

Instructional Technologies in the Algerian Higher Education: Towards a Sound Digital Learning Culture

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Abstract

Within the landscape of twenty-first-century education, the accelerating digital transformation of higher education has compelled universities to critically reassess their pedagogical frameworks and strategic approaches to ensure sustained alignment with the evolving demands of digitization and globalization. In Algeria, this transition has been reinforced by national reforms introduced by the Ministry of Higher Education and Scientific Research, which emphasize the integration of instructional technologies to enhance teaching quality and support the development of digitally competent graduates. In this framework, the emergence of a digital learning culture reflects a broader shift towards learner-centered education, technological synergy, and the cultivation of critical competencies necessary for active engagement in contemporary knowledge societies. This study employed an exploratory qualitative design, grounded in an interpretive analytical framework, to examine these dynamics. Data were collected from multiple sources, including national policy frameworks, institutional guidelines on instructional technology, and reflective accounts from a sample of 40 participants drawn from the University of Relizane–Ahmed Zabana, comprising 14 university instructors and 26 students from different faculties. The findings highlight the strategic alignment between digital tools and educational objectives, alongside institutional commitment to fostering effective and sustainable technology integration. However, implementation remains uneven across faculties, reflecting disparities in infrastructure, training, and digital readiness. The study concludes by stressing the importance of nurturing a coherent digital learning culture to enhance instructional quality, strengthen academic engagement, and support the long-term digital evolution of Algerian higher education.

Keywords: Algerian Higher Education; Digital Technology; Digital Learning Culture; Instructional Practices; Technological Integration; University students.

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Introduction

In recent years, educational practices have undergone profound transformations due to the increasing integration of digital technologies into teaching and learning processes. Digital tools, platforms, and resources have become essential components in higher education, fundamentally shaping pedagogical approaches, learning experiences, and instructional strategies. These innovations offer educators diverse opportunities to design flexible, operational teaching methods that engage students actively, stimulate motivation, and foster a dynamic learning environment. For students, the rapid evolution of technology and digital resources provides unprecedented avenues for exploring knowledge, engaging in autonomous learning, and achieving improved academic outcomes. Within this evolving landscape, technology-enhanced education provides a learner-centered approach that combines digital technologies with human values. It encourages critical thinking, creativity, ethical responsibility, and active participation, helping learners engage more effectively in the learning process.

The adoption of digital education in higher education extends beyond mere technological inclusion. It requires a strategic, coherent approach that prioritizes pedagogical effectiveness, learner autonomy, and ethical practices in digital learning environments. Digitally mediated instruction underscores the importance of integrating these principles to create a balanced educational ecosystem where technology complements, rather than replaces, effective teaching practices. This paradigm encourages instructors to move beyond traditional methods of content delivery and create interactive, personalized learning experiences that respond to students' individual needs, learning preferences, and sociocultural backgrounds. In this way, digital education is not only a tool for operational efficiency but also a vehicle for fostering professional development for teachers and lifelong learning skills for students.

In the Algerian higher education context, several factors have accelerated the adoption of digital education and the integration of e-pedagogical approaches. The outbreak of the COVID-19 pandemic represented a significant disruption to conventional teaching and learning practices, forcing universities to rapidly transition from face-to-face instruction to hybrid and fully online learning modalities. This shift revealed both the potential and the limitations of digital education, highlighting the urgent need for technological preparedness, pedagogical adaptation, and institutional support systems. In response, the Ministry of Higher Education implemented measures to equip universities with the necessary digital infrastructure, promote distance learning, and encourage the effective use of interactive media to sustain resourceful e-learning practices.

Moreover, the Ministry's efforts have been guided by the broader objective of enhancing the quality and internationalization of Algerian higher education. By fostering digital competencies among instructors and learners, these initiatives aim to strengthen pedagogical approaches, improve student engagement, and align educational outcomes with global standards. The adoption of digital education also reflects the need to cultivate a culture of continuous learning, where both students and teachers can actively participate in knowledge creation, critical evaluation, and problem-solving within digitally mediated environments. This approach aligns with the principles of digital education, which emphasize human-centered learning, ethical responsibility, and the meaningful application of technology to address complex societal challenges.

Technology-integrated education in Algeria encompasses a wide array of digital resources, including e-learning platforms, learning management systems, instructional software, and multimedia learning tools. These technologies are designed to expand access to educational content, foster collaboration among students, and support assessment practices that are more flexible, responsive, and tailored to individual needs. Similarly, educators are expected to engage in ongoing professional

development to harness these tools effectively, adopting pedagogical strategies that enhance learning outcomes and ensure ethical, responsible use of digital resources.

The central objective of this research is to examine the factors that enable or hinder the successful implementation of e-pedagogy in Algerian higher education, framed within the theoretical and practical perspectives of modern Educational requirements. Specifically, this study seeks to:

- a) Analyze how digital tools and e-pedagogical strategies influence teaching practices and student engagement.
- b) Identify the institutional, technological, and pedagogical challenges that affect the integration of digital education in higher education.
- c) Explore the ways in which digital learning fosters learner accountability, enhances professional development for teachers, and promotes ethical engagement in the Algerian context.

To guide this investigation, the research addresses the following questions:

1. How are instructional technologies utilized to support teaching and learning at the University of Relizane- Amed Zabana university?
2. How do instructors and students perceive the contribution of instructional technologies to the development of a digital learning culture?
3. What factors facilitate or impede the effective integration of instructional technologies in fostering a sustainable digital learning culture within Algerian higher education?

By situating this study within the digitally-mediated education framework, the research emphasizes the interconnection between technological innovation, human development, and ethical pedagogical practice. It seeks to provide insights into how digital learning environments can foster a culture of continuous, learner-centered education, where instructors exercise professional competencies, assume pedagogical responsibilities, and guide students in navigating the limitless educational opportunities afforded by digital technologies. Ultimately, this study contributes to a deeper understanding of the conditions, strategies, and challenges necessary to implement effective and sustainable e-pedagogy in Algerian higher education, offering a model for leveraging effective technological-mediated education principles to enhance both teaching and learning outcomes in the digital age.

2. Review of Literature

Examining a theoretical framework for digital education is essential for developing a comprehensive understanding of both the benefits and limitations of technology integration in classroom contexts. Such a framework enables a systematic analysis of how digital tools shape pedagogical practices, learning processes, and instructional outcomes. Moreover, theoretical grounding supports critical evaluation of technology use beyond instrumental effectiveness, emphasizing pedagogical coherence and contextual relevance. Consequently, theory-informed approaches are fundamental to ensuring that technology integration remains pedagogically sound, educationally constructive, and contextually appropriate.

2.1 Digital Education: Concepts and Evolution

Digital education has emerged as a modern innovation over the last few decades. The European Commission (2020) conceptualizes digital education as a strategic approach aimed at enhancing the quality, inclusiveness, and accessibility of education through the integration of digital technologies. It encompasses online courses, virtual classrooms, educational software and learning platforms, enabling flexible and accessible learning environments — particularly through asynchronous and synchronous instructional modalities (UNESCO, 2025).. In fact, the ever-increasing need for a prompt use of digital education has emerged as “a cornerstone of national and international education policy (European

commission, 2020). As described in recent literature, digital education is not merely the substitution of traditional methods, but rather “a pedagogical paradigm that reconceptualises teaching, learning, and educational access,” fostering personalized learning paths and transforming roles of educators and learners (Educational Technologies, 2025)

The employment of any type of digital instruction is directly connected to the extent of educational technology, which is defined as “the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources”(Richey, 2008). It covers a wide range of educational tools and resources, including e-learning, instructional technology, information and communication technology (ICT), and various forms of computer-assisted instruction. These tools are designed to improve classroom-learning experiences, whether they are conducted in a blended, face-to-face, or online format. Such a practice involves the adoption of an effective e- pedagogy known as a branch that “studies and develops learning technologies and improves educational approaches to a successful technology application” (Baldiņš, 2016).

2.2 Advent of Digital Technologies in Higher Education

The increasing adoption of digital technologies has transformed higher education by expanding the possibilities for teaching, learning, and academic engagement. Instructional technologies, including digital platforms, software applications, and online learning environments, have become integral to contemporary educational practices. As noted by Gaol and Prasolova-Førland (2022), “Versatile and disruptive technological innovations, such as smart devices and software applications have opened up new opportunities for advancing teaching and learning.” These technologies support more flexible, interactive, and learner-cantered educational experiences.

The growing integration of instructional technologies has been driven by several global developments, including the internationalization of higher education, the demand for digital competencies, and the increasing interconnectedness of educational systems. International collaboration, online exchange programs, and intercultural learning initiatives have further reinforced the need for technology-enhanced educational environments.

A major catalyst for the widespread adoption of instructional technologies was the COVID-19 pandemic, which compelled educational institutions worldwide to shift to online modes of instruction. According to UNESCO (2021), the pandemic created “a steep technological learning curve among teachers who were forced to adapt their teaching to a digital online format to meet the needs of more than 1.5 billion students across the globe who have been affected by COVID-19 restrictions.” This unprecedented transition highlighted both the importance of instructional technologies and the necessity of developing digital readiness among educators and learners.

As instructional technologies become increasingly embedded in higher education, they continue to create new opportunities for innovation while simultaneously presenting challenges related to infrastructure, digital literacy, and effective pedagogical implementation.

2.3 Advantages of Technology Integration in Pedagogical Practices

Digital education has been one of the greatest innovations of the past few decades. It is largely the direct outcome of a technological revolution that swept away all conventional methods and concepts of instruction. Undeniably, a multitude of research studies have emphasized the tremendous role of the educational technologies to offer new opportunities for learning (E.g., Underwood, 2009; Archer et al., 2014; Haßler et al., 2016; Chauhan, 2017; Higgins et al., 2019; Lee et al., 2020; Tang et al., 2022; Alenezi, 2023; UNESCO, 2025). Additionally, according to the European Commission (2021), digital technology provides customized, adaptable, student-focused, cooperative, and innovative learning

opportunities. It also presents endless potential for significant enhancements in educational institutions and influences various facets of a school's progress (OECD, 2021). Educational resources and digital tools can assist significantly in improving the classroom atmosphere and engage both students and educators more effectively, yet, the utilization of technology in educational settings can be successful only when educators possess all the essential skills and knowledge. (Ifinedo et al., 2020). Proficiency in technology and the ability to exploit it effectively are fundamental proficiencies commonly known as the "digital competence of students and staff to facilitate the successful incorporation of technology in educational and instructional methodologies" (Costa et al, 2021).

2.4 Factors Influencing Technology Integration in Education

Researchers have identified various factors as exerting influence on the incorporation and assimilation of technology in educational practices. A recent investigation has revealed that instructors' perceptions of teaching, inadequate digital proficiency, and increased amount of work are some of the obstacles hindering the successful implementation of technology-enhanced education on a broader scale (Børte et al., 2020). In addition, digital competence, technical support, user characteristics, content characteristics, technological considerations, and organizational capacity have, also, been shown to affect teachers' use of technology in their classrooms (Delgado et al., 2015). Cheok and Wong (2015) found that teachers' satisfaction and engagement with technology are closely linked to their personal characteristics. Factors such as lack of confidence, resistance to change, and negative attitudes towards the use of new technologies in teaching play a crucial role in determining teachers' levels of engagement with technology (Cheok & Wong, 2015). Wang et al., (2019) have concentrated on student attitudes towards utilizing technology as a facilitator for online education. Emphasizing the learners' sense of being lonely, absence of prompt feedback, feelings of frustration, lack of drive, and the mental challenge of transitioning completely from one mode to another are highlighted as some of the obstacles encountered by students in the context of the recently implemented instructional format. The integration of educational technology tools in academic settings has revolutionized the way instruction delivery. Ongoing research focuses on exploring the attitudes of both educators and students towards the diverse employed learning approaches.

2.5 Digital Learning Culture in Higher Education

The rapid advancement of digital technologies and the increasing accessibility of information have fundamentally transformed the educational landscape, creating new opportunities and challenges for higher education institutions. As universities navigate the demands of the digital era, growing attention has been directed towards the development of a digital learning culture that supports innovation, adaptability, and continuous learning. This transformation is closely associated with globalization and the emergence of digitally connected societies, which require educational institutions to cultivate new forms of literacy and competence. In this regard, Balyer and Öz (2018) emphasize the importance of "the understanding, adaptation, and design of education systems in accordance with current technological trends," highlighting the need for institutions to align their educational practices with ongoing technological developments.

Digital learning culture extends beyond the mere adoption of technological tools; it encompasses the values, beliefs, practices, and institutional conditions that shape how technology is used to support teaching and learning. The integration of instructional technologies has encouraged higher education institutions to rethink traditional pedagogical approaches and create learning environments that promote collaboration, engagement, innovation, and lifelong learning. Consequently, the focus has shifted from technology as an end in itself to technology as a catalyst for meaningful educational transformation.

A strong digital learning culture also depends on the quality of the educational environment in which technology is embedded. According to Kraft and Papay (2014), effective educational institutions are characterized by environments that support both teaching excellence and student learning. They emphasize the importance of creating conditions that foster the growth and development of educators and learners alike. Similarly, Weston and Clay (2018) describe a learning culture as one in which learners and educators “feel a sense of belonging, that they are trusted, nurtured and given the time and space to grow and develop.” Such conditions are particularly relevant in digitally mediated learning environments, where successful technology integration relies not only on infrastructure and digital tools but also on supportive institutional cultures.

Within higher education, the development of a digital learning culture requires continuous reflection on teaching and learning practices, investment in digital competencies, and the creation of inclusive learning environments that encourage experimentation and innovation. Examining the nature of learning culture within academic institutions is therefore essential for understanding how instructional technologies can be effectively leveraged to enhance educational quality and support sustainable digital transformation.

2.6 Digital Transformation in Algerian Higher Education

Digital transformation in Algerian higher education has become a strategic priority in recent years, particularly through national initiatives led by the Ministry of Higher Education and Scientific Research aimed at modernizing university governance and promoting ICT integration in teaching and learning. These initiatives include the gradual deployment of Learning Management Systems (LMS), the expansion of digital platforms for administrative and academic services, and investment in institutional infrastructure to support blended and online learning environments.

The COVID-19 pandemic has accelerated e-learning adoption in Algerian universities. As in many higher education systems worldwide, emergency remote teaching highlighted both the potential and limitations of digital learning infrastructures. Studies indicate that the rapid shift to online instruction revealed disparities in institutional readiness, while also reinforcing the importance of digital platforms for ensuring educational continuity and flexibility (Ameur et al., 2024). This period marked a turning point in the perception of instructional technologies, shifting them from supplementary tools to essential components of higher education delivery.

Post-pandemic research on Algerian universities shows increasing interest in understanding how ICT and e-learning are integrated into academic practices, with findings emphasizing both progress and persistent challenges. Among the key issues identified are limited digital infrastructure, unequal access to technology, insufficient digital training for faculty, and varying levels of digital literacy among students (Maouche, 2021; Ben Ghouala & Ben Aïmrouche, 2024). Despite these constraints, the literature also highlights emerging opportunities, particularly the development of hybrid learning models and growing institutional awareness of the importance of digital competence.

Recent studies further underline that while digital transformation initiatives are expanding, their implementation remains uneven across institutions, often depending on leadership support, institutional resources, and staff engagement. This has led to a growing recognition that technological adoption alone is insufficient without parallel pedagogical innovation and sustained capacity-building efforts.

Consequently, a clear research gap emerges in the Algerian context: although several studies have examined e-learning implementation and digital transformation at a descriptive level, fewer investigations have explored how instructional technologies contribute to the emergence of a sustainable digital learning culture within universities. This gap justifies the need for in-depth qualitative inquiry into stakeholder experiences, institutional dynamics, and the cultural dimensions of technology integration in Algerian higher education.

2.7 Promoting a Digital-Age Learning Culture

A digital-age learning culture refers to the deeper transformation of educational practices and institutional norms resulting from sustained integration of instructional technologies. It is not limited to the use of digital tools but reflects the interaction between pedagogical practices, institutional conditions, and stakeholder perceptions.

As Clement et al (2017) note, such a culture depends on fostering collaboration and communication among educators and staff to ensure effective technology integration in learning processes. This highlights the collective and institutional nature of digital transformation in higher education. Livingstone et al. (2018) further emphasize the need for “additional research to describe, analyse, understand, and explain learning in a digitalized world, including a focus on lifelong learning,” underscoring the evolving and complex nature of digitally mediated learning environments.

Within this study, digital learning culture is conceptualized as the outcome of interactions between instructional technologies, institutional enabling factors, and stakeholder perceptions. This framework guides the analysis of how technology use is shaped, interpreted, and sustained within higher education institutions.

3. Methodology

3.1 Research Design

This study adopted an *exploratory qualitative case study design* to examine the role of instructional technologies in shaping a digital learning culture within Algerian higher education. The exploratory nature of this design reflects the study’s aim to understand a complex and evolving phenomenon without testing predefined hypotheses. It seeks to generate in-depth insights into how instructional technologies are experienced and interpreted within their real institutional context. This approach allows flexibility in data collection and analysis, enabling new themes and patterns to emerge from participants’ perspectives rather than imposing fixed categories in advance.

The study is grounded in an interpretivist orientation, emphasizing the meanings constructed by stakeholders through their engagement with technology-mediated learning environments.

3.2 Participants and Sampling

Participants were selected through purposive sampling to ensure the inclusion of individuals with direct and sustained engagement in technology-enhanced teaching and learning practices. This strategy allowed the researcher to identify information-rich cases capable of providing meaningful insights into the development of digital learning culture within the institution.

The final sample included 40 participants drawn from the University of Relizane—Ahmed Zabana. It comprised 14 university instructors from different faculties who actively integrate instructional technologies into their pedagogical practices (See Table 1)

Table 1: Distribution of Teachers by Faculty and Gender

Instructors	Faculty	Gender	N
Team 1	<i>Humanities and Social Sciences</i>	Female	5
	<i>Humanities and Social Sciences</i>	Male	3
Team 2	<i>Science and Technology</i>	Male	2
	<i>Science and Technology</i>	Female	4

Source: *Author’s data*

The second category of participants included 15 undergraduate students enrolled in courses supported by digital platforms, and 11 master’s students with experience in blended and online learning environments across Humanities and Science and Technology domains (See Table 2).

Table 1: Distribution of Students by Faculty and Gender

Participant Category	Faculty	Male (n)	Female (n)	Total (n)
Undergraduate Students (Team A)	<i>Humanities & Social Sciences</i>	2	6	8
	<i>Science and Technology</i>	3	4	7
Subtotal		5	10	15
Master's Students (Team B)	<i>Humanities & Social Sciences</i>	2	5	7
	<i>Science and Technology</i>	2	2	4
Subtotal		4	7	11
Total		9	17	26

Source: *Author's data*

This diversity ensured representation of multiple academic disciplines and learning experiences, which strengthened the depth and credibility of the findings. The inclusion of both instructors and students allowed the study to capture complementary perspectives on instructional technology use, particularly in relation to classroom practices, engagement, accessibility, and institutional support. The sample size aligned with qualitative research standards that prioritize depth of understanding over statistical generalization.

3.3 Institutional Context

A single-case study was conducted at the University of Relizane–Ahmed Zabana to understand how instructional technologies are perceived, utilized, and institutionalized within teaching and learning environments. The university is actively involved in national digital transformation initiatives in higher education. It has introduced several instructional technologies, including Learning Management Systems (LMS), online learning platforms, and digital administrative services. The institution is also gradually improving its digital infrastructure and increasing awareness of ICT in teaching and learning. However, the level of implementation differs across faculties due to variations in digital skills, resources, and institutional support. This makes the university a suitable context to study how instructional technologies shape emerging digital learning practices. The case reflects a transitional stage where institutional capacity, teaching practices, and stakeholder engagement interact.

3.4 Data Collection Instruments

Data were collected through semi-structured interviews, focus group discussions, and document analysis to ensure methodological triangulation.

- **Semi-structured interviews** constituted the primary data source and were guided by a protocol developed from the literature on instructional technologies and digital pedagogy. The interviews explored participants' experiences, perceptions of institutional support, challenges in technology integration, and suggestions for improving digital learning practices.
- **Focus group discussions** were conducted with undergraduate and postgraduate students to capture shared perceptions and collective experiences of technology-enhanced learning environments. This method facilitated interaction among participants and supported the identification of common patterns in attitudes and challenges.
- **Document analysis** included institutional policies, e-learning guidelines, LMS implementation reports, and faculty development documents. These materials provided contextual insights and enabled comparison between institutional objectives and actual practices.

3.5 Data Collection Procedures

Ethical approval was obtained prior to data collection. All participants were informed about the study objectives, voluntary participation, and confidentiality measures, and written informed consent was secured. Semi-structured interviews, lasting approximately 45 minutes each, were conducted in person or online depending on participant availability and were audio-recorded with permission. Focus group discussions were organized separately for undergraduate and postgraduate students, lasting 30 to 45 minutes and guided by a structured discussion protocol. Institutional documents were collected at the same time as interviews and focus groups. The researcher organized them according to their relevance to instructional technology integration. The researcher also kept field notes throughout the process to record contextual observations and emerging insights.

3.6 Data Analysis

Data were analyzed using thematic analysis following Braun and Clarke (2019). Transcripts were first reviewed to ensure familiarity with the data, followed by iterative coding to identify meaningful patterns. Codes were then grouped into broader themes reflecting participants' experiences and perceptions. Findings from document analysis were integrated with interview and focus group data to strengthen interpretation and ensure methodological triangulation.

4. Results

The present section presents the thematic analysis of semi-structured interviews, focus group discussions, and institutional documents. Actually, the analysis revealed a set of interconnected themes concerning the integration of instructional technologies at the University of Relizane–Ahmed Zabana.

4.1 Results from Semi-Structured Interviews with Instructors

The analysis of semi-structured interviews with instructors revealed three interrelated themes: (1) instructional technologies as pedagogical enablers, (2) uneven institutional digital readiness, and (3) pedagogical transition challenges.

4.1.1 Instructional Technologies as Pedagogical Enablers

The exploration of interview data revealed a strong and consistent consensus among instructors that instructional technologies function primarily as pedagogical enablers rather than replacements for traditional teaching practices. Participants emphasized that digital tools contribute significantly to improving content delivery, enhancing conceptual visualization, and facilitating student comprehension, particularly in abstract or complex subject areas. Across disciplines, instructors described technology as an integrated component of effective pedagogy that supports explanation, illustration, and student engagement rather than fundamentally altering the teacher's role. This perspective reflects a constructive alignment between traditional instructional strategies and emerging digital practices, where technology is perceived as an extension of pedagogical intention rather than a disruptive force.

Instructors particularly highlighted the value of digital tools in making abstract concepts more accessible to students. A Humanities and Social Sciences instructor explained that *“technology does not replace teaching; it helps me organize content and make abstract ideas more visible to students,”* indicating that instructional technologies are viewed as structuring devices that enhance clarity and coherence in knowledge delivery. Similarly, a Science and Technology (Team 2) instructor emphasized the role of digital simulations in bridging the gap between theoretical knowledge and practical understanding, stating that *“simulations and digital tools help students understand concepts that are difficult to demonstrate in a physical lab.”* These perspectives suggest that instructors perceive instructional technologies as cognitively supportive tools that strengthen explanation, visualization, and learner engagement.

However, a contrasting perspective emerged from a smaller subset of both team participants who questioned the actual pedagogical added value of instructional technologies when not properly integrated.

These instructors argued that technology alone does not guarantee improved learning outcomes and may, in some cases, distract from core instructional objectives if overused or poorly implemented. One participant from humanities and social sciences Faculty cautioned that *“sometimes technology is used just for display, without real pedagogical improvement,”* suggesting a gap between technological presence and instructional effectiveness. Another instructor added a more critical view, stating that *“students focus more on the tool than on the content when technology is not well structured in the lesson.”* This divergence indicates that while instructional technologies are widely accepted as beneficial, their pedagogical impact is perceived as contingent upon meaningful instructional design rather than mere adoption.

Overall, the findings indicate a generally positive perception of instructional technologies as pedagogical enablers, although this view was not entirely uniform.

4.1.2 Uneven Institutional Digital Readiness

A second major theme emerging from the interviews relates to the unevenness of institutional digital readiness across faculties, particularly in terms of infrastructure availability, technical support, and access to digital learning platforms. While some departments reported adequate access to Learning Management Systems (LMS), projectors, and stable internet connectivity, others described persistent structural limitations that hinder consistent integration of instructional technologies. This disparity reflects an institutional landscape where digital transformation is in progress but not uniformly distributed, resulting in varied teaching experiences and levels of technological integration across academic units.

Participants repeatedly emphasized that infrastructural inconsistency directly affects the quality and continuity of technology-enhanced teaching. One instructor (Team 1) noted, *“In some faculties everything is available, but in others even stable internet is a challenge,”* highlighting the unequal distribution of digital resources within the same institution. Another participant further stressed this constraint, stating, *“We are expected to integrate technology, but the infrastructure is not always reliable,”* pointing to a gap between institutional expectations and operational realities.

In contrast, a minority of participants reported relatively satisfactory conditions, suggesting that institutional readiness is not uniformly deficient but rather unevenly distributed. One instructor from (Team 2) indicated, *“We have access to LMS platforms and technical support, which makes integration smoother compared to other departments.”* This contrasting experience underscores the existence of internal inequalities that shape instructors' perceptions and practices. While some faculty members experience supportive digital ecosystems, others operate under constrained conditions that limit their ability to fully integrate instructional technologies.

These accounts suggest that while institutional discourse promotes digitalization, its practical implementation is hindered by uneven infrastructural development. Consequently, instructional technology use becomes dependent on contextual faculty conditions rather than standardized institutional support, which ultimately affects pedagogical consistency and equity across departments.

4.1.3 Digital Transition and Pedagogical Resistance

The third theme reflects the ongoing pedagogical transition toward digital integration, characterized by both adaptation and resistance among instructors. Many participants acknowledged that instructional technologies are becoming increasingly necessary in contemporary higher education and expressed willingness to adapt their teaching practices accordingly. However, they also highlighted challenges related to workload, limited training, and the time required to effectively integrate digital tools into course design. One instructor explained, *“We are adapting, but it requires extra time, especially when we are not fully trained on the systems,”* indicating that digital integration is viewed as an intensive task that relies on institutional support. Another participant similarly noted that *“It is difficult to redesign courses every time to fit digital tools properly.”*

Nevertheless, contrasting views revealed a stronger form of resistance among some instructors, namely from (Team1), who expressed uncertainty towards rapid digital transformation. These participants emphasized the persistence of traditional pedagogical preferences and questioned the necessity of extensive technological integration in certain contexts. One instructor stated, *“Face-to-face teaching is still more effective for real interaction with students,”* suggesting a preference for conventional instructional methods. Another added, *“Not everything needs to be digital; sometimes it complicates teaching more than it helps,”* reflecting concerns about over-reliance on technology.

These opposing perspectives illustrate that the transition towards digital pedagogy is neither linear nor universally accepted, but rather marked by negotiation between innovation and pedagogical tradition.

4.2 Results from Focus Group Discussions with Students

The focus group discussions with undergraduate and master’s students provided insights into learners’ experiences with instructional technologies and their role in shaping an emerging digital learning culture within the university. The analysis revealed how students perceive, engage with, and adapt to technology-enhanced learning environments, highlighting both the opportunities and challenges associated with the development of digitally supported educational practices.

4.2.1 Enhanced Learning Engagement through Digital Platforms

Findings from the focus group discussions suggest that instructional technologies are widely perceived by students as facilitating greater engagement, accessibility, and flexibility in their learning experiences. Participants frequently described digital platforms as facilitating access to course materials, improving communication with instructors, and supporting independent learning. Learning Management Systems, recorded lectures, online assignments, and digital communication tools were particularly appreciated for allowing students to review content beyond classroom hours and manage their learning at their own pace. Many students emphasized that digital resources contribute to a more interactive and student-centered learning experience, enabling them to revisit difficult concepts and engage with course materials more effectively.

One undergraduate student explained, *“Having access to lectures online helps me review lessons before exams and understand parts that I missed during class.”* Similarly, a master’s student noted, *“Digital platforms make communication easier because we can contact teachers, receive feedback, and submit assignments without delays.”* Another participant highlighted the organizational benefits of technology, stating that *“everything is available in one place, which helps us manage our studies better.”* These responses suggest that instructional technologies contribute positively to learner autonomy, accessibility, and academic engagement.

However, not all students shared the same level of enthusiasm. Some participants argued that the availability of digital resources does not necessarily translate into increased engagement. One student remarked, *“Just uploading documents online does not make learning more interesting if there is no interaction.”* Another participant explained, *“Sometimes students download the materials but do not actually study them because there is less supervision.”* These contrasting perspectives indicate that while digital platforms provide valuable learning opportunities, their effectiveness depends on how they are pedagogically integrated and actively used by both instructors and learners.

4.2.2 Digital Fatigue and Unequal Access to Learning Resources

A second major theme emerging from the discussions concerns the challenges associated with digital learning, particularly digital fatigue and unequal access to technological resources. Although students recognized the advantages of technology-enhanced learning, many expressed concerns regarding prolonged screen exposure, reduced concentration, and physical exhaustion associated with extended

online activities. Participants, mainly from Team A, frequently described feelings of fatigue during periods of intensive online learning, noting that continuous interaction with digital devices can negatively affect motivation and engagement. One student stated, *"After several hours online, it becomes difficult to stay focused because everything is happening on a screen."* Another participant explained, *"Sometimes we spend the whole day moving between online lectures, assignments, and documents, which becomes mentally exhausting."* These comments suggest that excessive reliance on digital environments may create cognitive and motivational challenges that affect the quality of the learning experience.

Alongside digital fatigue, students repeatedly highlighted inequalities in access to technology. Differences in internet connectivity, device quality, and home learning conditions were identified as significant barriers to equitable participation. One participant noted, *"Not all students have a good internet connection, especially those who live far from urban areas."* Another student explained that *"some students attend online sessions using mobile phones because they do not have laptops, which makes learning more difficult."* These concerns indicate that technological access remains an important factor influencing educational participation and achievement.

Nevertheless, a contrasting viewpoint emerged from students who considered access-related problems less significant than in previous years. One participant from Team B stated that *"most students today have smartphones and internet access, so the situation is much better than before."* Another argued that *"technology is not the main problem; motivation and time management are often bigger challenges."* These differing perceptions suggest that while digital inequalities remain present, students experience and interpret their impact differently depending on their personal circumstances and technological resources.

4.2.3 Preference for Blended Learning Models

The third theme reflects students' strong preference for blended learning environments that combine traditional face-to-face instruction with digital learning opportunities. Across both Teams A and B, participants consistently emphasized the importance of maintaining direct interaction with instructors while benefiting from the flexibility offered by online tools. Students generally viewed blended learning as a balanced approach that combines the strengths of both instructional modes and minimizes their respective limitations.

One undergraduate student explained, *"We prefer a mix of online and face-to-face classes because both are important in different ways."* Another participant reacted, *"Online platforms are useful for accessing materials, but classroom discussions help us understand difficult concepts better."* Similarly, a master's student commented, *"Blended learning gives us flexibility without losing the human interaction that is important for learning."* These responses indicate that students perceive face-to-face and digital instruction as complementary rather than competing approaches.

At the same time, not all participants agreed on the optimal balance between online and in-person learning. Some students advocated for increased use of digital technologies, particularly for theoretical courses and administrative tasks. One participant stated, *"Many lectures could be delivered online because it would save time and allow more flexibility."* Conversely, others expressed reservations about expanding online learning, arguing that excessive digitalization may weaken communication and reduce engagement. As one student explained, *"When everything becomes online, students feel isolated and participation decreases."* Another Master student participant added that *"real interaction with teachers and classmates cannot be fully replaced by technology."*

These contrasting viewpoints reveal that although students broadly support blended learning, they differ in their perceptions of how much technology should be integrated into higher education. Overall, the findings suggest that students favor a balanced instructional model that combines the

accessibility and flexibility of digital tools with the social, interactive, and motivational benefits of face-to-face learning.

4.3 Results from Document Analysis

Document analysis focused on institutional reports, digital learning guidelines, faculty development documents, and official policy texts issued by the Ministry of Higher Education and Scientific Research (MESRS). Particular attention was given to Ministerial Decision No. 1242 of 22 September 2022 concerning the implementation of distance education, the ministry's directives regarding the deployment of Moodle-based learning environments, and the National Digital Transformation Roadmap introduced in 2022. Additional evidence was drawn from official reports documenting the launch of multiple digital platforms designed to support pedagogical innovation, digital governance, and student services. Collectively, these documents provided important contextual insights into the university's digitalization efforts and enabled comparison between institutional objectives and the realities reported by instructors and students. Three major themes emerged from the document analysis: institutional commitment to digital transformation, policy–practice gaps in implementation, and limitations in structured professional development.

4.3.1 Institutional Commitment to Digital Transformation

The reviewed documents consistently demonstrate a strong governmental and institutional commitment to digital transformation within Algerian higher education. Ministerial Decision No. 1242 (MESRS, 2022a) established a national framework for the implementation and monitoring of distance education practices, reflecting a strategic shift towards the institutionalization of digital learning. Similarly, the MESRS Digital Transformation Roadmap (2022b) identified the digitization of pedagogical activities, governance processes, student services, and research management as key priorities for the modernization of higher education institutions. This commitment was further reinforced through the launch of nine national digital platforms in 2023, intended to support teaching, learning, administration, and scientific research across Algerian universities (MESRS, 2023a).

Several policy statements emphasized the central role of technology in educational improvement. For example, the roadmap describes digital transformation as a means of promoting innovation, improving service quality, and strengthening institutional efficiency. Likewise, official reports associated with the launch of digital platforms stress the importance of creating a connected academic environment capable of supporting contemporary pedagogical practices. Collectively, these documents indicate a clear policy orientation toward the development of a sustainable digital learning culture within Algerian higher education.

However, some reports simultaneously acknowledge that achieving these objectives requires substantial institutional adaptation and resource investment. One implementation report noted that the digital transformation process remains gradual and dependent on local institutional capacities, suggesting that commitment at the policy level does not automatically ensure uniform implementation across universities.

4.3.2 Policy–Practice Gaps In Implementation

Despite the ambitious objectives articulated in national and institutional policies, the reviewed documents reveal notable discrepancies between strategic intentions and practical implementation. While Ministerial Decision No. 1242 and subsequent directives advocate the generalization of distance learning and the use of Moodle-based platforms across higher education institutions (MESRS, 2022a), implementation reports indicate varying levels of adoption among faculties and universities. Several documents refer to differences in infrastructure availability, technical support, and staff preparedness as factors influencing the effectiveness of digital initiatives.

For example, implementation reports associated with the digital transformation roadmap highlight that progress in digital integration remains uneven across institutions. Some faculties have successfully expanded their use of Learning Management Systems and online educational resources, whereas others continue to face operational and technical constraints. This observation supports the experiences reported by instructors, who described significant disparities in digital readiness across departments.

At the same time, some institutional reports present evidence of successful implementation efforts. Documents describing the deployment of national digital platforms report increased access to online services, improved administrative efficiency, and broader use of digital educational resources. These positive developments demonstrate that the policy framework has generated tangible progress in certain areas. Nevertheless, the coexistence of achievements and persistent challenges suggests that digital transformation remains an evolving process characterized by uneven implementation across educational contexts.

4.4.3 Limited Structured Professional Development

A third theme emerging from the document analysis concerns professional development and digital capacity building among academic staff. The reviewed policy documents consistently recognize instructor competence as a critical factor in the successful integration of instructional technologies. The MESRS Digital Transformation Roadmap (2022b) explicitly identifies training and capacity building as essential components of sustainable digital transformation, emphasizing the need to strengthen digital skills among university personnel.

Several institutional documents describe workshops, training sessions, and awareness initiatives designed to support instructors in the adoption of digital teaching practices. These initiatives are presented as mechanisms for facilitating the transition toward technology-enhanced learning and promoting pedagogical innovation. Official reports also highlight the importance of fostering a culture of continuous professional development capable of responding to emerging technological demands.

Nevertheless, other documents acknowledge limitations in the scope and consistency of these efforts. Internal evaluations indicate that training opportunities remain unevenly distributed and are often insufficient to meet the growing demands associated with digital transformation. Some reports specifically note the need for more systematic, long-term professional development programs capable of reaching all academic departments. These observations mirror the concerns expressed by instructors regarding insufficient preparation and limited institutional support.

Consequently, the findings suggest that while professional development is recognized as a strategic priority, its implementation remains fragmented, potentially constraining the development of a robust and sustainable digital learning culture.

5. Discussion

The present study investigated the integration of instructional technologies within a single higher education institution, drawing on semi-structured interviews with instructors, focus group discussions with students, and institutional document analysis. The findings reveal a complex and evolving digital learning landscape characterized by pedagogical opportunity, structural constraints, and uneven implementation. In line with qualitative interpretations of digital transformation in higher education, the results demonstrate that instructional technologies are not merely technical tools but socio-pedagogical mediators that reshape teaching practices, learning experiences, and institutional dynamics.

5.1 Instructional Technologies as Pedagogical Mediators

A central finding of this study is that both instructors and students largely perceive instructional technologies as pedagogical enablers that enhance teaching and learning processes. Instructors

emphasized their role in improving content delivery, visualization of abstract concepts, and supporting learner comprehension, while students highlighted increased accessibility, flexibility, and autonomy. This convergence suggests that digital tools have become normalized within classroom practices, aligning with broader literature that conceptualizes technology as an extension of pedagogy rather than a replacement for it (e.g., Baldinš, 2016; Gao & Prasolova-Førland, 2022; Lee et al., 2020; Tang et al., 2022; Alenezi, 2023).

However, the findings also indicate that the pedagogical effectiveness of instructional technologies is not inherent, but rather depends on their meaningful integration into instructional design. In this regard, both instructors and students cautioned against superficial applications of digital tools, where technology is used in a performative manner rather than as a means of enhancing teaching and learning processes. This observation aligns with previous research emphasizing that the educational value of technology is contingent upon its pedagogical alignment and purposeful use within well-structured learning environments (Mishra & Koehler, 2006; Selwyn, 2016). Consequently, the results suggest that while acceptance of instructional technologies is high, their transformative impact remains uneven and dependent on instructional quality and design competence.

5.2 Institutional Inequality and Digital Readiness

Another key finding concerns the uneven institutional digital readiness across faculties. Both instructors and students reported significant disparities in access to infrastructure, internet stability, and technical support. This fragmentation resulted in inconsistent implementation of instructional technologies and unequal learning conditions. Such findings are consistent with studies on the “digital divide” in higher education, which highlight that access alone does not guarantee meaningful integration without institutional capacity and support structures (OECD, 2021).

Document analysis further reinforced this observation, revealing that although national policies such as Ministerial Decision No. 1242 (MESRS, 2022a) and the MESRS Digital Transformation Roadmap (2022b) establish a clear strategic commitment to digitalization, implementation remains uneven. The gap between policy ambition and institutional practice reflects what could be conceptualized as a “*digital implementation gap*”, where centralized strategies are not uniformly operationalized at the faculty level. This finding underscores the importance of considering institutional heterogeneity when evaluating digital transformation in higher education systems.

5.3 Emergence of a Transitional Digital Learning Culture

The findings also suggest that the institution is currently experiencing a transitional phase towards a digital learning culture. Students’ preference for blended learning, combined with instructors’ partial adoption of digital tools, indicates that neither traditional nor digital models dominate the educational environment. Instead, both coexist in a hybrid configuration shaped by negotiation, adaptation, and constraint.

From a sociocultural perspective, this hybridization reflects the gradual formation of a digital learning culture that is still under development. While students increasingly rely on LMS platforms and online resources, they continue to value face-to-face interaction for clarification, engagement, and motivation. This dual orientation is consistent with prior research suggesting that blended learning models often represent a transitional equilibrium in digitally transforming institutions (Garrison & Kanuka, 2004). The present findings extend this understanding by showing that such hybridity is not only pedagogical but also infrastructural and institutional.

5.4 Professional Development and Capacity Building Gaps

A further significant finding relates to the limitations in structured professional development for instructors. While institutional documents, including the MESRS roadmap (2022b), emphasize the

importance of capacity building, both instructors and documents indicate that training opportunities remain irregular and insufficiently systematic. This gap directly influences instructors' ability to effectively integrate instructional technologies into pedagogical practice.

The findings suggest that digital transformation is constrained not by lack of willingness but by insufficient institutional scaffolding. Instructors expressed a need for sustained, discipline-specific training rather than occasional workshops. This aligns with international evidence indicating that successful technology integration depends heavily on continuous professional development and institutional support structures (UNESCO, 2025). Without such support, digital tools risk remaining underutilized or inconsistently applied, limiting their pedagogical impact.

5.5 Policy–Practice Misalignment in Digital Transformation

Document analysis revealed a strong institutional and national commitment to digital transformation through frameworks such as Ministerial Decision No. 1242 (MESRS, 2022a), the national digital transformation roadmap (MESRS, 2022b), and the deployment of digital platforms in 2023 (MESRS, 2023a). These initiatives demonstrate a clear top-down strategy aimed at modernizing higher education through ICT integration.

However, both empirical data and institutional reports indicate a persistent misalignment between policy objectives and classroom realities. While policy documents emphasize the generalization of distance learning and LMS adoption, implementation remains inconsistent across faculties. This disconnect reflects a structural challenge common in large-scale educational reforms, where policy diffusion does not automatically translate into institutional uniformity. Importantly, this misalignment should not be interpreted as policy failure but rather as a stage in an ongoing transformation process. The findings suggest that digital transformation is iterative, requiring continuous adjustment between institutional vision, infrastructural capacity, and pedagogical practice.

5.6 Implications for Theory and Practice

Theoretically, the study contributes to understanding digital learning cultures as emergent, context-dependent systems shaped by the interaction of technology, pedagogy, and institutional structures. The findings support socio-technical perspectives that view educational technology integration as a negotiated process rather than a linear adoption model.

Practically, the study highlights the need for more coherent institutional strategies that address infrastructural inequality, strengthen professional development, and ensure consistent implementation of digital policies across faculties. Bridging the gap between policy and practice is essential for the development of a sustainable digital learning ecosystem.

Overall, the findings demonstrate that instructional technologies at the University of Relizane–Ahmed Zabana are embedded within a dynamic but uneven transformation process. While positive perceptions among instructors and students indicate strong potential for digital enhancement of teaching and learning, structural limitations and implementation gaps continue to constrain full realization. The study therefore underscores the importance of aligning policy, infrastructure, and pedagogical development to support the emergence of a coherent and sustainable digital learning culture in higher education.

5.8 Limitations and Scope for Further Studies

This study is limited by its single-case design, which focuses on one Algerian university. While this approach allowed for an in-depth and context-sensitive understanding of instructional technology integration, it restricts the generalizability of the findings to other higher education institutions with different institutional, technological, or socio-cultural conditions. In addition, the relatively small sample size, although appropriate for qualitative inquiry, may not capture the full diversity of experiences across all faculties and academic levels within the institution. The study also relied on self-reported data from

interviews and focus groups, which may be influenced by participants' subjective perceptions and contextual biases. Furthermore, although document analysis provided important institutional insights, access was limited to publicly available and selected internal policy documents, which may not fully reflect all operational practices related to digital transformation.

Future research could benefit from longitudinal designs that track the evolution of digital learning practices over time, particularly as institutional reforms continue to develop. Comparative studies across multiple universities in Algeria or across different national contexts would also provide richer insights into how institutional conditions shape digital learning cultures. Additionally, future studies may incorporate quantitative approaches or mixed-method designs to examine relationships between digital readiness, pedagogical effectiveness, and student learning outcomes more systematically.

Conclusion

This study examined the integration of instructional technologies in a higher education context, focusing on how instructors, students, and institutional policies interact within an evolving digital learning environment. Digital tools are increasingly embedded in teaching and learning practices; however, their integration remains uneven and context-dependent, shaped by institutional capacity, pedagogical preparedness, and access to adequate infrastructure.

At the institutional level, the analysis highlights a clear strategic orientation towards digital transformation, as reflected in national policy frameworks and higher education directives. However, the implementation of these policies varies across faculties, suggesting a gap between strategic intent and operational practice. This divergence points to the ongoing nature of digital transformation as a gradual process that requires sustained alignment between policy, resources, and pedagogical development.

At the pedagogical level, instructional technologies are generally perceived as supportive tools that enhance teaching delivery and student engagement. Nevertheless, their effectiveness depends on meaningful instructional design and adequate training, rather than mere adoption. Students similarly value the flexibility and accessibility provided by digital platforms while continuing to emphasize the importance of direct interaction and structured guidance in face-to-face settings.

Overall, the study underscores that the integration of instructional technologies is not a purely technical process but a multidimensional transformation involving institutional, pedagogical, and human factors. Strengthening this process requires coherent policy implementation, continuous professional development, and balanced instructional models that combine digital and in-person learning. Such an approach is essential to support the development of a more coherent and sustainable digital learning environment in higher education

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