Review of Contemporary Philosophy
ISSN: 1841-5261, e-ISSN: 2471-089X
Vol 24 (01), 2025
pp. 463 - 470

The Digital Skills of Teaching Staff in Algerian universities: Between training and requirements in the field

[1]Dalel Araiche *, [2]Souad Benabbes

[1]University of Khenchela, Algeria

[2]University of Oum El Bouaghi, Algeria

Collective CLE, University of Sherbrooke, Canada

ABSTRACT: Technology education is one of the main challenges to be met today, both nationally and internationally. Forums such as UNESCO have long agreed on the need to promote the integration of technology into education systems. This article presents the results of a questionnaire survey on the use of Information and Communication Technology (ICT) in the training of university teachers in Algeria. Distributed online to teachers from various universities, fields, and specialities, the questionnaire collected preliminary data highlighting that, despite the undeniable potential of these technologies and the diversity of devices aimed at improving teaching and learning, their integration in the Algerian university context remains limited. From this perspective, in-service training for teachers and the digitalization of university environments are essential levers for promoting a more effective and sustainable adoption of these digital tools.

Keywords: Training, digital competence, teacher, university, Algeria
Received: 13 March 2025 **Received:** 06 June 2025 **Accepted:** 30 June 2025

1. Introduction

Over the past two decades, digital technology has become a predominant force in our personal and professional lives. This need extends to several areas, including health, trade, transport, and, in particular, education. According to Georges-Louis Baron and Christian Depover: "The question of the effects of educational uses of digital technology has arisen regularly for each of the waves of information and communication technologies that have swept through for more than 50 years, from audiovisual media to the most recent digital versions" (Baron and Depover, 2019: 57).

For schools to be up to the task of these technological and social changes, training professionals in digital technologies, as well as cultivating perceptive citizens, has been a necessity for almost four decades. However, the emergence of a standardized educational paradigm for all actors (teachers, education professionals, and political leaders) does not immediately follow from this common intuition. It is still necessary to define objectives, approaches, and training objectives. (Tessier, 2019).

In an innovative pedagogical context, some initiatives often present real challenges within education systems that grant teachers considerable autonomy in their choice of teaching methods and materials. These innovations could be adopted more easily in environments where teachers are subject to strict and continuous monitoring, thus facilitating a faster and even more effective implementation of already existing practices.

One of the primary hopes of educational technology lies in its ability to compensate for the lack of qualified human resources. In his book "The Teaching Industry", published in 1967, Le Than Khoi raised the issue of revising traditional teaching methods in light of the democratization of education and economic development. In particular, he envisaged the use of audiovisual tools as a means of "partially replacing human labour (the teacher) with capital (technology)" (Lê Thanh Khoi, 1967: 242).

Similarly, digital technology occupies a prominent place in media and political discourse, as well as in educational programs, experiments, and pedagogical practices. This presence is part of an ideological context marked by various representations. Moreover, the idea that digital technology should be integrated into education is widely accepted, and debates among education stakeholders focus less on the relevance of this integration and more on how to implement it effectively. According to Baron and Depover: "Technologies as tools at the service of teachers have polarized the interest of politicians and researchers, with a recurrence of questions concerning the change in the role of the latter (supposed to become more facilitators than instructors) and even their outright replacement by machines or algorithms capable of delivering supposedly "adaptive" teaching. (Baron and Depover, 2019: 57).

In our context, digital technology at the university is attracting considerable interest due to the significant transformations that universities worldwide, including those in Algeria, are undergoing. These changes are particularly linked to the increase in the number of students, a phenomenon observed in both countries, the North and the South. In this sense, G. Lameul and C. Loisy argue that "Since the 1960s, elitist systems have gradually been transformed into massive, universal systems with the increase in the number of students, the diversification of audiences, and the increase in training." (Lameul et. Loisy, 2014: 57).

This evolution is primarily influenced by globalization, which constantly requires the updating, adaptation, and development of new skills (Coste, 1999).

Moreover, universities are no longer places for the construction of knowledge but also essential environments for acquiring skills that facilitate professional and social integration. This evolution forces universities to take an interest in university pedagogy (De Ketele, 2010), as teaching methods can no longer be limited to traditional lectures; they must now incorporate innovative pedagogical practices that utilize ICTs.

The integration of educational technologies plays a crucial role in shaping learners' initial representations of the world and provides diverse perspectives for their future studies. The use of digital tools must develop differentiated pedagogies and personalize the training course for each learner, enabling them to acquire more self-confidence and autonomy. Teacher training is of crucial importance, as it aims to equip teachers with the necessary skills to use these tools effectively in their teaching.

Multiple studies have examined teachers' representations and beliefs on the use of ICT in language teaching, exploring, in particular, the difficulties encountered by students using online learning resources during school closures during the COVID-19 pandemic (Martin et al., 2020). The challenges identified include teachers' skills and comfort in the use of ICTs, their confidence in the use of these tools, the need for specific training, the inadequacy or absence of adequate software, the digital (and economic) divide, inadequate infrastructure and traditional education systems favouring face-to-face teaching over virtual ones, (Khatoony & Nezhadmehr, 2020Supriadi et al., 2020).

However, despite these obstacles, several studies have shown a generally positive perception of language teachers towards the integration of ICTs, highlighting their potential benefit for language teaching and learning (Ferdig et al., 2020; Fitri & Putro, 2021; Gandhi, Hethesia & Monica, 2020; Kundu & Dey, 2020).

That said, we try throughout this contribution to answer the following questions:

- How were Algerian teachers technically and pedagogically prepared to switch to distance learning?
- How have the training courses been adapted to meet the requirements and challenges of distance learning?

2. Theoretical Overview of the Main Concepts

2.1. Digital education: culture and computational thinking

While the rise of microcomputing has brought computer culture to the forefront (Drot-Delange & Bruillard, 2012), the rapid development of digital technology in our daily lives necessitates a re-examination of the

contours of this culture. Computer and digital cultures already coexist (Drot-Delange & Bruillard, 2012) and can be complementary, the former not being reducible to the latter.

To define computer literacy, we propose relying on Bruillard's four approaches to computer science (2017). The components of computer culture, according to these approaches, would then be algorithmic thinking, the use of computer objects, and participation in social activities in a networked world, as well as computer science considered as a material (Bruillard, 2016; Drot-Delange & Bruillard, 2012). Each of these components mobilizes a form of thought that can be grouped under the label "computational thinking." This, along with its expected effects on the learner, is the basis for justifying the teaching of computer science.

It is to be distinguished between the science of information processing and computational thinking. At the same time, some authors closely associate them, emphasizing the different purposes pursued by both: the development of specific modes of thought and reasoning in one case and the mastery of a structured body of knowledge that enables the efficient processing of digital information in the other case. The intersection between computational thinking and media literacy corresponds to the notion of digital literacy, which not only defines a kind of digital citizen culture encompassing both the development of computational thinking and media literacy but also conveys the idea that it is a body of knowledge that all must master, as must be the basics of reading and writing (Bruillard, 2017)

According to the Royal Society, there is a need to develop a digital culture that aligns with the curricula of primary, secondary, and tertiary education (The Royal Society, 2012). The curricula developed tend to focus on three principal axes, emphasizing specific dimensions more than others. Nevertheless, there has recently been a growing ambition among educational authorities to elevate learners to be not only informed users of technology but also creators of it. In doing so, the idea is to introduce them to digital culture from an early age, not only one whose limits have yet to be clearly defined but also to computational thinking, which is arousing renewed interest in the field of education.

2.2. Digital Education

Digital education is part of a long history that combines education and technology. Throughout the 20th century, and even before, technological advances have led to pedagogical experiments and efforts at integration through the educational field. As early as the 1930s, radio (such as Radio-Sorbonne) and later television gave rise to new forms of teaching, requiring a redefinition of the relationship between teachers and learners (Glikman, 2002, p. 29). At the end of the Second World War, the advent of television led to the emergence of "educational" audiovisual programs with the idea of complementing school and television. The potential of audiovisual technology to "revolutionize pedagogy", facilitate the "transformation of the teacher-student relationship", and free trainers from the repetitive tasks of transmitting knowledge in favour of "nobler" tasks consisting of helping with acquisitions (Glikman, 2002, p. 30).

It is clear that a gap already exists between the educational objectives and their practical application in the classroom. This discrepancy, which marks the gap between the expectations associated with the use of technology in education and the realities observed, mainly in higher education, echoes a series of disillusionments with the role of technology in education. The difference between the theoretical goals of education and their concrete achievement is primarily due to existing constraints, whether technical, financial, or particularly related to the human resources required to achieve them. (Glikman, 2002).

2.3. Integration of technologies

Teachers are sometimes reluctant to innovate in their classrooms because they are not always aware of the methods and practices adapted to technologies in terms of pedagogy; they also lack a precise vision, based on their personal and professional experience, of technology-assisted teaching (Depover et al., 2007).

Teachers need to be aware of the challenges of integrating technology into the classroom. Initial training does not always succeed in transmitting to future teachers the idea of integrating technology into educational environments (David, Yin, and Chalon, 2007). This training is often focused on limited everyday

experiences related to mastering institutional platforms. In addition to initial training, continuing education therefore plays a key role. It requires educational institutions, as well as other relevant institutions, to put in place the necessary means so that teachers can receive annual training in technological developments and best practices (Zhao & Bryant, 2006).

The pedagogical integration of technologies corresponds to a process that is spread over time. In this sense, models of pedagogical integration of technologies are complementary to other models, particularly those that describe the skills teachers must possess to integrate these technologies into their pedagogical practices. Among these models, the TPACK model, developed by Mishra and Koehler (2006), is undoubtedly the most influential. This model aims to specify the nature of knowledge required by teachers to enable them to integrate technologies in education more effectively. As UNESCO (2015) demonstrates, technology presents interesting educational possibilities, helping to reduce the long-standing gap in learning. The use of technology in the classroom is recommended, as it helps develop responsible digital citizens. It suggests reconsidering the way teachers approach the use and impact of technology.

The use of technologies as a lever for learning can also be done through continuous monitoring and accurate evaluation of teaching. In this way, we can address the challenges facing the scientific and practical communities, ensuring that solutions are tailored to the needs and realities on the ground. Collaboration and training platforms are central elements of this digital transition.

2.4. Distance learning/teaching

With the advent of Web 2.0 and ICT, distance education in higher education is facing significant challenges in terms of development, implementation, and dissemination (Lafleur & Samson, 2017). Distance learning encompasses all devices that provide instruction through the communication of print or electronic information to people engaged in planned learning at a different place or time than those where instructors intervene (Marhic, 2021). It is characterized by spatial and/or temporal distancing between the learner and the teacher, as well as the use of media to facilitate learning and support (such as pedagogical tutoring and group facilitation).

Distance learning is, therefore, an essential mode of teaching in university institutions and plays a key role in the evolution of teaching practices. According to Glikman (2002), "The term 'distance learning' applies to any type of organized training, regardless of its purpose, in which the essential activities of knowledge transmission or learning are outside the direct, face-to-face or 'face-to-face' relationship between teacher and student" (Glikman, 2002, p. 19).

For their part, Caron et al. argue that this type of training is thriving all over the world; it is one of the fastest-growing university sectors: "Distance learning is therefore experiencing a great boom nowadays in strategic university projects. Its implementation sometimes constitutes a large part of the turnover of the training centres or institutes associated with the university" (Caron et al., 2010: 11). It allows you to acquire knowledge and develop skills without having to attend an educational institution and without the physical presence of a teacher. This mode of teaching is developing today in a context that requires the use of increasingly sophisticated technical tools.

3. Methodology

To address our problem and verify the hypotheses we made at the outset, we organized our questionnaire into four axes—the first of which aims to analyze the concept of training university teachers in ICT. The second aim is to examine the degree of adaptation of digital tools to the nature and objectives of the various teaching content provided at the university. The third focuses on the challenges associated with the use of ICTs. The last axis explains the strategies suggested by teachers in order to make the use of these tools efficient and profitable.

3.1. Respondents' profile

Our questionnaire was administered to 58 university teachers with an estimated experience ranging from 4 to 39 years, from various specialities and fields (French Language, English Language, Translation,

Electrical Engineering, Mechanics, Science, and Technology) and practising in different Algerian universities. According to the data presented in the table below, the study population consists of 29 women and 29 men, with an equal distribution of participants. Twenty of these teachers have between 6 and 10 years of seniority in the profession, compared to only 12 who have less than five years of experience and four who have 16 years or more of experience. The average age is 11 years old, indicating that this is likely a group of experienced teachers.

4. Analysis and discussion

4.1. ICT teacher training

Generally speaking, teachers in underdeveloped countries often show a certain reluctance to adopt information and communication technologies in their teaching practices due to the inadequacy of infrastructure and problems related to connection networks. In addition, Carvalho, Casado, and Delgado (2020) highlighted that teachers' mastery of ICT is perceived as a crucial factor for the successful integration of technologies in teaching.

The analysis of the responses obtained shows that the majority of the teachers surveyed (62%) report not having attended any training or advanced workshops dedicated to integrating ICT into teaching. 38% of them say the opposite, specifying the nature and duration of this training, which vary according to its objectives. These differ from one teacher to another, depending on their field of specialization and the university to which they are attached. Thus, the duration of this training varies for our respondents. It can be a period that ranges from 4 hours, 3 days, a few months (from 1 to 8 months), or a year at the beginning of their career as an intern or as part of their doctoral training. It should be noted that this type of training can be conducted in either face-to-face or distance seminars.

The results indicate that ICT teacher training is evolving in various dimensions and lacks uniformity at the national level. Each university adopts its policy for offering online courses to train teachers in specific ICT skills. However, the supervisory authority must promote this type of training by ensuring that it is face-to-face, unified, and based on teaching and mastery of the new functionalities offered by today's digital technologies.

Based on the idea that ICT allows teachers to discover several paths, strategies and teaching modalities and is a significant contribution, especially for students with learning difficulties, teachers should take the initiative to self-train in this field in order to explore its new functionalities and update their digital skills taking into account the changing needs of learners and the demands of society.

4.2. Distance learning

When asked about the adoption of distance learning and the tools available to them, teachers indicate that their practices and strategies are in line with the directives of their administrative authorities, which have encouraged them to use tools such as Moodle, Google Teams, Classroom, Skype, WhatsApp, Zoom, Facebook, or Google Meet. Faced with the need to replace these courses, the choice of materials and teaching methods varied. Eighty-four per cent of the teachers surveyed have mostly opted to send textual documents to students. In contrast, only 16% of teachers preferred audio or video recording of their lessons. These observations confirm studies suggesting that teachers with a "richer" perception of the potential of technologies tend to better integrate them into their pedagogy (Ellis & Goodyear, 2013).

4.3. The contribution of ICT in the training and improvement of student performance

Regarding the question "Has ICT improved the interaction between you and your students?" less than half (42%) answered affirmatively, indicating that ICT has had a positive impact on their interaction with students. One of the respondents told us: "Yes, when I use audiovisual recordings in my courses, but it is the opposite when it comes to the use of Moodle (it has reduced face-to-face interaction since many students no longer attend and are reassured by the availability of online courses)." Another explains that: "The nature of socio-affective relationships has been reinforced: exchange between teachers and students is becoming easy." In other words, the group dynamic fostered by online interaction, which offers an out-

of-institutional dimension, as well as the feeling of comfort, breaks isolation, encourages and stimulates curiosity, making the training more human.

Significantly, teachers who regularly integrate these practices believe that they have a positive impact on face-to-face classes, promoting increased participation and richer exchanges. The interactions estimated by teachers are often justified by the use of digital devices in the classroom; however, synchronous online interaction remains a persistent issue. More than 56% of respondents' responses were negative. The reasons may be related to disparities in student access to ICT and technical problems with the institution's platform. When face-to-face exists, it is almost always used to regulate distance. These challenges underscore the need for balanced educational approaches that take into account the diverse contexts and needs of teachers and students in the adoption of ICTs.

When asked about the improvement in their students' academic performance due to the use of ICT, most teachers (86%) confirmed this. They stated that the hybrid context of teaching and learning has visibly contributed to the development of students' writing skills. Writing written assignments, chatting, and discussions via forums.

4.4. Training Programs

The teachers surveyed believe that technology training has not received sufficient attention as a skill that enables them to succeed and perform effectively in professional fields. The majority of respondents (84%) felt that ICT required educators to start teaching differently; it is essential to integrate ICT into the teaching of all specialities because they are currently only superficial; and that computer science teachers should not conceptualize the use of ICT only as the simple functionalities of Word and PDF or searching on search engines and websites. Some teachers (34%) say they have acquired skills more through professional development training than on their own. They have become high-level users of ICTs after completing several online and face-to-face training sessions.

Question 17, "How can these programs be improved to better support teachers in the integration of ICTs?" invites teachers to identify possible actions aimed at improving teaching programs. Most of the teachers interviewed responded that these programs will develop, utilize, and evaluate ICT-based teaching materials in various contexts. Teachers must practice continuously to deliver online classes and face-to-face tutorials effectively. It is also important to design platforms for creating teaching materials and to promote the use of ICT for assessment and feedback in order to enhance the monitoring of learning. Such an approach will enable teachers to practice and successfully conduct courses and tutorials, whether face-to-face or remotely, thereby addressing the challenges of modern education and maximizing the pedagogical potential of digital technologies.

3.5. ICT and the future of higher education in Algeria

When asked about the opportunities offered by information and communication technologies in higher education in Algeria, some (75%) expressed optimism about the potential benefits, highlighting the possibility of accessing a variety of educational resources, adapting teaching to the specific needs of learners, optimizing working hours, and stimulating students' attention. However, others (25%) express doubts, highlighting the inadequacy of resources and showing a preference for face-to-face teaching. Reservations may be related to concerns about the effectiveness of new technologies compared to traditional classroom instruction.

4. Conclusions

This study aimed to investigate teachers' perceptions of the integration of ICT in higher education in Algeria. On the one hand, it is worth noting the widespread recognition among teachers of the potential of ICT to revolutionize and innovate higher education, particularly in enhancing interactions between teachers and students, increasing the accessibility of educational resources, and promoting the digitalization of learning processes. On the other hand, there are challenges, such as the lack of infrastructure and inadequate training for teaching and student staff, which is marked by a certain

reluctance to fully adopt these technologies in daily practices.

The view was that, although ICTs can be an effective tool for knowledge transfer in higher education, they alone do not guarantee innovative teaching. The obstacles encountered by students and teachers in using remote communication platforms limit the benefits of these tools in two ways. Similarly, the lack or absence of advanced workshops and ICT training programs underscores the need for coherent and inclusive strategies for ICT teacher training. In addition, distance learning, although imposed during the COVID-19 pandemic, reveals unexplored possibilities for higher education in Algeria, providing opportunities for more flexible and inclusive education. However, the experience of the last four years has also highlighted the limits of the switch to online teaching, particularly in terms of student interaction and engagement, as well as the implementation of relevant and credible evaluation practices.

In conclusion, for the efforts aimed at integrating ICT in university pedagogy to bear fruit in Algeria, they must go beyond simply allowing actors to master the basic skills in using these technologies. Thus, the improvement of ICT-related pedagogical skills must be based on more strategic and well-thought-out long-term considerations and plans.

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