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# Digital transformation in higher education for achieving sustainable development goals in conflict zones: a case study of An-Najah National University

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Digital transformation (DT) is increasingly recognized as a vital strategy for advancing education and achieving the Sustainable Development Goals (SDGs). In conflict-affected regions, however, its implementation faces distinct challenges tied to political instability, financial constraints, and weak legal frameworks. This study explores how DT is being adopted in higher education through a case study of An-Najah National University (NNU) in Palestine. Using a qualitative design, data were collected through semi-structured interviews with senior decision-makers and DT specialists, supported by an analysis of institutional practices. Results show that DT tools have improved educational access, strengthened resilience, and enhanced administrative efficiency. Online and blended learning enabled students to continue their education despite checkpoints and closures, while digital correspondence reduced paperwork and streamlined communication. At the same time, significant barriers remain, including fragmented governance, limited infrastructure, and the absence of clear legal frameworks. The study concludes that DT can serve as a resilience mechanism in conflict-affected regions by enabling continuity and inclusivity in education, but its full potential depends on targeted policy reforms, capacity-building efforts, and stronger international partnerships. By situating the Palestinian experience within the broader context of fragile and resource-constrained regions, this research contributes practical insights for institutions worldwide that face similar challenges.

## KEYWORDS

conflict zones, higher education, digital transformation, sustainable development, education technology, socio-political challenges, capacity building

# 1 Introduction

Digital transformation (DT) has emerged as a critical force in the 21st century, profoundly reshaping the economy, society, education, and job markets (Rosalina et al., 2021; Quy et al., 2023). It is a pressing concern for organizations and educational institutions striving to maintain competitiveness and leadership in a rapidly evolving world (Niță and Guțu, 2023). This transformation introduces pedagogical innovations in classrooms, evaluation processes, and student monitoring systems (Mhlanga, 2023), offering what is considered “one of the most efficient solutions to the problems in the educational system [enabling it to] adapt to the changes in technology” (Ghnemat et al., 2022, p. 225). Additionally, Zhao et al. (2024) emphasize that DT is a powerful driver of organizational change, enhancing their capabilities and adaptability. Similarly, Verhoef et al. (2021, p. 889) define DT as “a change in how a firm employs digital technologies to develop a new digital business model that helps to create and appropriate more value for the firm.” Expanding this perspective, Vial (2019, p. 118) describes DT as “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies.” Taking a broader approach, Legner et al. (2017, p. 301) conceptualize DT as a “process of adopting and using technologies in broader individual, organizational, and societal contexts.”

In the educational sector, McCarthy et al. (2023, p. 3–9) define DT as “a realignment of education models utilizing digital technology to engage students, teachers, parents, and leaders more effectively at every point in the students’ schooling journey.” They describe it as an initiative that integrates people, data, and processes to generate a better environment for members of a society, and preparing students, educators, system leaders, and others for future changes and innovations. Zizikova et al. (2023) highlight how digital technologies enhance students’ knowledge, significance, and effectiveness, thereby streamlining the educational process. They also stressed that teachers must continuously improve their digital skills and literacy as educational institutions undergo rapid digital transformation.

These definitions collectively suggest that DT fosters positive changes across various dimensions of human life, forming a close link with sustainable development. Sustainable development is broadly defined as an “approach to social, economic, and environmental planning that attempts to balance the social and economic needs of present and future human generations with the imperative of preserving, or preventing undue damage to, the natural environment” (Kulik, 2019). The United Nations frames it as “how we must live today if we want a better tomorrow, by meeting present needs without compromising the chances of future generations to meet their needs” (Yinuo, 2023). Moreover, Kleespies and Dierkes (2022) underscore the pivotal role of educational institutions in equipping students with the skills and values essential for achieving sustainable goals.

Hashim et al. (2021) identify DT as the “roadmap” to sustainable education. Alojail and Bhatia (2023) explore the intersection of DT and sustainability, showing how digital technologies align with specific sustainable development goals, such as building innovative and inclusive infrastructure (Goal 9) and ensuring access to modern energy (Goal 7). Similarly, Robertstone and Lapina (2023) argue that DT fosters innovation, enhances knowledge and skills, aligns supply and demand, improves risk management, and increases service

accessibility and affordability. These contributions illustrate DT’s transformative potential to advance sustainable development goals, especially through educational empowerment. Robbins et al. (1999, p. 381) define empowerment as the “process by which individuals and groups gain power, access to resources and control over their own lives... to achieve their highest personal and collective aspirations and goals.”

While existing studies highlight the potential of DT in advancing sustainable education, little is known about its implementation in politically unstable contexts, particularly in higher education institutions in conflict zones. This gap is especially pertinent in regions like Palestine, where political instability, movement restrictions, and economic hardships present distinct challenges to digital innovation (Mahamid et al., 2023). This study aims to fill this gap by examining how DT is deployed in such environments and its impact on sustainable development goals (SDGs). Moreover, this research aims to broaden the conversation about the value of DT in higher education by examining its potential to drive development in conflict zones. Specifically, the study seeks to identify the political, infrastructural, and financial challenges that impede the implementation of DT technologies, with a particular focus on sustainability. The findings will provide policymakers and educational institutions with insights on incorporating technology to support educational and developmental programs in similar environments. Furthermore, this study strives to reinforce sustainable development in Palestine by offering practical strategies for enhancing DT efforts in educational institutions within conflict zones. By strengthening social and economic resilience through education, the research seeks to address the central question: How can educational institutions in conflict zones effectively use DT technologies to improve the educational process and contribute to sustainable development despite existing obstacles?

To answer this question, the study focuses on An-Najah National University (NNU) as a case study, offering practical recommendations for universities in conflict zones to leverage digital tools for advancing education and development. NNU was chosen for this research due to its status as one of the largest and most prominent higher education institutions in Palestine. With approximately 25,000 enrolled students and international rankings in sustainability and innovation, NNU serves as a meaningful and illustrative case for exploring DT in conflict zones (An-Najah National University, 2024). Its early adoption of digital platforms, strategic initiatives in blended learning, and its location in a politically volatile region provide a unique context to assess both opportunities and challenges in DT implementation. By addressing this gap in the literature, the research provides valuable empirical data on the use of DT technologies in politically unstable environments, yielding insights applicable to higher education institutions in Palestine and other regions facing similar geopolitical and economic constraints.

## 2 Literature review

Sustainable development, with its 17 goals, has become a central focus for organizations and institutions striving to address social, economic, educational, and environmental challenges (Sarkis and Ibrahim, 2022). These Sustainable Development Goals (SDGs) aim to promote global equity, well-being, and environmental stewardship,

providing a comprehensive framework for addressing complex issues. Numerous studies have examined the impact of SDGs on various aspects of human life, consistently highlighting the pivotal role of digital transformation (DT) in advancing these objectives. The interplay between DT and sustainable development has gained increasing attention, particularly in regions with distinct cultural, political, and economic contexts, such as Palestine (Mahamid et al., 2023). While the global literature emphasizes the importance of infrastructure and strategy, studies from conflict zones reveal unique constraints. Khlaif et al. (2024) and Salameh (2023) detail how mobility restrictions, fragmented governance, and economic hardship limit access to digital tools and hinder institutional reform in Palestine. Unlike stable environments, institutions in conflict zones must simultaneously build infrastructure, reform legal frameworks, and navigate political instability—creating a complex, multi-layered challenge for DT adoption. Moreover, DT continues to reshape educational systems worldwide making its role in achieving SDGs through higher education a critical area of study. In the Palestinian context, where instability and resource constraints pose unique challenges, understanding how DT can support sustainable education is vital. This review delves into the transformative role of DT in advancing SDGs, particularly in higher education (Khlaif et al., 2024; Hattab, 2022). It focuses on the challenges and opportunities associated with digitalizing education in Palestine, where infrastructural and political barriers often hinder progress. Special attention is given to An-Najah National University (NNU), which serves as a case study demonstrating the potential of DT to drive educational innovation and foster resilience in conflict zones.

## 2.1 Digital transformation and SDG

Digital transformation (DT) is increasingly recognized as a powerful driver of Sustainable Development Goals (SDGs). Alojail and Bhatia (2023), for example, argue that aligning DT initiatives with SDGs enhances long-term sustainability, while Feroz et al. (2021) emphasize DT's contribution to pollution control and sustainable production. These findings suggest that DT is not merely a technological upgrade, but a strategic enabler of socio-environmental progress. However, most of these studies emerge from stable contexts, revealing a gap in the literature concerning DT's environmental and developmental role in conflict-affected regions. Qolamani and Mohammed (2023) adds further evidence by showcasing DT's capacity to improve accessibility and promote international academic collaboration, enabling students to achieve their full potential through digital platforms.

## 2.2 Institutional readiness and strategic adoption

Marks et al. (2021) and Quy et al. (2023) converge on the importance of institutional readiness but diverge in context and outcomes. Marks points to the lack of a holistic vision and IT literacy in UAE institutions post-COVID-19, while Quy documents how a phased approach in Vietnam—covering infrastructure, legal frameworks, and training—resulted in measurable success. The contrast highlights that without cohesive planning and institutional commitment, DT efforts risk stagnation. Palestinian universities,

including NNU, often suffer from limited autonomy, fragmented governance, and resource dependency, suggesting that Vietnam's model may be aspirational but currently unfeasible without structural reforms. Furthermore, George and Wooden (2023) emphasize the role of strategic regulation in enabling successful DT, especially in 'smart universities' where AI implementation brings both opportunities and ethical risks, including privacy threats and job displacement.

## 2.3 DT and educational equity in resource-constrained settings

Studies like Mhlanga (2023) and Shenkoya and Kim (2023) emphasize DT's role in promoting access through online and asynchronous learning. Mhlanga highlights cost-effectiveness and coverage in underserved areas, whereas Shenkoya and Kim focus on preparing students for a digital workforce. Kleespies and Dierkes (2022) add a global student perspective, showing greater emphasis on educational equality in low-income countries. Together, these studies affirm DT's potential to reduce educational disparities—yet they also reveal a shared challenge: digital inequality persists when infrastructure and affordability are not addressed. This is particularly acute in Palestine, where internet access, device availability, and mobility restrictions compound the issue. George and Wooden (2023) further demonstrate how DT enhances teaching methods, resource management, and personalized student support—benefits that are critical for under-resourced settings. Additionally, Mhlanga (2023) calls for systemic policy reforms and investments in digital infrastructure to counter persistent challenges such as poverty, technological limitations, and skill gaps.

## 2.4 Barriers in conflict zones: the Palestinian context

In conflict zones such as Palestine, the adoption of digital transformation (DT) in higher education institutions poses a complex yet critical challenge for achieving Sustainable Development Goals (SDGs). The unique political, social, and economic conditions in these regions profoundly shape institutions' capacity to innovate and deliver accessible, high-quality education. Despite these challenges, digital transformation offers transformative opportunities to mitigate the impacts of instability, making it an essential component of progress toward sustainable development. Through the integration of technology, universities in conflict zones can overcome significant barriers posed by political and economic constraints.

Leveraging DT tools facilitates the development of a culture of innovation and adaptability, aligning institutional objectives with broader SDG targets (Qadri et al., 2025). For example, virtual learning platforms enable students to continue their studies despite movement restrictions, while digital collaboration tools connect Palestinian scholars with international academic networks and encourage intellectual growth (Khlaif et al., 2023). These opportunities mirror findings from other fragile settings. In Colombia, co-production between universities and public bodies has shown that DT initiatives grounded in citizen participation can “enhance trust, legitimacy, and public value,” offering lessons for societies where state authority is contested (García Camargo et al., 2025). Similarly, research on post-conflict higher education in Syria demonstrates that DT can “enable

access, continuity, and resilience where traditional infrastructure is compromised,” highlighting its potential to preserve learning even amid systemic disruption (Bajger et al., 2025).

Despite these possibilities, the political and economic realities in Palestine weigh heavily on implementation. Occupation-related restrictions and the division between Gaza and the West Bank create a fragmented policy framework that hinders coherent national strategies. Studies by Khlaif et al. (2023) and Rosenthal (2020) emphasize how the Israeli occupation, travel restrictions, and the bifurcation between the Gaza Strip and West Bank have produced a disjointed regulatory framework. This fragmentation hinders the development of cohesive national education policies, undermining institutional efforts to align with global SDG targets. Hitman (2023) further links these political realities to broader economic hardship, demonstrating how instability directly impacts digital innovation, public health, and education systems. Comparable challenges are noted in Latin American fragile settings, where DT requires co-production strategies that enhance trust, legitimacy, and public value to overcome governance deficits (García Camargo et al., 2025).

Economic conditions in Palestine significantly constrain investments in critical DT infrastructure. Salameh (2023) and Khlaif et al. (2024) document underfunded IT systems, lack of high-speed internet, and insufficient professional development programs. Students also face steep financial hurdles, including the inability to afford digital devices or consistent internet access. These constraints exacerbate educational inequalities and threaten progress toward SDG 4: quality education. The literature reveals a shared global insight: without adequate infrastructure and investment, the benefits of DT remain unevenly distributed. Research from Kosovo’s higher education sector similarly highlights how weak infrastructure, limited training, and resistance to change can stall sustainable DT, even when leadership and vision are in place (Veseli et al., 2025).

Internal challenges within Palestinian institutions compound these barriers. As Khlaif et al. (2024) note, the absence of a unified legal framework regulating DT in higher education leads to inconsistent policy adoption and fragmented implementation. Comparable lessons emerge from conflict-affected higher education in Syria, where DT initiatives are effective only when supported by “context-specific governance, resilience planning, and sustainable funding models” (Bajger et al., 2025). Itmazi and Khlaif (2022) argue that a successful digital transformation requires not just technology but a cultural and organizational shift—one in which digital tools are fully embedded within teaching, research, and administrative processes. Yet without clear strategies and regulatory backing, universities struggle to maintain momentum or scale pilot initiatives.

Despite systemic challenges common to Palestinian institutions, such as fragmented governance, socioeconomic disparities, and legislative obstacles, An-Najah National University (NNU) has made notable progress in adopting digital transformation. These efforts extend beyond institutional growth, offering a potential blueprint for how universities in conflict zones can adapt to global trends and contribute meaningfully to the SDGs.

## 2.5 An-Najah National University and DT

The digital era has driven higher education institutions worldwide to enhance students’ learning experiences by leveraging digital

technologies (Hashim et al., 2021). Among these institutions is An-Najah National University (NNU), a prominent Palestinian university with approximately 25,000 enrolled students and 2,000 employees (academic and administrative). The university offers 128 bachelor’s programs and 91 master’s and Ph.D. programs (An-Najah National University, 2024). Recognized globally for its achievements, NNU has secured positions in various international rankings, including the QS University Ranking, Times Higher Education World University Ranking, Webometrics Ranking, and the UI GreenMetric World University Ranking. It has made notable advancements in integrating technology to improve educational services and strengthen its contribution to the United Nations’ Sustainable Development Goals (SDGs), including quality education, gender equality, innovation and infrastructure, and partnerships.

Since the early 2000s, NNU has implemented digital transformation (DT) tools across multiple sectors to enhance its operations. According to S. Affouneh (personal communication, June 5, 2024), the establishment of the e-Learning Center marked a significant milestone, leading to numerous achievements such as recorded lectures, open courses, Massive Open Online Courses (MOOCs), the Moodle learning platform, Open-Model Online (OMO) systems, training courses on artificial intelligence (AI) and DT, and the adoption of blended learning methodologies. One example is the Faculty of Graduate Studies. The Palestinian Minister of Education, Dr. K. Barham (personal communication, June 2, 2024) explained that the faculty has integrated DT by teaching students’ essential digital skills, offering blended and online lectures, utilizing digitized assessment methods, and conducting supervisor and thesis defence sessions via Zoom. These initiatives aim to advance SDGs, particularly quality education, equality, and the right to education for all.

However, NNU’s location in Nablus, a city within a conflict zone, imposes unique challenges that consistently affect the educational process. The city is surrounded by seven permanent military checkpoints, 20 iron barriers separating it from nearby villages and cities, and frequent military invasions and lockdowns. These conditions often prevent employees and students from accessing university campuses. A letter sent to the Palestinian Minister of Education from the Directorate of Education in South Nablus on June 13, 2024, emphasized these barriers. According to A. Abu Wardeh (personal communication, June 11, 2024), there are nearly 600 permanent military checkpoints and countless temporary checkpoints across the West Bank, fragmenting it into segregated zones with restricted movement. Similarly, Shamali (2021) reported how Israel’s separation wall has physically divided Palestinian communities, further restricted movement and preventing many students from reaching their universities.

To ensure the continuity of education amidst these challenges, NNU has adopted innovative procedures. For example, F. Abudheir (personal communication, June 11, 2024) noted that the university turned to blended and online learning as a solution during closures. According to Affouneh, NNU has utilized DT tools through initiatives designed to support students during conflicts. Despite significant challenges—such as restricted freedom of movement, lack of security, poor technology infrastructure caused by import restrictions, and ongoing economic crises—the university has managed to implement sustainable projects. These include digital programs, courses, learning centres, and the development of digitized materials to maintain and



enhance the educational process. However, another major challenge to advancing DT at NNU is the legal dimension. As will be explored in the next section, the absence of a unified legal framework regulating the implementation of DT remains a critical obstacle. Developing clear legislative and regulatory structures is essential to standardizing and streamlining the DT process across Palestinian higher education institutions.

## 2.6 Legal and ethical gaps in DT implementation

A major unresolved issue across Palestinian higher education is the legal void surrounding DT. Interviews conducted with NNU stakeholders highlight the need for legislative clarity to safeguard intellectual property, ensure academic integrity in digital settings, and formalize data privacy norms. Without a national regulatory strategy, DT efforts risk becoming piecemeal and unsustainable. While some argue that DT may negatively impact educational institutions by limiting their publicity and restricting knowledge transfer in developing countries (Komljenovic, 2020), others emphasize the need to protect intellectual property rights as private property under national and international laws (Khlaif et al., 2023). These divergent perspectives highlight the complexity of the legal dimension in digital education. Furthermore, most Arab countries, including Palestine, still lag behind in developing tailored legal frameworks to regulate DT in the educational sector (Alhajri, 2019).

While the Palestinian government has introduced laws to govern digital technologies, these regulations fail to address the specific needs of higher education (Khlaif et al., 2024; Hattab and Mahamid, 2024). This gap underscores the urgent necessity for legislators and education administrators to formulate policies and laws that align with the unique requirements of educational institutions. The absence of robust legal regulations generates several challenges for digital transformation in education. These include concerns over intellectual property rights for electronically published materials, plagiarism prevention, recognition of academic certificates, and cheating in digital environments (Grassini, 2023; Sullivan et al., 2023; Katsamakos et al., 2024). Without clear legal and ethical guidelines, stakeholders may lose confidence in the fairness and legitimacy of digital education processes. Peláez-Sánchez et al. (2024) identified ethical and legal concerns as accounting for 20% of the challenges associated with implementing advanced technologies, such as artificial intelligence (AI), in education. They stressed the importance of urgently establishing ethical and legal frameworks to guide the use of these technologies.

Accordingly, researchers cross diverse contexts raise red flags about legal and ethical readiness. George and Wooden (2023) focus on the risks of unregulated AI in education, while Peláez-Sánchez et al. (2024) quantify legal and ethical challenges as comprising 20% of barriers in tech adoption. In Palestine, Khlaif et al. (2024) and Hattab and Mahamid (2024) show a total absence of sector-specific legal instruments, resulting in unstandardized practices. Unlike nations with institutionalized data governance, Palestinian higher education operates in a legal vacuum, making institutions vulnerable to privacy breaches, misuse of content, and disputes over intellectual property. The literature confirms the need not only for national legislation but also for internal institutional codes to

operationalize ethical DT usage. To explore, outdated legal frameworks leave educators, students, and institutions vulnerable to issues such as intellectual property violations, data breaches, and ambiguous regulations on online assessments. As Khlaif et al. (2023) and Sidani (2018) observe, ethical principles—rooted in shared conceptions of right and wrong—are essential for regulating human activities, including education and the adoption of DT. Such principles are particularly critical in environments where traditional legal systems fail to provide sufficient protection. The shift from traditional classroom-based teaching to online and digital learning further highlights legal challenges related to data privacy, copyright protection, and ethical standards (Guo et al., 2019).

In online environments, copyright concerns extend to the use of third-party materials, such as videos, images, and music, which require explicit permission or adherence to fair-use policies. According to Priatna et al. (2020), educational institutions must develop internal policies that define the rights and responsibilities of educators, students, and technical teams. For instance, institutions should ensure copyright protection for digital teaching materials, secure data privacy for students and faculty, and establish guidelines for the ethical use of digital platforms. Additionally, real-time digital interactions, such as live-streamed lectures, introduce new legal and ethical complexities. As Bokovnya et al. (2020) note, inappropriate behavior or language during live classes could result in reputational damage or legal consequences for participants. Educational institutions must therefore implement policies that not only outline expected ethical behavior but also educate their communities on the legal implications of digital learning environments. Accordingly, addressing these legal challenges requires a multi-faceted approach. First, governments and education policymakers must advocate for updated legal frameworks that specifically address the requirements of digital education. Second, institutions should create comprehensive internal policies to guide ethical and legal behavior, protect intellectual property, and safeguard data privacy. By implementing these measures, universities like An-Najah National University (NNU) can overcome legal obstacles to digital transformation and set a benchmark for achieving SDGs in conflict zones.

NNU has already begun taking proactive measures to address the legal challenges of DT. For example, the university has issued an e-Learning Code of Ethics, which outlines key legal and ethical principles for DT implementation, including provisions for security and privacy, intellectual property rights, cyberbullying prevention, access to information, partnership and collaboration, and accountability (Sabah et al., 2020). At the national level, the Palestinian Minister of Education, Dr. Barham (personal communication, June 13, 2024), affirmed the existence of regulations protecting graduate theses from manipulation or plagiarism. Additionally, N. Adas and G. Khaled (personal communication, June 13, 2024) recommended that Palestinian university law faculties collaborate to draft regulations specifically tailored to DT in education.

In a region grappling with the challenges of conflict, such as limited infrastructure, economic crises, and restricted movement, robust legal frameworks and internal policies serve as essential tools for sustaining the educational process. For Palestinian universities like NNU, these measures are not just administrative requirements, they rather represent a lifeline for preserving and advancing education in an endangered academic environment.

### 3 Methodology

This study adopted a qualitative research approach to explore the utilization of digital transformation (DT) tools at An-Najah National University (NNU). The research design was exploratory, relying primarily on semi-structured interviews and thematic analysis to gain in-depth insights into the university's attitudes, plans, and general policies regarding the implementation of DT tools.

Data were collected through semi-structured interviews with individuals in decision-making positions at the university, as well as with experts specializing in the development and implementation of DT programs. The interviews aimed to capture participants' experiences, perspectives, and evaluations of the effectiveness of DT technologies in supporting the educational process and addressing potential challenges. The qualitative data collected from the interviews were analyzed using thematic analysis to identify key patterns and themes related to the adoption and impact of DT tools at NNU.

#### 3.1 Participants

A purposive sampling strategy was adopted to ensure the inclusion of participants with substantial knowledge and direct involvement in digital transformation (DT) initiatives at An-Najah National University (NNU). The selection of participants was guided by their specific roles and expertise, which positioned them to provide valuable and contextually rich insights into both the opportunities and challenges of DT implementation at the university—particularly within the unique context of operating in a conflict zone.

In total, 13 participants were included in the study. These were divided into two key groups:

Senior decision-makers ( $n = 9$ ): This group included the university president, vice president for academic affairs, vice president for administrative affairs, vice president for planning, president's assistant for digitalization and e-learning, dean of graduate studies, dean of scientific research, dean of the Faculty of Medicine and Health Sciences, and Dean of the Faculty of Law and Political Science. Their participation was essential due to their strategic perspectives on university policy, planning, and the integration of DT across academic and administrative domains.

DT program specialists ( $n = 4$ ): This group comprised the manager of the Community Service and Continuing Education Center, the Head of the Artificial Intelligence and Virtual Reality Research Center, the Director of An-Najah Innovation Park, and a specialist from the Faculty of Communication and Digital Media. These participants were selected for their specialized knowledge and hands-on experience in implementing and evaluating DT tools and strategies.

The sample size was determined in accordance with qualitative research norms, prioritizing information-rich cases over numerical representation. The decision to include these specific participants was justified by the need to gather comprehensive, multi-perspective insights from those most intimately involved in DT processes at NNU. Interviews continued until thematic saturation was achieved—meaning that additional interviews no longer generated new information or themes relevant to the research questions. This approach ensured both the depth and breadth of data necessary to address the study's objectives.

#### 3.2 Data collection

Interview dates were arranged via phone calls or emails, and questions to be asked were clarified. The first group of questions focused on the university vision, attitudes and plans toward merging DT tools into the educational process, while the second group dealt with programs the university has already implemented to achieve DT. Each interview was attended by three of the researchers, and the answers were all written down and printed. In cases where the interviewee gave consent, the interviews were recorded adding more authenticity to the results of the study. Once ready, the printed answers to the interview questions were sent back to all the interviewees to check that everything is as they said exactly without any modification or change in intended meaning. The final stage was arranging and analyzing the responses so as to extract final results. All analyzed responses were once again revised to check their exactness compared with interviewee responses.

To ensure reliability and adherence to research ethics, the study obtained approval from the Institutional Review Board (IRB) at NNU. Additional permissions were secured from the offices of the university president and vice president for conducting the research and collecting information.

#### 3.3 The translation process

Participants' responses to the interview questions were in Arabic, so the researchers applied a conceptual equivalence translation method alongside back-translation to ensure accuracy and reliability. First, a translator converted the responses and themes from Arabic to English. The researchers thoroughly reviewed these translations to identify and correct any technical inaccuracies or potential misunderstandings of concepts. Following this, a second translator, unaware of the original Arabic content, back-translated the English version into Arabic. This step ensured consistency and conceptual equivalence between the original and translated versions.

The researchers then compared the back-translated Arabic text with the original responses, focusing on maintaining the intended meaning and concepts. The comparison revealed a high degree of alignment, with a 93% match between the original and translated versions, demonstrating the translations' reliability. Given the strong agreement and time constraints, the researchers opted not to consult a panel of translation experts. The thorough review and back-translation processes provided confidence that the translated themes accurately reflected the original material.

#### 3.4 Data analysis procedures

Participants' responses to semi-structured interview questions are considered as qualitative data utilized to address the research questions. An inductive thematic analysis was conducted to analyze the data following the six-step methodology proposed by [Braun and Clarke \(2006\)](#) ([Figure 1](#)). This process involved conducting and recording around 5 h of interviews. Prior to analysis, participant responses were cleaned and organized.

The second stage of the second phase of data analysis (see [Table 1](#)) involved the systematic development of a coding framework tailored

to the study’s objectives (Creswell and Miller, 2000). Determining validity in qualitative inquiry.

This process began with constructing a coding book, which was informed by themes derived from a comprehensive literature review. These themes were then categorized to capture the key factors contributing to challenges in adopting digital transformation (DT) in higher education institution. To ensure the reliability and validity of the coding framework, a pre-testing phase was conducted. Following this pre-test, adjustments were made to refine the coding process.

The final phase of data analysis involved systematically coding all responses using the established framework. To verify the trustworthiness of the analysis, the coded data were assessed through a comparison of agreement and disagreement rates between researchers. we utilized NVivo 12 software to manage and interpret the collected data effectively (see Table 2). The software supported the identification of key themes and subthemes, offering insights into the factors influencing the adoption of DT and the associated challenges faced by faculty and administrators. By using NVivo 12, we ensured a structured approach to understanding the underlying causes of the issues related to implementing DT in the educational context.

### 3.5 Nvivo role in data analysis

NVivo 12 qualitative analysis software played a central role in ensuring the rigor, organization, and transparency of our data analysis. After transcribing all interviews, the text files were imported into NVivo, where the software’s node creation function was used to establish a coding framework. Initially, broad parent nodes were

created to represent the main themes emerging from the data, such as “DT requirements,” “DT challenges,” “DT benefits,” “DT and scientific research,” “DT and education,” and “DT and administrative work.” Within each parent node, a series of child nodes were constructed to capture more specific subthemes, for example, “Building a clear policy for blending AI with education and scientific research” or “Privacy.” As we coded, relevant text segments from participant interviews were systematically assigned to the appropriate nodes, which allowed for the efficient sorting and retrieval of data throughout the analysis.

NVivo’s organizational capabilities were particularly valuable in handling the large volume of qualitative information, enabling us to quickly access, compare, and cross-reference coded data across different participants and stakeholder groups. To further strengthen the analysis, we utilized NVivo’s word frequency query to identify common terms and concepts, which helped verify and refine the subthemes by highlighting recurring language and ideas. Matrix coding queries were also employed to explore relationships and intersections between themes, such as how digital transformation requirements related to identified challenges or perceived benefits. This function enabled the comparison of perspectives between different participant categories, such as administrators and DT specialists.

NVivo’s features for data visualization, such as tree maps and coding stripes, provided an overview of theme distribution and coding density, helping to assess data saturation and thematic prominence. Furthermore, the software facilitated the extraction and organization of illustrative quotations for each subtheme, as presented in Table 2, ensuring that our thematic claims were consistently supported by evidence from the data.

TABLE 1 Coding book.

Participants	Main category	Sub category
“Digital transformation will continue even if oppressive conditions end as we live in an open world and are affected by its achievements as others” (A. Alkaiyat)	DT requirements at the university	Building a message and vision for digital transformation
“The university aims at establishing intellectual property protection policies that align with digital transformation” (N. Adas)	DT challenges	Intellectual property rights
“We focus on improving students’ technological skills to prepare them for workplace requirements” (K. Barham)	DT benefits	Improving students’ technological skills
“The university continues to communicate with other universities and organizations to enhance digital transformation strategies” (S. Affouneh)	DT requirements at the university	International cooperation
“All correspondence transitioning to electronic communication has led to faster communications and less time needed for administrative task execution” (S. Koni)	DT effects on administrative operations	Transitioning administrative correspondence to electronic correspondence

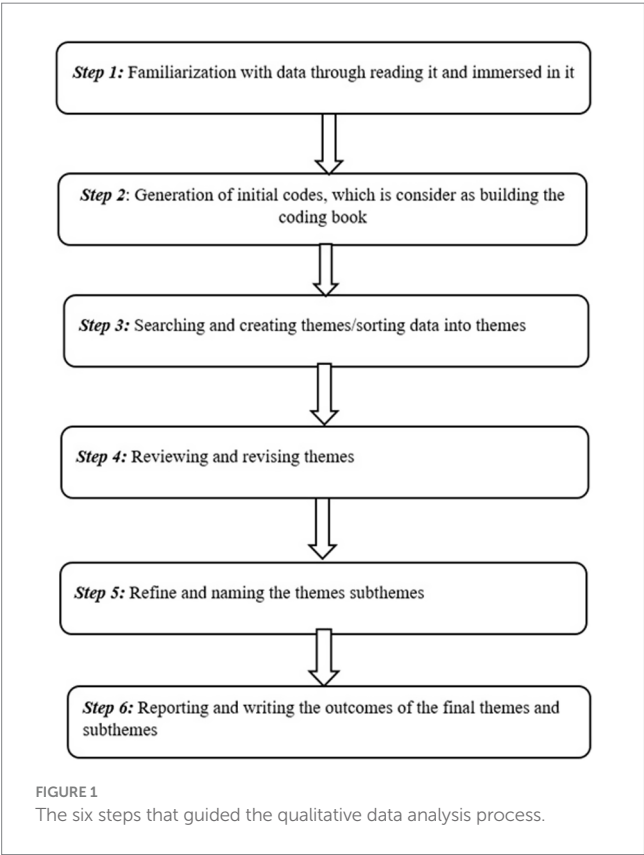


TABLE 2 Qualitative data analysis.

Theme	Subtheme	Example
DT requirements	Building a clear message and vision for DT	The university aims at improving a five-year DT and sustainable development vision and strategy.
	Improving DT infrastructure	The university is working to improve electronic infrastructure to confront technical challenges.
	Employee training	Conducting training courses to enhance employees' DT skills
	Building a clear policy for blending AI with education and scientific research	Establishing specialized committees for developing plans for blending AI with education and scientific research
	International cooperation	Expanding international cooperation with local and international organizations to benefit from digital transformation
DT challenges	Poor infrastructure	The university suffers from poor infrastructure which impedes e-learning implication
	Staff and student attitudes	Staff and students have varying attitudes toward DT
	Intellectual property rights	There is a need for developing intellectual property laws within the digital learning environment
	Privacy	Implementing policies and regulations to maintain staff and student privacy in virtual classes
	Technical and security risks	Securing systems against attacks to assure technical continuity
DT benefits	Facing challenges arising from being in a conflict zone	Facilitating blended learning implication to include both in-class and e-learning
	Improving students' technological skills	Training students to use technology and educational programs to improve their skills
	Increasing opportunities for learning and accessing information	Opening new horizons in distance learning and accessing global educational content
DT and scientific research	Enhancing scientific research quality	Enabling researchers to easily access electronic references and resources to enhance their research
	Providing electronic platforms and digital journals	Launching electronic platforms for scientific journals and digitizing all publications
DT and education	Enhancing blended learning	Implementing blended learning which includes both in-class and e-learning
	Developing open educational resources	Developing open educational resources accessible to a large segment of learners via the internet
DT and administrative work	Improving administrative efficiency	Digital transformation sped up work procedures and enhanced the efficiency of administrative work
	Transitioning from paper correspondence to electronic correspondence	90% of paper correspondence is now electronic, reducing the need for paper
	Developing a legal framework to protect staff and student rights	Enacting laws and legislations for protecting digital rights and regulating student behavior during virtual classes
	Adjusting digital learning instructions	Adjusting legislation to correspond to recent developments in digital learning

By leveraging NVivo 12 at each stage—from initial coding to theme refinement, pattern identification, and illustrative quotation extraction—we ensured that our analytic process was systematic, traceable, and robust. This comprehensive use of NVivo contributed significantly to the credibility, validity, and depth of our qualitative findings.

### 3.6 Trustworthiness

To minimize social desirability bias in a sensitive conflict setting, several measures were implemented. First, participants were assured of complete anonymity and confidentiality, with all identifying details removed from transcripts and reports. Interviews were conducted in a neutral and supportive environment, and researchers emphasized that there were no “right” or “wrong” answers, only the participants' own experiences and perspectives. Open-ended and non-leading

questions were used to avoid shaping responses. Moreover, interviews were conducted in Arabic, the participants' native language, to ensure comfort and authenticity. To further reduce bias, member checking was applied: participants reviewed their transcripts and verified that their responses were accurately captured. Triangulation across different participant groups (senior decision-makers and technical specialists) also minimized overreliance on a single perspective. These strategies collectively helped to reduce the risk of socially desirable responses and enhance the credibility of the data.

## 4 Findings & results

All study participants focused on the importance of adopting DT in higher education institutions, particularly in conflict zones. The qualitative data was analyzed and divided into seven main categories



including DT requirements, DT challenges, benefits of DT particularly in conflict zones, DT and scientific research, and DT and administrative work. Each category included a number of subcategories which the participants referred to in the individual interviews. The following will provide a detailed explanation of the results.

## 4.1 Digital transformation requirements at the NNU

All participants agreed that DT requires a number of conditions and requirements to be met to prove successful in the field of education. The first element all participants agreed on is building a clear vision and message for DT. It is agreed by all participants that having a clear vision and strategy reflects future trends and assures the continuity of the transformation process. They stated that the university is working on a five-year DT strategy to achieve long-term goals. One participant assured that, “DT will continue even if oppressive conditions come to an end as we live in an open world and are affected by its achievements as others” (A. Alkaiyat, personal communication, June 5, 2024).

Another element is improving DT infrastructure which has been considered by some participants as a major component in the transformation process. They believe the university needs to improve its networks, databases, and devices to assure efficient digital transformation. One participant said, “We are constantly working on improving our digital infrastructure and transitioning all services to electronic systems” (Affouneh, 2024). Participants pointed to the necessity of training university staff, faculty, and students to equip them with the digital skills necessary for dealing with DT. They mentioned the course the university conducted specialized in technology utilization and AI for the benefit of transformation. “We are training staff members continuously through courses and workshops specialized in DT and its applications,” (K. Issa, personal communication, June 7, 2024). Further, some participants remarked on the need for clear policies for blending AI with education and scientific research to implement DT. They mentioned that the university has established specialized committees to develop this policy to foster innovation in the educational process. A participant stated that, “Blending AI with education has become a major component of the university’s policy” (W. Sweileh, personal communication, July 9, 2024).

Finally, most participants stressed the necessity to enhance cooperation with local and international organizations to benefit from their expertise in the field of AI and DT. Such cooperation can foster university potential. “The university seeks communication with other universities and international organizations to enhance digital transformation strategies” (Affouneh, 2024).

## 4.2 Digital transformation challenges at the NNU

Despite the optimistic opinions, some participants pointed out a number of challenges which impede digital transformation in higher education institutions. The main challenge pointed out by participants is poor infrastructure. It has been noted that poor digital infrastructure stands in the way of implementing e-learning and improving the educational process. According to Yasin (M. Yassin, personal

communication, June 2, 2024), the NNU is “constantly facing issues in internet availability which affects the digital educational process negatively.”

Another challenge mentioned by some participants is the variation in student and staff attitudes. Students and staff members vary in their readiness and willingness to participate in the DT process, which requires efforts to change prevailing perceptions. According to Alkaiyat (2024), “Not all staff members and students have the same skills in using technology, however, we are working on enhancing such skills gradually.”

Some participants emphasized the need for enacting intellectual property protection laws in a digitalized learning environment. They called for legal protection to assure rightful usage of digital resources and academic content. “The university is working on a policy that protects intellectual property and conforms to DT” (Adas, 2024).

Furthermore, all participants assured the importance of formulating clear policies to protect the privacy of both students and staff in the digital environment. They stressed that it is crucial to safeguard personal data and information related to the educational process. One participant stated that, “Protecting student and staff privacy is a priority for which the university is establishing rules” (N. Dwaikat, personal communication, June 13, 2024).

Finally, some participants mentioned the challenge faced by the university due to technical and security risks. It was noted that technical risks such as hacking are issues they have already encountered. Participants reaffirmed the need for protecting systems and ensuring the continuity of the educational process without disruptions or cyberattacks. “We are working on reinforcing digital security for electronic systems. We have to protect information and guarantee the safety of the educational process” (Yassin, 2024).

## 4.3 Digital transformation benefits for the NNU

Most participants pointed out that DT tools not only play a critical role in achieving Sustainable Development Goals (SDGs) but also help overcome obstacles caused by conflicts, such as a lack of safety, curfews, and roadblocks. “Curfews and roadblocks” (A. Zaid, personal communication, July 9, 2024) were frequently mentioned as barriers that DT can help mitigate. For example, A. Abu Wardeh (2024) stated that Nablus city is currently surrounded by seven roadblocks at its main entrances and 20 gates at the entrances of nearby villages, making it difficult for students to reach university campuses. As such, there is “a growing need for utilizing DT tools to help the educational process go on” (Barham, 2024).

Furthermore, all participants agreed that DT provides new opportunities for accessing global educational content, allowing the university to benefit from a wide range of educational resources. “Digital platforms open horizons for learning and teaching, increasing the chance to access information anywhere” (Affouneh, 2024). Some participants also highlighted that DT contributes significantly to enhancing students’ technical skills, preparing them for a technology-driven workplace. One participant remarked, “We focus on developing students’ skills in using technology to be well-prepared for the demands of the changing workplace” (Barham, 2024).

## 4.4 Digital transformation and scientific research at the NNU

Participants stated that DT significantly enhances scientific research by enabling researchers to easily access electronic resources, thereby improving the quality and accuracy of research. “Scientific research has benefited greatly from DT, and data platforms are now within reach” (Sweileh, 2024). Additionally, some participants noted that DT facilitates the improvement of electronic platforms and digitized journals, accelerating the publication process and promoting the global exchange of knowledge. A participant highlighted, “Publishing research electronically offers an opportunity to communicate with the global scientific community” (I. Warad, personal communication, June 6, 2024).

## 4.5 Digital transformation and education

The majority of participants stated that DT supports blended learning, combining in-class teaching with e-learning. This hybrid approach provides better learning quality and greater flexibility, especially in regions affected by conflict. “We are working on applying blended learning to maximize benefits for students” (Issa, 2024).

Additionally, participants mentioned that DT has enabled the development of open educational resources (OER), making self-learning more accessible and providing students with a wide variety of educational materials. “The university has developed open educational resources for the benefit of students from different specializations” (M. Sharaf, personal communication, June 15, 2024).

## 4.6 Digital transformation and administrative work

Most participants considered that DT has significantly sped up administrative procedures and increased their efficiency. This improvement is attributed to enhanced communication and the ability to accomplish tasks quickly. “Digital platforms contributed to enhancing administrative procedures and increased their efficiency” (S. Koni, personal communication, July 5, 2024).

Participants noted that the university has successfully transitioned 90% of its administrative paperwork to electronic correspondence, which has reduced reliance on paper and accelerated the exchange of information and decisions. One participant highlighted, “The transition to electronic correspondence accelerated communication and reduced the time required for executing administrative tasks” (Koni, 2024).

## 4.7 Improving regulations and policies

The participants stressed the need for the university to amend and improve its policies and regulations to align with the requirements of DT. This adjustment is essential for creating a supportive environment for digital transformation. Two main points were emphasized:

- 1 Developing a legal framework to protect staff and student rights: Participants agreed on the importance of enacting clear

rules to guarantee the protection of digital rights and regulate behavior during online classes. “We are working on enacting laws to specify technology use standards, and staff and student duties and responsibilities” (Adas, 2024).

- 2 Adjusting digital learning instructions: Participants also called for continuous updates to university instructions to ensure they align with contemporary DT advancements. This includes integrating distance learning as a fundamental part of the educational process and developing specific guidelines for exams and digital learning. One participant emphasized, “Updating university regulations continuously is a necessity to assure that they conform to DT and the requirements of modern education” (Adas, 2024).

## 5 Discussion

The results of the interview analysis align closely with previous literature on digital transformation (DT) and its role in development, both in organizations generally and in educational institutions specifically. They demonstrate that DT tools significantly enhance educational access, foster student resilience, and streamline administrative functions at NNU. These outcomes closely confirm prior studies by [Shenkoya and Kim \(2023\)](#) and [Qolamani and Mohammed \(2023\)](#), which document how DT promotes flexible learning and improves educational equity and accuracy while accelerating the publication and exchange of knowledge globally. The study by [Quy et al. \(2023\)](#) further affirmed DT’s positive effects on scientific research, citing its impact on a university in Vietnam. Similarly, the interviewees in this study confirmed that DT enhances research quality. Additionally, DT’s ability to provide opportunities for students in dangerous areas, or during military closures, to continue their education through online and blended classes was noted by both the interviewees and previous studies, such as [Mhlanga \(2024\)](#). Digital transformation therefore emerges as a practical response to the challenges of mobility restrictions, military checkpoints, and institutional disruptions—issues frequently encountered in conflict-affected areas such as Palestine, but also in other fragile contexts where physical access to education is disrupted.

NNU’s case also resonates with international experiences. In Syria, for example, digital technologies have been shown to “enable access, continuity, and resilience where traditional infrastructure is compromised” ([Bajger et al., 2025](#)). In Kosovo, universities implementing learning management systems faced staff’s resistance, weak infrastructure, and resource limitations similar to those in Palestine, suggesting that the struggle to embed DT is not unique but magnified in conflict conditions ([Veseli et al., 2025](#)). In Colombia, digital innovation was advanced through co-production between government and universities, demonstrating how citizen and institutional collaboration can “enhance trust, legitimacy, and public value” in fragile governance environments ([García Camargo et al., 2025](#)). Unlike these cases, however, NNU operates without state-led reforms or stable public partnerships, relying instead on institutional improvisation and international collaborations to keep DT initiatives alive. This comparison underscores that while DT can improve access, efficiency, and inclusion across fragile and resource-constrained settings, the Palestinian case is distinctive because it shows how

universities innovate under occupation and political fragmentation—where legal ambiguity and governance gaps weigh as heavily as technical barriers.

Furthermore, administrative improvements through digital correspondence and paper reduction at NNU reflect converging evidence from previous studies. For examples, [George and Wooden \(2023\)](#), [Alojail and Bhatia \(2023\)](#), and [Marks et al. \(2021\)](#) emphasize the positive effects of DT on organizations, particularly in terms of reducing the time required for administrative tasks and enhancing productivity. These findings were echoed by the interviewees in this study, who highlighted how DT speeds up administrative work, facilitates communication, and improves overall efficiency. They further noted that transitioning to electronic correspondence saves both time and effort, making it a valuable administrative tool. What sets NNU apart is its consistent emphasis on DT as a resilience mechanism in a conflict zone, which extends the existing literature by framing DT not only as a tool for efficiency but as a safeguard against systemic disruptions.

In terms of legal challenges, the interviewees emphasized the urgent need for a legal framework to ensure privacy, security, and regulated usage of DT tools, thereby addressing potential risks. This aligns with the findings of [George and Wooden \(2023\)](#), who called for policymakers to devise guidelines that ensure the responsible application of technology while addressing privacy and protection concerns. Similarly, [Mhlanga \(2024\)](#) underscored the necessity of policy reforms to support DT in education. The study found that challenges to DT at NNU stem from poor infrastructure, legal ambiguities, and varied attitudes among students and staff. These insights are in strong alignment with [Marks et al. \(2021\)](#) and [Quy et al. \(2023\)](#), who both found that infrastructure and digital literacy are common barriers even in relatively stable environments. However, the situation at NNU is exacerbated by movement restrictions, funding shortages, and a fragmented national policy framework—challenges also noted in [Khlaif et al. \(2024\)](#) and [Salameh \(2023\)](#), making this case particularly instructive. Accordingly, the Palestinian context reveals a deeper interplay between political instability and educational technology—highlighting gaps in the global DT literature that often overlooks crisis-affected regions. Furthermore, participants highlighted the absence of legal frameworks to govern DT, which undermines trust in digital assessments and IP protections. This is consistent with [George and Wooden \(2023\)](#) and [Peláez-Sánchez et al. \(2024\)](#), who also called for ethical codes and legal policies in AI and DT adoption. However, while institutions in stable regions debate how to regulate DT, universities in Palestine still debate whether they can do so at all, extending the scope of legal debates to include political and institutional feasibility in conflict environments.

Nonetheless, NNU's efforts to modernize infrastructure and train staff reflect a broader trend of institutional adaptation to digital demands. These efforts confirm findings by [Quy et al. \(2023\)](#), who showed that phased, capacity-building strategies yield positive outcomes. But whereas institutions in Vietnam benefitted from state-led reforms, and universities in Colombia leveraged public–private co-production, NNU operates in a decentralized and under-resourced environment where institutional readiness is less a matter of planning than of survival. This distinction is critical: it shows that in conflict zones; digital transformation cannot be understood only

through the usual lenses of efficiency or strategy. Instead, it must be seen as an improvised form of resilience that enables universities to sustain learning and research despite conditions of occupation, uncertainty, and fragility.

Finally, the opinions of the study interviewees all lead to the importance of DT in achieving SDGs. Having online and blended courses lead to inclusive and equality education (Goal 4); transforming to electronic correspondence and less paper work reduce energy consumption (Goal 7); equipping students and employees (academic and administrative) with new technological skills and preparing them for the digitalized workplace assures decent work and economic growth (Goal 8); building an enhanced information and communication infrastructure achieves industry, infrastructure innovation (Goal 9), reducing inequalities among students through online classes which reduce transport expenses (Goal 10); reducing fear from risks and dangers when crossing checkpoints and traveling for long distances in a conflict zone achieves peace and justice (Goal 16) and building global partnerships with other educational institutions and global organizations (Goal 17).

## 6 Strengths and limitations

This study draws strength from its access to senior decision-makers and experts at An-Najah National University (NNU), offering deep insights into the strategic and operational dimensions of digital transformation (DT) in a conflict-affected setting. The use of thematic analysis from diverse perspectives added depth, allowing the study to identify both the challenges and opportunities of implementing DT in alignment with the Sustainable Development Goals (SDGs).

However, several limitations should be acknowledged. First, the study is limited by its focus on a single institution, which may restrict the generalizability of its findings to other higher education institutions in Palestine or conflict zones. Second, the modest participant pool—while sufficient for reaching thematic saturation in qualitative inquiry—reduces representativeness and may not fully capture the diversity of perspectives within the broader higher education sector. Third, the reliance on interviews and self-reported data introduces potential bias. In particular, the politically sensitive context of Palestine may have influenced participants' willingness to speak openly, leading to cautious or socially desirable responses. Despite efforts to ensure confidentiality, neutrality, and member checking, the possibility of self-censorship cannot be entirely ruled out. Fourth, although rigorous translation and back-translation procedures were applied, with a high degree of alignment achieved, subtle nuances may still have been lost in rendering responses from Arabic to English.

Taken together, these limitations underscore the need for caution in interpreting the findings beyond the immediate case. Future research should expand to include comparative case studies across multiple institutions and integrate additional data sources, such as student and faculty surveys, institutional documents, and classroom observations, to mitigate bias and strengthen validity. Such efforts would help validate the results and offer a broader,

more adaptable framework for digital transformation in higher education across conflict-impacted contexts. Finally, while this study highlights the urgent need for a legal and regulatory framework at NNU to support digital learning, protect intellectual property, ensure academic integrity, and validate online credentials, broader collaboration with ministries, legislative bodies, and international partners will be essential to build a sustainable and context-sensitive foundation for DT in Palestine and beyond.

## 7 Conclusion

Digital transformation (DT) in higher education is a complex process requiring robust infrastructure, skilled personnel, updated regulations, and coordinated planning. At An-Najah National University (NNU), this study reveals significant progress despite the challenges of operating in a conflict zone. Strategic planning, staff training, and infrastructure improvements have positioned the university to better integrate DT into its academic and administrative systems, supporting continuity and alignment with the SDGs.

The research addresses a critical gap in understanding how DT functions in conflict-affected educational settings, an area still underexplored despite growing global interest. Interview findings show that NNU has taken proactive steps toward digital integration, but the lack of a comprehensive legal framework remains a key obstacle. Participants stressed the importance of formal legislation to recognize digital credentials, safeguard academic integrity, and clarify the rights and responsibilities of stakeholders.

The study highlights the value of ongoing staff development, international collaboration, and sustained investment in infrastructure. It calls for stronger coordination between universities, ministries, and legal authorities to build supportive policies that ensure the legitimacy and sustainability of DT in such challenging contexts. While NNU's efforts demonstrate the promise of DT in conflict zones, long-term success hinges on legal reform, policy alignment, and multi-sector partnerships tailored to the complexities of conflict zones.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The protocol of our study received ethical approval from An-Najah University's Research Ethics Board (IRB) under Ref: Med. Oct, 2024/36. Additionally, permissions were secured from the offices of the university president and vice president for conducting the research and collecting information, and informed consent was obtained from all participants included in the study.

## Author contributions

NA-S: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. MH: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. ZK: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. TA: Methodology, Validation, Writing – original draft, Writing – review & editing. NA: Writing – original draft, Writing – review & editing. JA-K: Writing – original draft, Writing – review & editing. OF: Writing – original draft, Writing – review & editing. GK: Writing – original draft, Writing – review & editing. MO: Writing – original draft, Writing – review & editing. EB: Writing – original draft, Writing – review & editing.

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## References

- Alhajri, A. (2019). The legal framework for the right to access information and digital transformation in Kuwait: a qualitative study. LSE Middle East Centre Kuwait Programme Paper Series. 5–20. Available online at: [https://eprints.lse.ac.uk/127724/1/The\\_Legal\\_Framework\\_for\\_the\\_Right\\_to\\_Access\\_Information\\_and\\_Digital\\_Transformation\\_in\\_Kuwait.pdf](https://eprints.lse.ac.uk/127724/1/The_Legal_Framework_for_the_Right_to_Access_Information_and_Digital_Transformation_in_Kuwait.pdf)
- Alojail, M., and Bhatia, S. (2023). Impact of digital transformation toward sustainable development. *Sustainability* 15:14697. doi: 10.3390/su152014697
- An-Najah National University. (2024). An-Najah National University: facts and figures. Available online at: <https://www.najah.edu/en/about/annu-facts/> (Accessed February 15, 2025).
- Bajger, T., Khoshnaw, D., Ali, K. A. A., and Mousa, K. M. (2025). Impact of digital transformation on rehabilitating higher education infrastructure in conflict-affected settings. *Eur. J. Educ.* 60:e70151. doi: 10.1111/ejed.70151
- Bokovnya, A. Y., Khisamova, Z. I., Begishev, I. R., Latypova, E. Y., and Nechaeva, E. V. (2020). Computer crimes on the COVID-19 scene: analysis of social, legal, and criminal threats. *Cuest. Polit.* 38, 463–472. doi: 10.46398/cuestpol.38e.31
- Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. doi: 10.1191/1478088706qp0630a
- Creswell, J. W., and Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Pract.* 39, 124–130. doi: 10.1207/s15430421tip3903\_2
- Feroz, A. K., Zo, H., and Chiravuri, A. (2021). Digital transformation and environmental sustainability: a review and research agenda. *Sustainability* 13:1530. doi: 10.3390/su13031530
- García Camargo, J., Linares Anzola, J., Cardozo Guerrero, L., Egas Naranjo, M., and Bejarano Gómez, A. (2025). Driving public value through co-production: digital transformation in Colombia. *Policy Des. Pract.*, 1–12. doi: 10.1080/25741292.2025.2532214
- George, B., and Wooden, O. (2023). Managing the strategic transformation of higher education through artificial intelligence. *Admin. Sci.* 13:196. doi: 10.3390/admsci13090196
- Ghnemat, R., Shaout, A., and Al-Sowi, A. M. (2022). Higher education transformation for artificial intelligence revolution: transformation framework. *Int. J. Emerg. Technol. Learn.* 17, 224–241. doi: 10.3991/ijet.v17i19.33309
- Grassini, S. (2023). Shaping the future of education: exploring the potential and consequences of AI and ChatGPT in educational settings. *Educ. Sci.* 13:692. doi: 10.3390/educsci13070692
- Guo, J., Li, C., Zhang, G., Sun, Y., and Bie, R. (2019). Blockchain-enabled digital rights management for multimedia resources of online education. *Multimed. Tools Appl.* 79, 9735–9755. doi: 10.1007/s11042-019-08059-1
- Hashim, M. A., Tlemsani, I., and Matthews, R. (2021). Higher education strategy in digital transformation. *Educ. Inf. Technol.* 27, 3171–3195. doi: 10.1007/s10639-021-10739-1
- Hattab, M. K. (2022). Modern approach to the employer's unilateral promises: a comparative analysis. *J. East Asia Int. Law* 15, 381–394. doi: 10.14330/jeail.2022.15.2.09
- Hattab, M. K., and Mahamid, F. (2024). The intersection of socio-cultural system and legislation: family protection laws in Palestine and gender equality. *An-Najah Univ. J. Res. B* 38, 2364–2398. doi: 10.35552/0247.38.12.2295
- Hitman, G. (2023). Israeli and the Palestinian present: a temporary arrangement in the West Bank for ethnonational ongoing conflict. *Cogent Arts Humanit.* 10:2170008. doi: 10.1080/23311983.2023.2170008
- Itmazi, J., and Khlaif, Z. N. (2022). Science education in Palestine. Lecture notes in educational technology. Singapore: Springer, 129–149.
- Katsamakos, E., Pavlov, O. V., and Saklad, R. (2024). Artificial intelligence and the transformation of higher education institutions: a systems approach. *Sustainability* 16:6118. doi: 10.3390/su16146118
- Khlaif, Z. N., Ayyoub, A., Hamamra, B., Bensalem, E., Mitwally, M. A. A., Ayyoub, A., et al. (2024). University teachers' views on the adoption and integration of generative AI tools for student assessment in higher education. *Educ. Sci.* 14:1090. doi: 10.3390/educsci14101090
- Khlaif, Z. N., Sanmugam, M., Hattab, M. K., Bensalem, E., Ayyoub, A. A., Sharma, R. C., et al. (2023). Mobile technology features and technostress in mandatory online teaching during the COVID-19 crisis. *Heliyon* 9:e19069. doi: 10.1016/j.heliyon.2023.e19069
- Kleespies, M. W., and Dierkes, P. W. (2022). The importance of the sustainable development goals to students of environmental and sustainability studies—a global survey in 41 countries. *Humanit. Soc. Sci. Commun.* 9:218. doi: 10.1057/s41599-022-01242-0
- Komljenovic, J. (2020). The future of value in digitalised higher education: why data privacy should not be our biggest concern. *High. Educ.* 83, 119–135. doi: 10.1007/s10734-020-00639-7
- Kulik, R. (2019). Sustainable development. London: Routledge.
- Legner, C., Eymann, T., Hess, T., Matt, C., Böhmman, T., Drews, P., et al. (2017). Digitalization: opportunity and challenge for the business and information systems engineering community. *Bus. Inf. Syst. Eng.* 59, 301–308. doi: 10.1007/s12599-017-0484-2
- Mahamid, F., Hattab, M., and Berte, D. (2023). Palestinian law to protect family and prevent violence: challenges with public opinion. *BMC Public Health* 23:412. doi: 10.1186/s12889-023-15276-9
- Marks, A., AL-Ali, M., Attasi, R., Elkishk, A. A., and Rezgui, Y. (2021). Digital transformation in higher education: maturity and challenges post COVID-19. *Advances in Intelligent Systems and Computing*. 53–70
- McCarthy, A. M., Maor, D., McConney, A., and Cavanaugh, C. (2023). Digital transformation in education: critical components for leaders of system change. *Soc. Sci. Humanit. Open* 8:100479. doi: 10.1016/j.ssaho.2023.100479
- Mhlanga, D. (2023). “Open AI in education, the responsible and ethical use of ChatGPT towards lifelong learning” in FinTech and artificial intelligence for sustainable development: the role of smart technologies in achieving development goals (Cham: Springer), 387–409.
- Mhlanga, D. (2024). Digital transformation of education, the limitations and prospects of introducing the fourth industrial revolution asynchronous online learning in emerging markets. *Discov. Educ.* 3:32:32. doi: 10.1007/s44217-024-00115-9
- Niță, V., and Guțu, I. (2023). The role of leadership and digital transformation in higher education students' work engagement. *Int. J. Environ. Res. Public Health* 20:5124. doi: 10.3390/ijerph20065124
- Peláez-Sánchez, I. C., Velarde-Camaqui, D., and Glasserman-Morales, L. D. (2024). The impact of large language models on higher education: exploring the connection between AI and Education 4.0. *Front. Educ.* 9:1392091. doi: 10.3389/feduc.2024.1392091
- Priatna, T., Maylawati, D., Sugilar, H., and Ramdhani, M. (2020). Key success factors of e-learning implementation in higher education: vision and approach of a specific university in Vietnam. *Int. J. Emerg. Technol. Learn.* 15, 101–114. doi: 10.3991/ijet.v15i17.14293
- Qadri, U. A., Ghani, M. B. A., Abbas, U., and Kashif, A. R. (2025). Digital technologies and social sustainability in the digital transformation age: a systematic analysis and research agenda. *Int. J. Ethics Syst.* 41, 142–169. doi: 10.1108/IJOES-08-2024-0239
- Qolamani, K. I. B., and Mohammed, M. M. (2023). The digital revolution in higher education: transforming teaching and learning. *QALAMUNA: Jurnal Pendidikan, Sosial, Dan Agama* 15, 837–846. doi: 10.37680/qalamuna.v15i2.3905
- Quy, V. K., Thanh, B. T., Chehri, A., Linh, D. M., and Tuan, D. A. (2023). AI and digital transformation in higher education: vision and approach of a specific university in Vietnam. *Sustainability* 15:11093. doi: 10.3390/su151411093
- Robbins, S. P., Chatterjee, P., and Canda, E. R. (1999). Ideology, scientific theory, and social work practice. *Fam. Soc.* 80, 374–384. doi: 10.1606/1044-3894.1217
- Robertson, G., and Lapina, I. (2023). Digital transformation as a catalyst for sustainability and open innovation. *J. Open Innov.: Technol. Mark. Complex.* 9:100017. doi: 10.1016/j.joitmc.2023.100017
- Rosalina, D., Yuliari, K., Setianingsih, D., and Zati, M. R. (2021). Factors influencing the digital literacy competency of college students in the industrial revolution era 4.0. *Int. J. Econ. Bus. Appl.* 6, 81–92. doi: 10.31258/ijeba.6.2.81-92
- Rosenthal, F. S. (2020). A comparison of health indicators and social determinants of health between Israel and the occupied Palestinian territories. *Glob. Public Health* 16, 431–447. doi: 10.1080/17441692.2020.1808037
- Sabah, K., Naser, K., Sehweil, M., Juaidi, M., AbuMuh, Y., AL-qasim, M., et al. (2020). E-learning code of ethics. Available online at: [https://elc.najah.edu/media/filer\\_public/d3/11/d311892f-b47f-4738-8768-84b005ebdc14/ethics.pdf](https://elc.najah.edu/media/filer_public/d3/11/d311892f-b47f-4738-8768-84b005ebdc14/ethics.pdf)
- Salameh, N. (2023). Essential or supportive? Legal education, legal aid and the sustainable development goals. *Cogent Soc. Sci.* 9:2275432. doi: 10.1080/23311886.2023.2275432
- Sarkis, J., and Ibrahim, S. (2022). Building knowledge beyond our experience: integrating sustainable development goals into IJPR's research future. *Int. J. Prod. Res.* 60, 1–18. doi: 10.1080/00207543.2022.2028922
- Shamali, E. (2021). The impact of Israeli military checkpoints on the Palestinian educational process. Available online at: <https://hadfnews.ps/post/92847>
- Shenkoya, T., and Kim, E. (2023). Sustainability in higher education: digital transformation of the fourth industrial revolution and its impact on open knowledge. *Sustainability* 15:2473. doi: 10.3390/su15032473
- Sidani, Y. (2018). Business ethics in the Middle East. London: Routledge.
- Sullivan, M., Kelly, A., and McLaughlan, P. (2023). ChatGPT in higher education: considerations for academic integrity and student learning. *J. Appl. Learn. Teach.* 6. doi: 10.37074/jalt.2023.6.1.17
- Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., et al. (2021). Digital transformation: a multidisciplinary reflection and research agenda. *J. Bus. Res.* 122, 889–901. doi: 10.1016/j.jbusres.2019.09.022
- Veseli, A., Hasanaj, P., and Bajraktari, A. (2025). Perceptions of organizational change readiness for sustainable digital transformation: insights from learning management system projects in higher education institutions. *Sustainability* 17:619. doi: 10.3390/su17020619

- Vial, G. (2019). Understanding digital transformation: a review and a research agenda. *J. Strateg. Inf. Syst.* 28, 118–144. doi: 10.1016/j.jsis.2019.01.003
- Yinuo. (2023). Fast facts—what is sustainable development? United Nations sustainable development. Available online at: <https://www.un.org/sustainabledevelopment/blog/2023/08/what-is-sustainable-development>
- Zhao, X., Chen, Q., Yuan, X., Yu, Y., and Zhang, H. (2024). Study on the impact of digital transformation on the innovation potential based on evidence from Chinese listed companies. *Sci. Rep.* 14:6183. doi: 10.1038/s41598-024-56345-2
- Zizikova, S. I., Nikolaev, P. P., and Levchenko, A. V. (2023). Digital transformation in education. *E3S Web Conf.* 381:02036. doi: 10.1051/e3sconf/202338102036