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Digital Pedagogy in Algeria: Between Top-Down Policy Directives and Technical Arrangements—What Gaps Exist Between Policy and Implementation?

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Abstract

This article critically examines the development and implementation of digital pedagogy in Algeria, with particular attention to the gap between policy ambitions and on-the-ground conditions. It considers the expansion of digital infrastructure and platforms, as well as policy initiatives, alongside persistent inequalities in access, limitations in teacher preparation, and the pedagogical challenges associated with technology-mediated learning. The analysis argues that digital technologies do not, by themselves, improve learning or reduce educational inequalities; when introduced without adequate infrastructure, training, pedagogical design, and institutional support, they may weaken foundational learning, learner engagement, and teachers' professional agency. The article therefore calls for a shift from technology-centred digitalisation towards a coherent pedagogical strategy that places learning quality, equity, teacher development, and critical use of technology at its centre.

Keywords: digital pedagogy, teaching and learning, education policy, digital technologies, Algeria

Introduction

Digital infrastructure has become an important component of contemporary education. With the rapid development of technology, computers, tablets, smartphones, and educational applications are increasingly used both inside and beyond the classroom. Their importance is particularly evident in access to information, as they allow learners and teachers to consult databases, digital books, research articles, and other resources. Digital tools can also support interactive teaching by integrating software, videos, messaging services, online platforms, virtual environments, simulations, and serious games into the learning process. When used purposefully, such tools can help learners engage with abstract concepts, participate more actively, collaborate with peers and teachers, exchange ideas, receive timely feedback, and access learning activities adapted to different needs and preferences.

The growing digitalisation of education systems has consequently become a major social and didactic issue. During an international conference discussion prompted by a 2016 debate in the Swiss newspaper *Le Temps* on whether schools should prioritise digital technology, participants expressed numerous, often sharply contrasting views (Capt et al., 2020). These reactions reflect a broader conception of digital integration in which learners are expected to become more active participants in their education, teachers increasingly assume mediating and supportive roles, and knowledge is often treated as information that can be readily accessed and used. At the same time, public discourse can reduce pedagogical questions to technological ones, presenting digital tools as levers that can reshape the relationships among learners, teaching, and knowledge.

These developments invite reflection on the nature of knowledge at a time when search engines and generative artificial intelligence tools can provide large quantities of information almost instantly. They also raise questions about the kind of learner produced by the intensive and sometimes abrupt integration of internet-based technologies into educational practices and by the growing permeability between educational spaces and the wider digital environment.

Digitalisation has attracted particular attention in Algeria, where successive reforms have encouraged the use of information and communication technologies in education. In this context, “digital pedagogy” may be understood as the set of human, technological, and material resources mobilised to support the acquisition of knowledge and skills through

digital practices, whether in face-to-face, hybrid, or distance settings. It therefore encompasses new ways of teaching, learning, communicating, and organising educational work.

The development of digital pedagogy in Algeria has been shaped largely by government policy and technical arrangements. Despite the stated ambitions of these initiatives, implementation continues to face substantial difficulties, raising questions about effectiveness and educational impact. This article therefore critically analyses the state of digital pedagogy in Algeria and examines the extent to which the gap between policy ambitions and implementation may justify the strongly negative assessments sometimes associated with digitalisation.

The study has four objectives: to analyse official policies and discourse in Algeria concerning the integration of information and communication technologies into education; to examine the technical arrangements associated with digital pedagogy; to assess their implications for teachers, learners, and the education system; and to identify the factors that contribute to the perception that digitalisation has produced serious educational dysfunctions.

Context of Digital Pedagogy in Algeria

Digital Technology and Learning in Algeria: Integration and Outcomes

Digital pedagogy has gradually been incorporated into Algeria's national education policy. This development has been driven by global technological change, efforts to broaden access to education, and increasing recognition of the importance of digital competencies in contemporary society.

In recent years, Algeria has expanded initiatives aimed at integrating information and communication technologies (ICTs) into the education system. Governance is divided primarily between the Ministry of National Education, which oversees primary, middle, and secondary education, and the Ministry of Higher Education and Scientific Research (MESRS), which oversees higher education. This framework is also supported by the National Education Framework Law (Law No. 08-04 of 23 January 2008), which provides a legal basis for the development of educational infrastructure and equipment (Journal officiel de la République algérienne, 2008).

Under the Ministry of National Education, the National Centre for the Integration of Pedagogical Innovations and the Development of Information and Communication Technologies in Education (CNIIPDTICE) was established by Executive Decree No. 03-471 of 2 December 2003 (Journal officiel de la République algérienne, 2003). Its missions include conducting studies and research, providing expertise, and designing and disseminating innovative pedagogical approaches that incorporate ICTs. The National Office for Distance Education and Training, also under the ministry's supervision, serves learners who are unable to participate in regular schooling. Established by Executive Decree No. 01-288 of 24 September 2001, it provides distance education at several school levels and develops partnerships in the field of distance education (Journal officiel de la République algérienne, 2001).

In higher education and scientific research, the Directorate-General for Scientific Research and Technological Development is governed by Executive Decree No. 13-81 of 30 January 2013 (Journal officiel de la République algérienne, 2013). Under this institutional framework, the Centre for the Development of Advanced Technologies contributes to the development and deployment of advanced technologies. The Research Centre for Scientific and Technical Information (CERIST), established by Decree No. 85-56 of 16 March 1985, also plays an important role in scientific and technical information, ICT research, the development of the information society, and the modernisation of university information services, including virtual libraries (Journal officiel de la République algérienne, 1985).

The Ministry of Vocational Training and Education (MFEP) also includes a Directorate of Information Systems and Media and relies on the National Centre for Distance Vocational Training and Education as a support institution for its distance-training activities.

In the telecommunications sector, the ministry responsible for post and telecommunications is responsible for internet governance, electronic communications, information system security, service continuity, online child protection, and data protection. The National Information Security Framework provides an institutional reference for these responsibilities (Ministère de la Poste et des Télécommunications, 2020).

- Establish general rules for internet governance and guide the development of electronic communications, online content, and services;
- Ensure the security of sectoral information systems while safeguarding the continuity and quality of services provided by postal, internet, and telecommunications operators;
- Protect access networks, contribute to the protection of children online and the preservation of data in cyberspace, and support the establishment of internet-governance mechanisms.

To translate these ambitions into concrete action, several public policies have been implemented. In this regard, one of the key initiatives was the “e-Education” programme launched in 2005, followed by the introduction of a new digital academic support platform aligned with the national education curriculum for the 2023/2024 academic year.¹

¹ The “MOALIM” platform offered by Algérie Télécom provides interactive online academic support in accordance with the Ministry's recommendations. The platform is intended for middle- and secondary-school pupils, particularly those in the science stream, and offers educational packages in subjects including mathematics, physics, science, languages, history, geography, and Islamic studies (Algérie Télécom, n.d.). “Mo@lim” is accessible through the Inkidia platform (Inkidia, n.d.). The Ministry has also sought to expand the use of electronic tablets in schools in line with presidential directives; the stated objective was to reach at least 50% tablet use by the end of the relevant academic year (Algérie

This programme aimed to develop ICT infrastructure in schools and distribute computer equipment to students and teachers. It also promoted the use of digital platforms for learning and for sharing educational resources online. In this context, the Order of 30 October 2016 (Journal officiel de la République algérienne, 2016) requires educational institutions to provide a multimedia computer room. At the same time, the Government Action Plan for the Presidential Programme seeks to consolidate distance education, particularly by acquiring technological equipment.

Since then, Algeria has continued to invest in ICT infrastructure, including initiatives targeting rural schools and remote areas. These efforts have sought to improve connectivity and provide digital equipment to institutions that previously had limited access to it.

Theoretical Foundations and Contributions of Digital Pedagogy in Algeria

Digital pedagogy seeks to support educational innovation by integrating digital technologies into established teaching practices. Lebrun (2021) presents digital technology as an opportunity to reconsider the respective roles of teachers and learners and to move from a predominantly teacher-centred model towards a stronger focus on learning. In this sense, digital tools may support learner engagement, collaborative work, and more interactive and individualised learning experiences.

This transition, however, requires a pragmatic approach. Digital pedagogy should not be treated as a wholesale replacement for face-to-face teaching, but rather as a set of practices that can complement and reshape existing forms of instruction. Its introduction also does not automatically ensure that teachers or students possess the competencies required to use digital tools effectively; appropriate training and pedagogical support remain essential.

Top-Down Approaches to Digital Pedagogy in Algeria

Educational Policies Supporting Digital Pedagogy

The transition towards digitally supported schooling is increasingly presented as a strategic priority for education systems operating within a knowledge-based society. UNESCO (2023) emphasises that the educational value of technology depends on the conditions under which it is introduced and on whether it serves clearly defined learning purposes, rather than on the mere provision of devices or platforms.

In Algeria, this policy orientation is reflected in structural reforms aimed at enriching traditional classroom practices through digital technologies. The effectiveness of such top-down policies, however, depends on whether institutional directives can be reconciled with practitioners' competencies, working conditions, and pedagogical realities.

Karsenti (2009) similarly argues that the pedagogical integration of ICTs requires more than institutional directives; it depends on sustained support for teachers and on developing the competencies needed to translate policy into classroom practice.

Thus, the effectiveness of top-down digital education policy depends on teachers' actual appropriation of digital tools in their classrooms. This requires continuing professional development, technical assistance, and pedagogical support rather than a purely technological injunction.

Among the major initiatives, the National Programme for Computing in Education, launched in 2005, represented an early step towards introducing computing and information technologies across different levels of the education system.

More recently, Algeria's National Digital Transformation Strategy was formalised as part of the country's broader digital roadmap towards 2030 (Haut-Commissariat à la Numérisation, 2024). In education, this orientation has also been reflected in initiatives promoting online learning platforms, the gradual expansion of digital tools in classrooms, the development of curriculum-related digital content, and the strengthening of teachers' digital competencies through training programmes (Ministère de l'Éducation nationale, 2016).

Despite these advances, implementation continues to face structural and organisational challenges.

Constraints and Limitations of the Policy Approach

Policies intended to develop digital pedagogy encounter structural, financial, and organisational obstacles that reduce their impact. Geographical disparities in internet coverage remain a major barrier, particularly for teachers and learners in rural or isolated areas (UNESCO, 2023). Such disparities deepen the digital divide and slow the wider adoption of digitally supported pedagogical practices.

These difficulties are compounded by institutional discontinuity and changes in decision-making structures, which can weaken long-term planning. UNESCO (2023) stresses that sustainable digital transformation requires coherent planning, coordination among stakeholders, and regular evaluation of implemented measures.

The effectiveness of digital education policy is therefore closely linked to economic, institutional, and local conditions. These factors shape not only access to technological tools but also the extent to which teachers and students can use them meaningfully.

Challenges in Accessing Digital Resources

Slow internet connections, interruptions to the electricity supply, insufficient information technology equipment, and limited access to digital resources hinder the effective use of learning platforms and tools. These constraints restrict

Presse Service, n.d.). In addition, the Ministry announced a new version of the education sector's information system for March 2025 as part of its 2025–2026 digital-transformation strategy, with the aim of digitising pedagogical, educational, administrative, and organisational operations (Algérie 360, n.d.).

opportunities for pedagogical innovation, interaction, and collaboration and can reduce the effectiveness of digitally mediated teaching (UNESCO, 2023).

Financial constraints also limit institutions' capacity to acquire and maintain equipment and can deepen inequalities in students' access to hardware, software, and connectivity. Digital pedagogy should therefore be evaluated not only as a means of maintaining instructional continuity but also for its capacity to reduce inequalities, improve educational provision, and support the competencies required in contemporary society (UNESCO, 2023).

Mallard (2021) argues that these challenges also require attention to the organisation and design of educational spaces. From this perspective, digital technology should be integrated into learning environments in ways that connect infrastructure, spatial organisation, and pedagogical practice rather than treating equipment as an isolated solution.

Imbalances Between Policy Objectives and Realities on the Ground

A central challenge in public education policy is the persistent gap between ambitions formulated at the decision-making level and the conditions under which reforms are implemented. National strategies may set ambitious objectives for modernising education, but implementation depends on local contexts that differ markedly in resources, infrastructure, staff competencies, and institutional constraints. These differences help explain why policies for integrating digital technology do not produce uniform outcomes across institutions.

The findings of our national survey of teachers are consistent with this pattern. Across questions concerning the effectiveness of ICTs, their influence on teaching, and barriers to digital transition in Algeria, respondents repeatedly pointed to a gap between policy promises and the budgets and resources available in practice.

Teachers identified several major obstacles, including shortages of qualified personnel, budgetary constraints, insufficient digital infrastructure, inadequate equipment maintenance, and unequal access to technology. Without adequate material, logistical, and pedagogical foundations, even well-designed reform projects may fail to achieve their intended objectives.

A strongly top-down approach can also overlook the practical needs of schools, teachers, and pupils by prioritising institutional announcements over sustained appropriation of reforms by practitioners.

Moreover, highly centralised and uniform strategies can restrict adaptation to local conditions and geographical disparities. The effective adoption of digital technologies depends on variables such as urban–rural differences, infrastructure provision, teachers' prior pedagogical and digital competencies, and the socio-economic characteristics of the communities served.

The survey findings therefore suggest that the difficulties observed cannot be explained by technical or financial factors alone. They also reflect weak alignment between national strategic directives and teachers' everyday working conditions, a gap that can undermine confidence in institutional discourse.

Limitations of Teacher Training and Infrastructure

Progress in digital technology remains unevenly distributed, and important obstacles continue to limit the effectiveness of digital transformation. In many schools and universities, shortages of computer equipment restrict both students' and teachers' access to digital resources.

Although many institutions have computer rooms, interactive whiteboards, and video projectors, access to such infrastructure remains uneven. Less advantaged regions continue to face equipment shortages, which can reinforce existing inequalities in access to digital tools.

Beyond physical infrastructure, successful digital integration depends heavily on teachers' competencies. Training is therefore essential to the appropriate pedagogical use of technology. Although programmes have been introduced to strengthen teachers' ICT skills and pedagogical engineering, they are often insufficient, unevenly accessible, or focused primarily on technical operation rather than instructional design and classroom use.

At the same time, Algerian higher education has expanded e-learning, online course platforms, and other forms of digitally mediated instruction. These initiatives have broadened access to educational resources and encouraged new forms of knowledge transmission.

The expansion of hybrid formats that combine face-to-face and distance learning has also diversified modes of instruction. Such formats can support approaches such as the flipped classroom and can give students a more active role in their learning pathways when they are supported by appropriate instructional design.

Digital technology can therefore contribute to broader access to knowledge and to the diversification of teaching. Its effectiveness, however, depends on coordinated governance capable of reducing territorial inequalities, strengthening infrastructure and connectivity, and providing sustained teacher development. In Algeria, these conditions remain unevenly established.

Beyond organisational and material constraints, a further question concerns the effects of digital technology on learning itself, particularly on the acquisition and consolidation of foundational knowledge.

Potential Negative Effects of Digital Technology on Foundational Skills

Although digital technology facilitates access to information and broadens the range of teaching resources, it can also change the cognitive demands placed on learners. Carr (2011), for example, argues that constant exposure to rapidly changing online information can weaken sustained attention and encourage fragmented reading practices.

Desmurget (2019) likewise warns that excessive or poorly regulated screen exposure, particularly when it displaces cognitively demanding activities, may have adverse consequences for children's cognitive development and

academic learning. Such claims are especially relevant when digital use is poorly structured or primarily recreational rather than pedagogically guided.

Research on note-taking also illustrates that the educational effects of technology depend on how it is used. Mueller and Oppenheimer (2014) found that longhand note-taking could support deeper conceptual processing than verbatim laptop transcription in some learning tasks. This finding reinforces the importance of preserving foundational practices that require active processing, including reading, writing, numeracy, memorisation, and sustained reflection, rather than assuming that digital substitution is inherently beneficial.

The technological transformation of education has also changed the creation, organisation, and dissemination of knowledge. Universities increasingly combine elements of traditional academic provision with forms of distance education and massive open online courses (MOOCs). The rapid expansion of MOOCs after the highly publicised Stanford artificial-intelligence course of 2011 contributed to Davidenkoff's (2014) metaphor of a digital tsunami. This development reflects an attempt to combine the accessibility and flexibility of online knowledge with the institutional legitimacy of formal higher education.

Universities nevertheless face persistent difficulties in managing distance learning and assessment. For teachers, one of the central challenges is determining the extent to which students have engaged with and understood course content when interaction is limited or primarily asynchronous.

In Algeria, this problem is particularly visible in studies of hybrid and distance teaching. Ould Benali et al. (2021) report that, where teachers had limited training in the pedagogical use of Moodle, online teaching often consisted mainly of uploading PDF or Word course files, with limited interaction or follow-up.

As a result, lecturers may have limited information about the technical or conceptual difficulties students encounter unless they deliberately collect feedback through surveys, questionnaires, forums, or other forms of interaction. When student feedback is limited, delayed, or affected by participation bias, teachers have fewer opportunities to adjust courses in real time.

These difficulties also raise questions about the perceived value and legitimacy of distance education. Although the MESRS has encouraged the digitalisation of higher education, the social and institutional status of online learning remains contested. Research on the Algerian experience during the COVID-19 period points to practical constraints such as unstable connectivity, the cost of internet access, limited direct supervision, and unequal study conditions, all of which can affect students' and teachers' perceptions of distance education (Boulahia, 2021; Lassassi et al., 2020).

This raises a broader question: how can equitable learning conditions be ensured for students participating in distance education?

In distance education, students may face substantially different learning conditions:

- Students study in different physical, technological, and family environments;
- Some students may receive more external assistance than others;
- Students do not necessarily receive explanations or feedback at the same time;
- Opportunities to ask questions at the moment a difficulty arises may be limited.

Online assessment creates an additional challenge: verifying the identity and authorship of the person completing an examination. The European Union-funded TeSLA project explored the use of tools such as facial recognition, voice recognition, keystroke patterns, and authorship analysis to support secure e-assessment (TeSLA Project, n.d.). Such systems, however, depend on suitable equipment, reliable connectivity, and institutional capacity to manage biometric and other sensitive data.

These technologies also raise questions about transparency, privacy, accessibility, and the interpretation of algorithmic outputs. Students may understand that monitoring is taking place without necessarily understanding how data are processed or how automated indicators contribute to decisions. For this reason, biometric assessment systems require clear governance, informed communication, and safeguards against erroneous or inequitable outcomes.

Technology-based authentication should therefore not be treated as a complete solution to the challenges of online assessment. In the Algerian context, large-scale implementation would also have to account for inequalities in equipment, connectivity, digital proficiency, study environments, and economic resources. Without such safeguards, technical requirements can introduce disadvantages that are unrelated to students' academic knowledge or integrity.

Learner Effort, Motivation, and the Teaching Profession

Digital Technology and Changes in Student Motivation

The widespread use of digital technologies is transforming learning practices and students' relationships with knowledge. Instant access to information, automation tools, and artificial intelligence applications offers important learning opportunities, but it can also foster expectations of immediacy that may weaken perseverance, sustained effort, and intellectual autonomy. These changes require teachers to design learning activities that use digital tools without removing the cognitive effort necessary for meaningful learning.

Redefining the Role of the Teacher in the Digital Age

In response to these transformations, the teaching profession is undergoing substantial change. The integration of digital technologies and more recent developments in artificial intelligence require a reconsideration of teachers' roles, competencies, and professional identity. UNESCO (2023) and Tardif (2012) both emphasise that the teacher's role

extends beyond the transmission of information and increasingly includes mediation, guidance, and the organisation of meaningful learning experiences.

Teachers must therefore help students learn how to search for, select, verify, interpret, and critically analyse information. In this context, professional practice also depends on human and relational competencies that technologies cannot simply replace, including empathy, creativity, communication, collaboration, critical judgement, and the management of classroom relationships.

This development is also evident in Algerian universities. Benaouali and Bourkaib (2022) show that university teachers recognise the pedagogical potential of e-learning while also reporting insufficient techno-pedagogical training, limited institutional support, and difficulties associated with distance-learning platforms. Their findings illustrate the gap between digitalisation policy and the conditions under which teachers are expected to implement it.

Similarly, Yamani (2023) shows that teachers' difficulties with online teaching extend beyond technical constraints to include the adaptation of pedagogical methods and attitudes towards online instruction. Dine (2026) likewise presents digital transformation in Algerian higher education as an organisational process that requires infrastructure, teacher development, and sustained institutional support.

Research on artificial intelligence points in the same direction. Bouzidi and Zarif (2025) report that Algerian teachers recognise potential pedagogical uses of artificial intelligence while also expressing concerns about preparedness, training, and conditions of integration. Khattab (2025) similarly emphasises the importance of institutional support and continuing professional development for responsible use of artificial intelligence in higher education.

Against this background, the article examines tensions among ministerial directives on digitalisation, teachers' perceptions of their role, and the actual use of tools such as Moodle, Rosetta Stone, Google Classroom, and WhatsApp in university settings. In the Algerian university context, particularly in open-access faculties, the teacher's professional role may remain ambiguous as institutions negotiate changing expectations, new technologies, and established forms of pedagogical authority.

Adapting to digital technologies is therefore one of several challenges facing Algerian teachers. The difficulty is not limited to technical proficiency; it is embedded in broader questions of professional recognition, pedagogical authority, workload, institutional support, and working conditions.

UNESCO (2023) stresses that technology integration must be accompanied by appropriate support for teachers. Research in Algeria reaches a similar conclusion: Benaouali and Bourkaib (2022), Yamani (2023), and Dine (2026) all identify continuing professional development, pedagogical support, and institutional capacity as important conditions for a sustainable digital transition in higher education.

Insufficient support can demotivate, weaken perceived self-efficacy, and reduce professional engagement, with consequences for the quality of teaching and learning. Tardif (2012) also highlights the relationship between teachers' professional conditions, recognition, and capacity to fulfil the increasingly complex demands of the profession.

Taken together, international and Algerian studies suggest that the difficulties teachers encounter should not be reduced to resistance to technology. They result from the interaction of technological, pedagogical, institutional, and social factors. Gaps in continuing professional development, weak support structures, organisational constraints, and pressures on professional authority can limit teachers' capacity to innovate and complicate adaptation to digitally mediated education.

Conclusion

The digital transformation of education is reshaping how knowledge is produced, transmitted, and learned. The analysis presented here indicates that successful transformation depends not on technological modernisation alone but on its integration within a coherent pedagogical, institutional, and social framework. In Algeria, repeated investment in equipment, platforms, and digital initiatives has coexisted with persistent weaknesses in infrastructure, teacher preparation, governance, equitable access, and pedagogical support.

These weaknesses can reproduce traditional teaching practices in digital form, increase teachers' workload, deepen learner dependence on tools, and encourage superficial engagement with knowledge. Under such conditions, digitalisation may be experienced as educationally disruptive not because technology is inherently harmful, but because technical innovation is being mistaken for pedagogical innovation.

Digital technology is therefore neither a universal solution nor an inevitable source of educational decline. It can become a meaningful lever for improvement when it is embedded in policies that prioritise teacher development, participatory governance, appropriate infrastructure, equitable access, and pedagogical approaches that promote critical thinking, autonomy, and high-quality learning. Without these conditions, digital expansion risks generating more disappointment than educational progress.

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