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E-Learning in Algerian Higher Education: Structural, Technological, and Pedagogical Challenges in the Context of Digital Transformation

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Abstract

Educational systems — in their aims, practices, and content — are shaped by ongoing social, economic, and political changes and developments. These transformations are directly reflected in the educational and training needs of individuals, and consequently influence the objectives and practices of educational institutions. Among the most prominent features of the contemporary world are the rapid advancements in knowledge and technology, which have had a profound impact on educational systems and contributed to the emergence of the concept of e-learning. This modern approach, now adopted by many educational systems, has moved beyond being a mere pedagogical method to become intertwined with the economic, political, and social dimensions of contemporary societies. Accordingly, the aim of this study is to examine the key challenges facing the Algerian university system in implementing this form of education. This will be done through an exploration of the concept of e-learning — with a particular focus on its systemic dimension — followed by an overview of its development within Algerian universities, and an analysis of the most pressing challenges encountered in its application.

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1_ Introduction

Modern technologies, particularly information and communication technologies (ICT), represent a significant leap in the life of humanity. Information technology has permeated all aspects of life, becoming an essential part of contemporary societies. In a relatively short time, these technologies have dramatically transformed the features of daily life and continue to evolve at a rapid pace—so much so that it is difficult to predict what the world will look like in the near future.

Building on this technological revolution that has reshaped the world since the end of the last century, a profound convergence emerged between communication and information technologies and the field of education. This integration gave rise to modern educational approaches and unprecedented challenges. Today, higher education—particularly at the university level—has transformed in its goals, methods, and tools. It is no longer confined to the simple transfer of knowledge within specific temporal and spatial boundaries. The explosion of knowledge and

technology over recent decades has dissolved traditional borders between countries and educational institutions, enabling the exchange and acquisition of knowledge in unconventional ways. As a result, significant changes have occurred in educational and learning systems worldwide.

In parallel with industrial progress and the ongoing technological revolution, the concept of quality has emerged as a central criterion distinguishing between various systems and institutions. As the number of universities, along with their students, faculty, and researchers, has grown significantly, higher education institutions have found themselves compelled to engage in a competitive global market. They are now expected to produce graduates who possess the skills of innovation, creativity, and adaptability in a dynamic labor market. Consequently, universities have evolved from being mere educational and training entities operating within limited frameworks of goals and standards, to becoming proactive institutions responsible for driving change, fostering innovation, and contributing to the advancement of society as a whole. This transformation comes amid a host of challenges that urge all institutions—including educational ones—to seek continual improvement and relevance.

To enhance the quality of university outcomes and align them with the globalization of education, training systems, and labor market demands, technology-based education has emerged as a key indicator of the quality of contemporary higher education systems. It has also become a fundamental criterion in ranking countries and evaluating their educational policies. Since the 1990s, competition among universities to integrate various forms of technology into teaching and learning has grown steadily. This integration has become not merely an option, but a necessity. As a result, a new model of education has taken shape—one that is built on digital tools and modern technologies, challenging traditional educational concepts and reshaping the structure and function of academic institutions.

This transformation in education was not unforeseen. Bill Gates, one of the leading figures in technological advancement, predicted the profound impact of technology on education as early as 1998. He stated, "The information highway will help raise educational standards for each individual in future generations. It will pave the way for the emergence of new methods of teaching and a much broader field of choice. Computer-based learning will represent the starting point for continuous learning from the computer, and good teachers of future will do more than show students how to find information on the information superhighway, they will still be required to know when to test, and when to comment, stimulate or arouse interest." This vision accurately reflects the direction modern education has taken—where technology not only expands access to knowledge but also redefines the role of educators, making them facilitators of critical thinking, creativity, and lifelong learning (Al-Jabali, 2016,37).

All of this has now become an undeniable reality in many educational systems, particularly in higher education. The widespread availability of digital networks, their seamless connection to the internet, and the growing use of electronic educational resources have collectively fostered an increased reliance on technology-driven models of learning. These developments have led to the emergence of a comprehensive and fully integrated mode of delivering education via digital platforms—commonly known as e-learning. This evolution reflects not only a shift in educational delivery methods but also a deeper transformation in the philosophy and structure of modern education, as previously envisioned by pioneers like Bill Gates.

In alignment with this global shift toward technology-driven education, most international universities have increasingly adopted e-learning due to the significant advantages it offers. Economically, it generates substantial returns; academically, it expands access to educational opportunities for individuals who may face barriers to participating in traditional, campus-based education. Moreover, it has contributed to resolving numerous challenges faced by classical models of university education. While theoretical literature and practical implementations generally agree on associating e-learning with the tools and techniques employed within it, there remains a divergence in perspectives—some view it merely as a teaching method or instructional aid, while others regard it as a fully integrated educational system, complete with its own inputs, processes, and outcomes. Observers of this evolving educational model note that its development has progressed in stages: beginning with the use of audiovisual aids and technological tools in teaching, and culminating in its establishment as a self-sufficient system capable of facilitating diverse teaching and learning practices.

The globalization of education has transformed e-learning from a complementary tool into a vital mechanism for continuity and institutional presence. It is no longer a luxury or a secondary option, but rather a necessity driven by evolving educational demands. This reality became especially evident during the COVID-19 pandemic in the 2019/2020 academic year, when most educational institutions were compelled to adopt e-learning solutions to sustain the learning process. Universities that had previously underinvested in digital infrastructure found themselves facing significant challenges in adapting quickly to this shift. This experience highlighted the imperative of establishing robust and flexible e-learning systems—not merely to enhance education, but to ensure its resilience in the face of emergencies. In this context, e-learning should not be viewed as an inferior alternative to traditional in-person education, but rather as an equivalent and integrated component within a broader educational system committed to quality, accessibility, and sustainability.

In light of the foregoing discussion, and based on pioneering international and Arab experiences in the field of e-learning—as well as the growing interest of students, particularly youth, in embracing the digital revolution—this article aims to evaluate the Algerian university's experience with e-learning. The objective is to identify the key challenges it

faces in building an e-learning system capable of achieving the core goals of higher education. Furthermore, the study seeks to support the implementation of an educational model that is flexible, efficient, and effective—one that transcends traditional temporal and spatial boundaries. To achieve this, an inductive approach was adopted to first explore the fundamental concepts related to e-learning, followed by an examination of the current state of the Algerian experience in this domain and the most pressing obstacles that hinder its development.

2- E-learning at the Algerian University :

Before addressing the challenges of e-learning in Algerian universities, it is important to briefly review its origins. Tracing the development of e-learning is closely tied to the history of distance education, which remains the most commonly used term by educational authorities when describing this form of learning.

Following Algeria's independence, the national education system adopted distance education methods—such as correspondence courses, radio, and television broadcasts—to respond to the significant challenges the country faced at that time (Djoudi, 2018).

However, when it comes to e-learning as associated with the use of modern digital technologies in education, Algeria's experience is relatively recent and has not yet achieved its expected objectives when compared to other countries.

Although Algeria was connected to the Internet in 1993, and although the Centre for Research on Scientific and Technical Information (CERIST)—a research body under the Ministry of Higher Education—was the sole Internet service provider in the country during the 1990s (Douidi et al., 2007), the widespread use of the Internet and access to its services across various sectors only began later. In the field of education, significant expansion in Internet use began in the first decade of the 21st century, which coincided with the liberalization of the telecommunications market in Algeria (Ben Bouza & Bin Zian, 2016, p. 85)

Ghraf, a historian of e-learning, states that it began in Algeria with the experience of EEPAD, the first Internet provider in Algeria, and the National Center for Distance Vocational Education (CNEPD), which represents the country's first venture into virtual education. This center still exists and is supervised by the University of Continuous Formation (UFC) through a virtual platform that broadcasts supplementary lessons to its students in several disciplines (Ghraff, 2015).

The Algerian university system, in response to technological advancements and their impact on education, has aimed to adopt the national project for distance education. The main objectives of this project are to accommodate the growing number of students, reduce the shortage of teachers, improve the quality of training, and implement recommendations designed to ensure educational quality.

The launch of the project in 2003 enabled the establishment of the national system for distance education. The Ministry allocated special funding for this project, estimated at 71,615,200,000 DZD. Accordingly, 59 university institutions were provided with a video lecture platform, which consists of 13 transmitting sites and 46 receiving sites, used both synchronously and asynchronously (recorded sessions that are rebroadcast). Additionally, a distance education platform was established—a dedicated network of e-learning platforms that enables students to access online content through websites, accessible via the National Research Network (ARN) (Aknoush & Ben Tazeer, 2010, p. 121).

Between 2006 and 2009, approximately 500 specialists in technical and pedagogical aspects of e-learning were trained through several cooperative projects with private European organizations such as COSELEARN, the Ibn Sina Program, the AUF Program, the @IDE Program, and others (Ghraff, 2015).

In this context, distance education units have been established across all university institutions to manage and maintain the platforms, support the use of modern technologies in the educational-learning process, and facilitate the exchange of experiences in modern educational methodologies emerging from technological advancements.

The objectives of this project were generally divided into three main phases, each with its own goals that lay the foundation for the subsequent phase. According to the speech by Mr. Rachid Harraoubia, then Minister of Higher Education and Scientific Research, at the Regional Symposium of Eastern Algerian Universities (CRU.Est) held on May 5, 2012, the first phase aimed at the simultaneous use of video lectures by recording sessions at qualified institutions and rebroadcasting them to other institutions. Additionally, it focused on digitizing existing pedagogical content and making it accessible to students.

The second phase aimed to begin producing standardized content based on modern educational approaches and publishing it on electronic platforms. The third phase sought to "prepare a distance education system" that leverages e-learning by building upon the investments of the previous phase, while relying on curricula and plans approved according to applicable standards and recommendations. It also planned to establish a virtual library conforming to the standards adopted in this field

Perhaps the main goal of all these efforts was to produce electronic content based on modern educational approaches, develop clear pathways according to a specific pedagogical charter, and publish them through e-learning platforms. However, this goal was not fully achieved due to several obstacles, the most significant of which was the irregular development of the national research network (Aknoush & Bin Tazeer, 2010, p. 125), in addition to material, human, and technical challenges related to Internet access.

Over the years, the Ministry, through the National Committee for Distance Education, has expanded the project to include additional university institutions. It has launched numerous integrated electronic projects and services for students, professors, researchers, and staff, such as the SNDL project—the National System for Online Documentation. This platform serves as a gateway dedicated to students and teachers, providing access to both national and international digital databases (Bin Dhaifallah & Batoush, 2016, p. 446). Other services include online registration for new baccalaureate holders, student guidance, management of the LMD system, access to educational assessments, reception and evaluation of university scientific research projects, electronic journals, among others. The Ministry aims to establish and generalize these services widely in recent years.

A simple browse through the websites of university institutions reveals that most offer numerous electronic services in addition to e-learning platforms. However, these platforms—primarily relying on the Moodle platform more than others—contain very few lectures compared to what is offered in traditional face-to-face education. Moreover, students' access to these platforms, especially before the pandemic, was limited relative to their numbers (Djoudi, 2018), making them insufficient to establish a self-sustaining e-learning system.

The COVID-19 pandemic that the world experienced provided a strong impetus for e-learning platforms. The university system, with all its components—authorities, administration, professors, and students—found itself facing the repercussions of the pandemic with one irreplaceable option : e-learning. Consequently, efforts were made to develop courses on e-learning platforms. On July 27, 2020, the former Minister of Higher Education, Abdel-Baqi Ben Zayan, stated on National Radio that 90 percent of lectures and practical work were delivered through university digital platforms.

It was also observed during the pandemic that the number of visitors to these platforms increased compared to the pre-pandemic period. Despite this positive development resulting from the compulsory use of e-learning, an examination of the lectures and pedagogical materials posted online—mostly in the form of DOC, PDF, and PPT files—reveals that they generally do not differ in wording or structure from traditional university lectures. This indicates a lack of training and mastery in the use of educational platforms.

In general, observers of the implementation of this type of education in Algeria recognize the Ministry of Higher Education and Scientific Research's interest over the past two decades in providing its most essential requirements. However, this effort has not yet achieved all the goals set forth. Despite the repercussions of the pandemic and the rapid developments seen in this form of education in other educational systems, the Algerian experience remains young and progresses slowly.

The implementation is fragmented, relying largely on individually produced educational content and limited applications in some universities across the country. The extent of adoption varies from one university to another, and even within the same university, which hinders its widespread generalization. This situation is attributed to a set of obstacles that currently represent challenges the university must address in order to catch up.

3- The Algerian University and the challenges of e-learning

In the following section, an analysis will be attempted on the results of a group of studies and articles focusing on e-learning in Algerian universities, such as those by Belbekai (2015), Salami, Dahmar & Ski (2016), Makrani & Titrawi (2017), Deif Allah & Boutaba (2016), and Massoudi (2016). These studies present the most important challenges of e-learning, which are generally divided into three main axes.

The first axis concerns requirements that go beyond the university sector and are mainly related to the country's overall policies, its capabilities, future prospects, and forward-looking vision. It also relates to the formulation of educational policies and the status and roles assigned to the university by these policies. This challenge can be considered the foundation for many other challenges and requires a separate, in-depth analysis in light of Algeria's current options, policies, and orientations.

Within this axis, various problems related to the state's capabilities and infrastructure in the telecommunications and technical sectors are also included. These problems include weak internet connectivity, low bandwidth, power outages, incomplete communications infrastructure, and regional disparities across Algeria—issues that directly affect the utilization of e-learning.

The second axis concerns the challenges faced by the university system in general, beyond e-learning. It encompasses the longstanding problems that the university has encountered over time, which are reflected in its role and its educational and research performance, including in the electronic domain.

The third axis relates specifically to the challenges associated with the implementation and use of e-learning itself. It is impossible to separate the challenges of this type of education (i.e., e-learning) from those experienced by the Algerian university in its traditional face-to-face education. In fact, most of the challenges of e-learning stem primarily from the difficulties faced by the current Algerian university system, which are directly reflected in its application and processes.

Addressing these difficulties will pave the way for e-learning to expand further and will be an effective means to overcome many of its inherent challenges.

One of the most important challenges associated with the axis of the university system—according to reality, studies, and the scientific literature (e.g., Bouhniyya, 2005; Zarqan, 2012; Bounguib & Habbash, 2018; Khaoua et al., 2019)—is, for example:

_ The increasing demand for higher education institutions: Algerian universities are witnessing a steady rise in student enrollment. Although this growth aligns with the aspirations expressed by officials in the higher education sector, it has given rise to several other challenges, such as increased public spending and a growing administrative budget, insufficient academic supervision and its declining quality, as well as inadequate infrastructure and equipment. These issues have had direct repercussions on the scientific and pedagogical level of students.

In addition, there is a persistent mismatch between the competencies of university graduates—whether in terms of academic output or research—and the requirements of the labor market and society. This is further exacerbated by rising unemployment rates among graduates, including those holding advanced degrees.

_ The university's inability to engage with its social and economic environment, and the failure of its curricula to keep pace with scientific advancements on the one hand, and the needs of its surrounding context on the other, raise many questions about the university's actual role today. Unfortunately, despite the Algerian university's formal adoption of the LMD (Licence-Master-Doctorate) system, its philosophy and working methods remain largely traditional and disconnected from the intended goals of that system.

Moreover, teaching, training, and assessment processes are still characterized by rigidity, relying heavily on repetition and rote learning, and lacking the quality and effectiveness expected of modern educational and training services. This situation calls for a thorough reconsideration and reform of academic practices, programs, and curricula to align with the demands of the knowledge economy—both at the national and global levels

_ The absence of societal participation in the planning and financing of higher education: The reliance on government resources as the primary source of funding for higher education, with limited contribution from alternative sources, remains one of the key challenges that must be addressed in order to align with global trends. Diversifying funding sources can foster competitiveness, promote more efficient spending, and shift the focus toward qualitative rather than merely quantitative development.

Moreover, it can support the move toward decentralized university governance, which could help overcome many of the challenges currently facing the system.

_ The inflexibility of the university system, coupled with the absence of strategic and forward-thinking planning, has adversely impacted its capacity to adapt to evolving global developments.

_ Non-participation in the production, publication, and development of scientific research and knowledge building remains a core issue. Our university system, in general, is largely centered on the transfer and repetition of existing knowledge rather than its creation – across nearly all academic levels. It primarily focuses on delivering information to learners with the aim of enabling them to pass exams, advance academically, and obtain certificates – a quantitatively driven policy that prioritizes outcomes over depth and quality. As a result, students are taught what to memorize rather than how to think, solve problems, build knowledge, or engage in creative inquiry. This may, in part, explain why many students tend to distance themselves from e-learning platforms and rely instead on printed lecture materials.

_ The emigration of scientists and skilled professionals who could contribute to the implementation of this type of education, along with their limited participation in improving the situation, is a significant concern. This may be attributed to the absence of a supportive environment within the university system, the failure to invest in and develop their potential, or a lack of proper recognition of their contributions. Additionally, it may stem from a prevailing preference among decision-makers for adopting externally imposed solutions and models in alignment with globalized systems."

E-learning has the potential to address many of the shortcomings of traditional education. However, without thoughtful development, its implementation remains superficial and unlikely to succeed. To adopt e-learning effectively—especially in alignment with international best practices—it is essential to overcome structural challenges and establish a comprehensive intellectual, technical, and socio-educational environment, rather than relying on fragmented and individual efforts.

Therefore, the challenges of the third axis become evident, as the success of e-learning depends on a shared awareness among all stakeholders—most importantly, the governing authorities. In the Algerian context, there appears to be a lack of comprehensive understanding of the philosophy behind this systemic form of education and its foundations as a civilizational project aimed at advancing society prior to—and through—the development of the university and its human capital.

When adopting the distance education initiative, the Ministry in charge refers to it primarily as a tool to support in-person learning, rather than recognizing it as a parallel, self-sufficient educational model. This reflects a conceptual deficiency and a limited acknowledgment of its effectiveness, future potential, and its capacity to modernize the university system—especially in light of global trends.

Such vagueness in the concept, or its partial understanding, inevitably affects the objectives, direction, mechanisms, and implementation of e-learning. This conceptual ambiguity, in itself, constitutes a fundamental challenge to the success of e-learning initiatives.

Like many global education systems that recognize e-learning as an integrated and comprehensive form of education, raising awareness of it as a necessary and standalone system—rather than merely a supplementary tool—may enable the achievement of the objectives set by the ministerial distance education project. These objectives include

accommodating the growing number of students without relying solely on compulsory daily attendance, addressing the shortage of teaching staff, improving the quality of training, and implementing quality assurance recommendations.

The lack of awareness regarding the concept and necessity of e-learning also extends to educational stakeholders. This is particularly evident in the conflicting opinions and attitudes of university professors toward e-learning, as well as their difficulty in adapting to its requirements (Ben Ali, 2011; Doudou, 2014; Rabie, 2017; Massoudi, 2016). Such conflict may stem from limited mastery of its mechanisms and applications, insufficient training and professional development in the field, and the absence of enforcement or even encouragement from educational authorities. These factors have contributed to resistance and a general lack of acceptance of e-learning among faculty members.

The situation is generally similar among students. Although today's youth are highly familiar with modern technologies and digital media, their actual engagement with university e-learning platforms remains limited. This reluctance may be attributed to several factors.

Some are student-related, such as the lack of access to essential resources (e.g., computers, internet connection), insufficient training, limited proficiency in using educational platforms, and a general lack of motivation toward learning. Other factors are external, such as the lack of encouragement from instructors to adopt e-learning, and the failure to integrate it meaningfully into course delivery or provide diverse pedagogical content that could inspire new learning perspectives.

Moreover, the nature of the Algerian educational system at its various levels has traditionally shaped students to be passive, dependent learners who tend to value diplomas over actual knowledge. This mindset often leads to a superficial and even negative use of modern technologies—such as resorting to cheating and plagiarism—whereas e-learning fundamentally relies on principles of autonomy and self-directed learning.

Furthermore, a number of challenges persist, including

_ The existing educational curricula demonstrate significant weaknesses and a lack of alignment with the philosophy of e-learning, failing to meet the standards of quality and competitiveness. Furthermore, they largely neglect the technical and skill-based competencies required for effective engagement in this mode of education.

_ There is a shortage of trainers and specialists with the necessary expertise and competencies—both in managing and operating e-learning systems and in designing educational websites and developing digital curricula. These tasks require integrated teams that include educators, content specialists, and experts in communication technologies and digital media. Additionally, there is a lack of qualified personnel in areas such as system installation and technical maintenance.

_ There is a clear shortfall in the financial resources allocated to equipping universities with the tools and infrastructure required for effective e-learning implementation—especially when compared to expenditures in other areas and to the levels of investment observed in certain Arab and international contexts.

_ The lack of well-developed systems, laws, and regulations governing e-learning and its consequences poses a major challenge, especially in terms of protecting intellectual property rights and ensuring legal clarity.

_ There is a noticeable lack of commitment to keeping up with scientific advancements and to fostering innovative initiatives in the field of e-learning.

_ There is a general lack of societal awareness about the significance and value of this form of education.

These are, in general, some of the key challenges hindering the implementation of e-learning as a comprehensive system within Algerian universities. In light of current global conditions, this mode of education has become a necessity rather than a luxury. A brief reflection on the experiences of educational systems—particularly universities—during the COVID-19 crisis clearly reinforces the urgent need to establish an electronic learning system that runs parallel to, and integrates with, traditional in-person education.

Achieving this goal requires strategic planning based on a thorough analysis of strengths, weaknesses, opportunities, and threats (SWOT), along with a committed effort to overcome the obstacles that hinder its effective adoption and institutional integration.

Conclusion

The rapid and ongoing technological development that has impacted all aspects of life has compelled educational systems to respond accordingly. In the era of the globalization of education, these systems are now more than ever required to modernize and adapt sustainably in order to keep pace with such developments and ensure their relevance in a highly competitive, knowledge-driven world shaped by human capital.

E-learning is both a product of the technological revolution and a means of responding to it. Most universities worldwide have adopted this form of education, recognizing its advantages across multiple levels.

Thus, this article aimed to examine the Algerian university's experience with e-learning and highlight its most significant challenges. Although this experience reflected a form of investment and foresight on the part of educational authorities, it has fallen short of achieving its intended goals. It has yet to reach a stage where it effectively engages the main educational stakeholders—namely students and teachers—in active participation, which constitutes the foundation of any successful e-learning system.

The Algerian university continues to face numerous obstacles that hinder the effective implementation of this educational model in a way that reflects its particular context, while also aligning with local and global trends.

"The implementation of e-learning, as practiced today in leading international universities, requires a fundamental re-evaluation of the structure and function of university institutions. It also necessitates profound changes in their policies, objectives, methods, resources, and operational capabilities.

Given the current limitations in available resources, universities must rise to the challenge by providing the necessary technical, administrative, and legislative support. This includes developing robust infrastructure, ensuring regular maintenance of technological equipment, and embedding e-learning into all pedagogical and educational practices for all stakeholders involved.

This does not imply abandoning face-to-face education or underestimating its value. On the contrary, both modes of learning should be integrated in a complementary manner, where the strengths of one offset the limitations of the other. Such an approach will enable national universities to offer high-quality, competitive educational outcomes.

Ethical Considerations

This study is based on theoretical analysis, document review, and secondary sources related to higher education and e-learning practices in Algerian universities. It does not involve human participants, personal data, surveys, interviews, or experimental procedures. Therefore, ethical approval from an institutional review board was not required. The authors confirm that the research was conducted in accordance with established principles of academic integrity, objectivity, and responsible scholarly practice.

Author Contributions

Dr. Fouzia Benkemchi contributed to the conceptualization of the study, theoretical framework development, and analysis of the challenges related to e-learning in Algerian higher education.

Dr. Radjia Benali contributed to the literature review, contextual analysis of digital transformation in universities, and the drafting and revision of the manuscript.

Both authors reviewed and approved the final version of the manuscript and take full responsibility for its content.

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Conflict of Interest

The authors declare that there are no conflicts of interest, financial or otherwise, that could have influenced the conduct or outcomes of this research.

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