Digital Transformation	Educational qualification	80	26.30	.36	241	.84
	Non-educational qualification	163	26.53			
Tools	Educational qualification	80	104.48	.018	241	.85
	Non-educational qualification	163	104.44			

Table 6 shows no statistically significant differences at the significance level (σ=0.05) attributed to academic qualifications (educational qualifications, non-educational qualifications) in mathematics teachers' views of digital transformation in mathematics education across all fields.

The current study investigated the impact of mathematics teachers' academic qualifications. The highest academic qualifications obtained by teachers were classified into two categories: educational qualifications and non-educational qualifications. The results indicated no statistically significant differences at the significance level (σ=0.05) attributed to academic qualifications regarding the role of digital transformation tools in mathematics education from the perspective of mathematics teachers at the field level or overall score. Academic qualifications did not play a role in influencing mathematics teachers' views, and neither educational nor non-educational qualifications played a role in creating differences regarding digital transformation tools in mathematics education.

The lack of an impact of academic qualifications is attributed to the fact that all mathematics teachers held similar views regarding digital transformation tools in mathematics education, regardless of their university qualifications. It indicates that mathematics teachers are convinced of the use of digital transformation tools in mathematics education, and that this has had a positive impact. They also agree on the challenges they face in using digital transformation tools in education, and that the recommendations they outlined were widely agreed upon. The lack of an impact may be attributed to the educational qualification variable, as mathematics teachers share the same desire and orientation to use digital transformation tools in mathematics education. They also work in similar educational settings and within a similar social environment.

CONCLUSION

The study's findings lead us to the following key points:

1. Mathematics teachers' perception of the educational benefits associated with digital transformation tools.

2. Teachers emphasized that these tools not only increase interaction between teachers and students but also enhance students' conceptual understanding and cognitive skills.

3. Teachers emphasized the importance of continuous professional development in the use of digital transformation tools in mathematics education.

4. The need for a comprehensive infrastructure—including internet connectivity, data protection, and specialized human resources—emerged as the most important factor in ensuring a sustainable and effective digital transformation.

5. The findings indicate that mathematics teachers face significant challenges in implementing digital transformation tools, with inadequate training emerging as the most significant barrier and a pressing need for continuing professional development specifically designed to use digital technologies in mathematics education.

RECOMMENDATIONS

Based on the research findings, the research offers the following recommendations:

1. Encourage teachers to use digital transformation tools in mathematics education.

2. Conduct more training courses by the Ministry of Education and its directorates for teachers on the use of digital transformation tools in mathematics education.

3. Minimize the challenges of using digital transformation tools in mathematics education.

4. Consider mathematics teachers' recommendations to activate the role of digital transformation tools in mathematics education.

5. The study showed that teachers can use free digital tools to teach math. Curriculum developers can also include these tools in teacher guides and lesson plans.

Ethical Considerations

Regarding ethical considerations, ethical standards were adhered to throughout the research, from instrument design to analysis and dissemination of results. This included respecting participants' privacy, maintaining the confidentiality of their data, and obtaining informed consent before collecting any information. Bias or manipulation in the presentation of results was avoided, and objectivity and transparency in data interpretation were ensured without researcher intervention. Accurate documentation of sources and avoidance of plagiarism are essential requirements for academic and research credibility.

REFERENCES

Abdo, S. (2022). Digital transformation and its role in addressing educational waste in primary schools in Dakahlia Governorate. *Journal of the Faculty of Education, Damietta University*, *37*(83), 153–197. https://journals.ekb.eg/article_263940.html

AlDhafiri, F. (2021). Digital educational transformation: A new pedagogical model. *International Journal of E-Learning*, *1*(3), 11–30. https://journals.ekb.eg/article_159806_80a61d0f07817d670bc24b5bb1ff75f5.pdf

Alhubaishy, A., & Aljuhani, A. (2021). The challenges of instructors' and students' attitudes in digital transformation: A case study of Saudi universities. *Education and Information Technologies*, *26*, 4647–4662. https://doi.org/10.1007/s10639-021-10491-6

Ali, Z. (2019). The digital age teacher: Aspirations and challenges. *Educational Journal of the Faculty of Education, Sohag*, *68*, 3105–3114. https://search.emarefa.net/detail/BIM-10971

AlMutref, A. R. (2020). The digital scientific transformation of university education in light of diversity between public and private universities from the perspective of faculty members. *Journal of*

the Faculty of Education, Assiut University, *36*(7), 157–186. https://digitalcommons.aaru.edu.jo/jfe_au/vol36/iss7/6/

AlNimri, M. (2023). The impact of digital transformation on public schools in facing the continuous challenges and developments in the world from the perspective of teachers in the Makkah region. *Journal of Educational and Psychological Sciences*, *7*(30), 1–18. https://journals.ajsrp.com/index.php/jeps

AlOmari, R. (2020). *The degree of awareness of Jordanian university students of the concept of digital culture and its relationship to its themes* [Master's thesis, Middle East University, Amman, Jordan]. https://search.mandumah.com/Record/1129899

AlQarni, Z. (2021). The degree of contribution of Saudi universities to digital empowerment among students. *King Abdulaziz University Journal*, *29*(2), 247–290. https://www.kau.edu.sa/Files/320/Researches/73799_46971.pdf

AlSaadi, M. (2021). The degree of readiness for digital learning in Jordan during the Corona pandemic from the perspective of teachers in the North of Jordan. *Journal of the Faculty of Education, Assiut University*, 61–90. https://mfes.journals.ekb.eg/article_165477.html

Al-Sayed, K. (2022). *The reality of digital transformation in Jordanian universities from the perspective of administrators and faculty members* [Master's thesis, Middle East University]. https://journalajpas.com/index.php/AJPAS/article/view/533

Al-Shamrani, A. (2019). The impact of employing digital learning on the quality of the educational process and improving its outcomes. *Arab Journal of Educational and Psychological Sciences*, *3*(8), 145–170. https://search.shamaa.org/FullRecord?ID=241864

Al-Shamrani, S. (2019). Digital education in light of the Kingdom of Saudi Arabia's Vision 2030. *Arab Journal of Specific Education*, *6*, 119–124. http://search.shamaa.org/PDF/Articles/EGAjqe/AjqeNo6Y2019/ajqe_2019-n6_119-124.pdf

Al-Sharif, D. (2021). A proposed vision for establishing an enabling environment for the success and sustainability of digital transformation in education in light of Egypt's digital vision. *Educational Journal of the Faculty of Education, Sohag University*, *91*(91), 3561–3604. https://journals.ekb.eg/article_196346.html

Al-Silawi, M. (2024). The impact of digital education on the educational and ethical process. *Qarar Journal for Scientific Research*, *5*(2), 224–246. https://www.elqarar.com/wp-content/uploads/2024/05/elqarar_silawi_224-246_5-2-1-2024.pdf

Al-Zain, A. (2016). Digital transformation for the era of digital education: Cognitive advancement or methodological regression. Paper presented at the 11th International Conference of the Generation Research Center on Learning in the Age of Technology. Generation Research Center (Lebanon). http://jilrc.com/archives/4921

Alzoebi, A., Ghunaimat, M., & Alawneh, E. (2023). The effects of flipped classroom strategy based on "ADDIE model" for algebraic skill development. *Anatolian Journal of Education*, *8*(1), 141–158. https://www.eaje.net/images/dosyalar/aje_2023_1_10.pdf

Assaf, H. (2023). The role of digital transformation in education in the development of digital culture among female public-school students and the obstacles they encounter from their teachers' point of view. *Dirasat: Educational Sciences*, *50*(2), 463–476. https://doi.org/10.35516/edu.v50i2.691

Bahar, Y., Ahmad, R., Nurfarhanah, N., & Ardi, Z. (2022). Digital transformation and teacher's shifting role: The impact on the learning attitude of students (Case study in high school). *International*

Journal of Educational Review, Law and Social Sciences, *2*(6), 855–866. https://radjapublika.com/index.php/IJERLAS

Balaj, A. (2024). The role of digital technology and artificial intelligence in improving education: A review of challenges and opportunities in the era of digital transformation. *Journal of Scientific Development for Studies and Research*, *5*(18), 268–282. https://jsd.sdevelopment4.com/index.php/jsd/article/download/217/222/886

Balyer, A., & Oz, O. (2018). Academicians' views on digital transformation in education. *International Online Journal of Education and Teaching*, *5*(4), 809–830. https://www.researchgate.net/publication/333354818_Academicians'_views_on_digital_transformation_in_education

Bilyalova, A., Salimova, D., & Zelenina, T. (2020). Digital transformation in education. In *Integrated science in digital age: ICIS 2019* (pp. 265–276). Springer International Publishing. https://doi.org/10.1007/978-3-030-47945-9_27

Dalia, M., Edith, F., & Amalya, L. (2014). The Albert Einstein archives digitization project: Opening hidden treasures. *Library Hi Tech*, *32*(2), 318–335. http://dx.doi.org/10.1108/LHT-07-2013-0084

Grand-Clement, S. (2021). Digital learning: Education and skills in the digital age. *RAND Europe*. https://www.rand.org/pubs/conf_proceedings/CF369.html

Kandemir, M., & Bay, Y. (2024). The effect of digital stories on 4th grade students' fluent reading skills. *Anatolian Journal of Education*, *9*(2), 79–90. https://e-aje.net/volumes/270-october-2024,-volume-9,-number-2

Maksimović, J., & Dimić, N. (2016). Digital technology and teachers' competence for its application in the classroom. *Istraživanja U Pedagogiji*, *6*(2), 59–71. https://www.researchgate.net/publication/311989031_Digital_technology_and_teachers'_competence_for_its_application_in_the_classroom

Malkawi, S. (2022). The actual reality of digital learning practices from the perspective of principals of private schools in the Northern Region. *Journal of Natural and Human Sciences*, *3*(10). https://doi.org/10.53796/hnsj31013

Norton, A., Shroff, S., & Edwards, N. (2020). *Digital transformation: An enterprise architecture perspective*. Publish Nation Limited. https://www.researchgate.net/publication/341297551_Digital_Transformation

Sharir, R. (2023). Digital transformation in higher education in the southern governorates of Palestine. *Journal of the Association of Arab Universities for Higher Education Research*, *43*(3), 217–234. https://digitalcommons.aaru.edu.jo/jaaru_rhe/vol43/iss3/14

Tawfiq, S., & Shahata, H. (2021). Digital transformation and its role in developing educational institutions. *Middle East Journal of Cultural and Human Sciences*, *1*(5), 461–488. https://doi.org/10.56961/mejhss.v1i5.246