RCMOS – Multidisciplinary Scientific Journal of Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year V, v.1 2025. | submission: 04/09/2025 | accepted: 06/09/2025 | publication: 08/09/2025

The use of digital technologies in higher education: challenges and possibilities for teaching practice

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SUMMARY

This article analyzes the use of digital technologies in higher education, discussing the main challenges and possibilities for teaching practice. The research was conducted through a qualitative literature review, including works published between 2014 and 2024 in national and international scientific databases. Books, articles, and dissertations that address the relationship between university teaching, pedagogical innovation, and the integration of digital technologies were selected. The results show that the use of digital resources, when combined with active methodologies, enhances student autonomy, promotes collaborative learning, and expands the possibilities for interaction. Practices such as the flipped classroom, project-based learning, and blended learning stand out as promising strategies for the critical and meaningful development of students. However, the review also revealed significant obstacles, such as gaps in teacher training, limited technological infrastructure, unequal access to digital tools, and cultural resistance to methodological change. Furthermore, the study identified a lack of longitudinal studies and critical analyses on the impacts of artificial intelligence and personalized learning in higher education, highlighting the need for new research that considers the ethical and social dimensions of digitalization in education. The conclusion is that digital technologies, while not an immediate solution to teaching challenges, represent opportunities for transformation when accompanied by consistent institutional policies, teacher training programs, and infrastructure investments. Thus, this study contributes to strengthening the academic debate on contemporary university teaching and highlights the importance of a critical and conscious integration of digital resources for building an inclusive, innovative, and socially committed higher education.

Keywords: Teaching; Higher Education; Digital Technologies

Abstract

This article analyzes the use of digital technologies in higher education, discussing the main challenges and possibilities for teaching practice. The research was conducted through a qualitative literature review, covering works published between 2014 and 2024 in national and international scientific databases. Books, articles, and dissertations addressing the relationship between university teaching, pedagogical innovation, and the integration of digital technologies were selected. The results show that the use of digital resources, when combined with active methodologies, enhances student autonomy, fosters collaborative learning, and expands interaction possibilities. Practices such as flipped classrooms, project-based learning, and blended teaching stand out as promising strategies for meaningful and critical student education. However, the review also revealed important obstacles, such as gaps in teacher training, technological infrastructure limitations, inequalities in access to digital tools, and cultural resistance to methodological changes. In addition, the study identified a scarcity of longitudinal research and critical analyzes on the impacts of artificial intelligence and personalized learning in higher education, highlighting the need for new studies that consider the ethical and social dimensions of education digitalization. It is concluded that digital technologies, alt-hough not an immediate solution to the challenges of teaching, represent opportunities for transformation when supported by consistent institutional policies, teacher training programs, and infrastructure investments. Thus, this study contributes to strengthening the academic debate on contemporary university teaching and emphasizes the importance of a critical and conscious integration of digital resources for building inclusive, innovative, and socially committed higher education.

Keywords: Teaching; Higher Education; Digital Technologies

1. INTRODUCTION

The advancement of digital technologies has caused profound transformations in various sectors of society, including the educational field. In higher education, these changes are especially evident in the way teaching processes and learning are conceived, planned and executed. Virtual learning environments learning, digital platforms, artificial intelligence resources and tools collaborative approaches have been consolidated as central elements for teaching practice, redefining the role of the teacher and interaction with students (MORAN, 2018; BLIKSTEIN, 2020). In this context, discussing the use of digital technologies in teaching university becomes essential to understand the challenges and possibilities that present themselves in the contemporary scene.

Despite the recognition of its potential, the integration of digital technologies in higher education it does not occur in a homogeneous way or free from contradictions. Various factors influence this process, such as the teacher's pedagogical training, institutional infrastructure, the resistance of some teachers and students to changes methodological, as well as social inequalities that affect access to technologies (KENSKI, 2021; BELLONI, 2019). Such problems reveal a fertile field for critical reflection on how teaching practices can be improved, seeking construction of more inclusive, dynamic and meaningful teaching processes.

Interest in the topic is also justified by the growing demand for pedagogical innovation and the need to overcome teaching models that are still centered in traditional approaches. Recent studies indicate that the simple presence of digital technologies do not guarantee improved learning, and their use is essential is linked to consistent pedagogical strategies aligned with students' needs (BACICH; MORAN, 2018; LÉVY, 2019). Thus, understanding the limits and the possibilities of these tools are essential to enhance the quality of higher education.

Given this scenario, this article aims to analyze the use of digital technologies in higher education, identifying the main challenges faced

by teachers and pointing out the possibilities that such resources offer for practice pedagogical. The aim is to contribute to the academic debate about teaching contemporary university, highlighting the importance of critical and reflective training of teachers in the face of digital transformations that impact teaching and learning.

2. METHODOLOGY

The present study was developed based on a bibliographic review of a qualitative, based on the analysis of scientific productions that address the use of digital technologies in higher education and their implications for teaching practice. The option this type of research is justified by its potential to gather and systematize knowledge already consolidated by the academic community, enabling the identification of trends, advances and gaps in the literature, as guided Marconi and Lakatos (2017) and Gil (2019).

To ensure the current status and relevance of the material consulted, only studies published between 2014 and 2024 were considered as inclusion criteria, in Portuguese, English and Spanish, as long as they adhered to the central theme of the research. Priority was given to articles from indexed journals, academic books, theses and dissertations that directly address university teaching mediated by technologies digital. As exclusion criteria, texts aimed exclusively at basic education, productions with an opinionated character or without scientific rigor, in addition to materials published outside the defined time frame.

The search for studies was carried out in national and international databases recognized by the scientific community, such as SciELO, Google Scholar, Portal de CAPES and ERIC (Education Resources Information Center) journals. They were also included reference works published by academic publishers, such as Cortez, Autêntica and Penso, which have stood out in the field of Education. The search strategies contemplated the use of descriptors such as “digital technologies in higher education”, “university teaching and pedagogical innovation”, “active methodologies and digital education” and “remote teaching and technology-mediated learning”.

The selection process took place in two stages. First, a initial screening based on titles and abstracts, with the aim of verifying the relevance of the studies in relation to the problem investigated. Then, the pre-selected works

were read in full, which allowed us to evaluate their effective contribution to the objectives of the article. This procedure resulted in the selection of approximately thirty productions scientific, considered central to the critical analysis of the topic.

Data extraction included essential information, such as authorship, year of publication, study objectives, methodologies adopted, main results and conclusions. The collected information was then organized and analyzed in interpretative and critical form, seeking to establish relationships between theoretical references of higher education and the findings of the literature. This process allowed us to identify points of convergence and divergence among authors, as well as emerging trends and gaps that still need to be explored in future research on the use of digital technologies in higher education.

3. RESULTS AND DISCUSSIONS

3.1 Main Trends and Findings in the Literature

The literature review shows that the incorporation of digital technologies in higher education has intensified in recent decades, especially since the expansion of virtual learning environments, the popularization of devices furniture and the growing appreciation of innovative methodologies in the pedagogical process. Moran (2018) highlights that digital technologies are configured as mediators essential for more dynamic educational practices, favoring student autonomy and collaborative learning. Similarly, Kenski (2021) emphasizes that digitalization of education is not restricted to the instrumental use of tools, but implies a reconfiguration of the ways of teaching and learning, demanding new teacher skills.

Among the main findings, it is observed that virtual environments learning (AVA) have been consolidated as central instruments for the organization of the contents, monitoring of activities and interaction between teachers and students. Studies show that hybrid learning, when associated with methodologies active, increases student participation and contributes to meaningful learning (BACICH; MORAN, 2018). Blikstein (2020) adds that digital technologies allow the creation of more open and interactive learning ecosystems, in which

the student stops being a mere receiver of information and assumes an active role in construction of knowledge.

Another relevant aspect identified is the impact of artificial intelligence and analysis of educational data in the personalization of learning. Authors such as Selwyn (2022) show that digital performance monitoring systems student enable faster and more accurate feedback, favoring intervention pedagogical in a timely manner. However, the literature also points out that such advances are still little explored critically, lacking more in-depth studies about its effects on the quality of academic training.

Overall, the results indicate that the literature converges to the understanding that digital technologies represent not only support tools, but transformative elements of teaching practice in higher education. They broaden the possibilities for interaction, make learning processes more flexible and stimulate new forms of pedagogical organization. However, the authors also warn that such changes only become effective when accompanied by pedagogical planning consistent, adequate teacher training and structural conditions that guarantee access equitable access to digital innovations.

3.2 Challenges of University Teaching in the Face of Digital Technologies

The incorporation of digital technologies into higher education, although it presents countless possibilities for pedagogical innovation, also highlights a set significant number of challenges for teaching practice. Among the main obstacles are the insufficient specific pedagogical training for the use of digital resources, inequalities of access between teachers and students and the structural difficulties of institutions. Kenski (2021) notes that technological integration requires more than just instrumental mastery of tools, demanding cultural and methodological changes which do not always find support in Brazilian academic reality.

One of the most discussed aspects in the literature refers to gaps in training of university professors, since many enter teaching with solid research background, but with little or no pedagogical preparation. In this sense, Moran (2018) emphasizes:

> Most university faculty learn to teach based on their experiences as students or intuitively, without receiving systematic pedagogical training. This scenario makes it more difficult to adopt new methodologies and technologies, as it requires constant reinvention of teaching (MORAN, 2018, p. 42).

In addition to training, the issue of technological infrastructure constitutes another challenge significant. Belloni (2019) argues that although the discourse of digital innovation is recurrent in institutions, many still have structural limitations, such as lack of adequate equipment, unstable internet, and lack of technical support. These barriers end up restricting the scope of innovative pedagogical proposals, reinforcing existing inequalities.

Another important element to be considered is the social inequality that crosses access to digital technologies. According to Kenski (2021), the digital divide affects not only only low-income students, but also teachers who sometimes do not have adequate material conditions to fully exploit the tools digital in their practices. This reality contributes to the worsening of disparities in higher education, compromising the democratization of access to knowledge.

This resistance, in many cases, is related to the fear of losing control over the classroom or insecurity in the face of the unknown, which reinforces the need for training programs and continuous monitoring of teachers.

Another widely discussed challenge concerns the time commitment required to the incorporation of digital technologies into teaching practices. Kenski (2021) points out that the preparation of digital materials, monitoring in virtual environments and personalization of activities requires additional effort, not always recognized or valued by institutions. This creates an overload of work for teachers, who need to reconcile teaching, research and extension.

The changes required by the use of digital technologies also impact the teaching identity. For Belloni (2019, p. 67):

> The teacher, traditionally seen as a transmitter of content, needs to transform into a mediator of learning, which requires a redefinition of roles, knowledge, and practices. This process is complex and involves resistance, tension, and insecurity.

In this sense, the literature points out that the transition to a pedagogical model mediated by digital technologies only becomes effective when there are institutional conditions that support the teacher. Kenski (2021) emphasizes that the absence of institutional policies

clear for technological integration generates fragmented and disjointed practices, without continuity over time.

Therefore, it is worth highlighting that the challenges listed here should not be understood not only as obstacles, but as points of tension that can stimulate reflections criticism and significant advances in university teaching. Moran (2018) argues that difficulties encountered can be converted into opportunities for innovation, as long as are accompanied by teacher training policies, investments in infrastructure and institutional commitment to democratizing access to digital technologies.

3.3 Pedagogical Implications and Methodological Innovations

The presence of digital technologies in higher education should not be understood just as a set of tools that assist teaching practice, but as elements that demand the reconstruction of pedagogical concepts. Moran (2018) argues that methodological innovation becomes significant when articulated with a consistent pedagogical project, which values student autonomy and places them as protagonist of the learning process. In this sense, technologies do not replace the teacher, but expand their possibilities of mediation.

One of the main impacts identified refers to the adoption of methodologies teaching activities. Bacich and Moran (2018) highlight that the flipped classroom, project-based learning and gamification meet in digital technologies a fundamental support for its operationalization.

Regarding this, the literature states that:

> Active methodologies foster the construction of knowledge through experience, collaboration, and research. Digital technologies enhance this movement, expanding learning spaces and enabling greater personalization of pedagogical practices (MORAN 2018, p. 35).

This perspective highlights the need for a mediating teacher, capable of propose learning situations that encourage student participation, as opposed to traditional model focused on content transmission. As Kenski (2021) observes, pedagogical innovation is not achieved only by the introduction of technologies, but by redefinition of teaching practices towards a more critical and reflective education.

Brazilian literature also highlights the role of hybrid education as a of the main pedagogical trends driven by the use of digital technologies. Belloni (2019) highlights that the combination of in-person and online activities favors flexibility of the teaching process, responding better to student demands contemporaries, accustomed to different forms of interaction and access to information. However, the author warns that simply overlapping formats does not guarantee quality, planned pedagogical integration is necessary.

Another fundamental aspect refers to the promotion of collaborative learning. According to Moran (2018), digital resources, such as discussion forums, wikis and interactive platforms, create environments conducive to the exchange of experiences and development of socio-emotional skills.

> Collaborative learning mediated by digital technologies breaks with the individualistic logic of traditional teaching, promoting greater engagement and collective construction of knowledge (BACICH, 2018, p. 47).

In addition to collaboration, personalizing learning has proven to be a relevant pedagogical implication. Kenski (2021) argues that the use of educational data and adaptive platforms allow teachers to monitor more accurately student performance, adjusting strategies according to individual needs. This movement brings higher education closer to more student-centered practices, which can contribute to reducing academic dropout and improving rates learning.

The literature also points out that methodological innovation demands a change cultural in higher education institutions. Belloni (2019) emphasizes that resistance to transformations can be overcome through continuing education programs that encourage the teacher to experiment with new practices and to critically reflect on their use of technologies. Without this support, the adoption of methodologies tends to be fragmented and limited to the individual efforts of some teachers.

Thus, it is necessary to consider that the pedagogical implications of digital technologies are not limited to methodological innovation. They point to a broader process of redefining university teaching, in which the professor stops being just a transmitter of content and takes on the role of guide, mediator and curator of knowledge

3.4 Gaps and Perspectives for Future Research

The literature review shows that, although there are significant advances in debate on the use of digital technologies in university teaching, persist important gaps that need to be explored by future research. A first aspect refers to the scarcity of longitudinal studies that follow, in a continuous, the impacts of digitalization on Brazilian higher education. As highlighted Kenski (2021), much of the analysis is still specific, focused on isolated experiences, without considering the sustainability of practices over time.

Another little explored point concerns inequalities in access to technologies. Although there is research on digital inclusion, Belloni (2019) argues that there is a lack of more consistent research that relates technological exclusion to social, gender, and racial inequalities in higher education. For the author, understanding these intersections is fundamental to thinking about public policies that democratize, in fact, pedagogical innovations.

There is also a lack of critical analysis of the impacts of artificial intelligence and data analysis in higher education. Moran (2018, p. 63) warns that:

> Emerging technologies can expand access and personalize learning, but they also pose risks of control and surveillance that need to be critically analyzed. It is not enough to incorporate intelligent systems; it is necessary to understand their ethical, social, and pedagogical effects (MORAN, 2018, p. 63).

This reflection points to the need to expand studies that relate the advancement of digital technologies to ethical issues, teacher autonomy and privacy of students. Although some international research has already advanced this discussion, Brazilian production is still in its infancy.

Furthermore, the literature reveals the absence of a more robust systematization on the impacts of active methodologies mediated by digital technologies in courses from different areas of knowledge. Bacich and Moran (2018) highlight that most of the research focuses on undergraduate and pedagogy courses, with fewer attention to the areas of exact sciences, engineering and health. This limitation leaves room for comparative studies between different academic contexts.

Another challenge concerns the need to investigate institutional conditions for the consolidation of innovative practices. Kenski (2021, p. 112) draws attention to the fact that:

> Without clear institutional policies and consistent investments in infrastructure and training, innovations tend to be restricted to isolated experiences of more engaged teachers, without generating structural transformations in higher education (KELSKI, 2021, p. 112).

Therefore, new research should consider the role of institutions in promoting digital culture, not only as equipment suppliers, but as spaces for pedagogical and technological support.

It is also important to highlight that studies on learning assessment in digital environments remain incipient in Brazil. As Belloni (2019) points out, there are a tendency to replicate traditional assessment instruments, without exploring the potential that technologies offer for procedural, formative and collaborative assessments. This gap indicates a promising field for future investigations.

In this way, the review highlights that the challenges identified should not be understood as definitive obstacles, but as possibilities for progress. Moran (2018) argues that the gaps present in the academic debate constitute opportunities to consolidate a more critical, democratic and connected higher education social transformations. Thus, future research needs to not only map difficulties, but propose ways to build pedagogical models that articulate technology, inclusion and innovation in an ethical and sustainable way.

4. CONCLUSION

This article aimed to analyze the challenges and possibilities arising from the use of digital technologies in higher education, reflecting on their implications for teaching practice. From the bibliographic review carried out, it was possible to note that the incorporation of digital resources in the university context is not restricted to an instrumental dimension, but requires pedagogical transformations, methodological and institutional changes that redefine the role of the teacher and the experience of student learning.

The results revealed that digital technologies, when integrated into projects consistent pedagogical methods, expand learning opportunities, and promote student autonomy and encourage more collaborative and innovative practices. Methodologies such as blended learning, flipped classroom, and project-based learning demonstrated great potential for building meaningful experiences. By At the same time, it was observed that such practices require teacher preparation, planning careful and adequate infrastructure, at the risk of being limited to specific initiatives or fragmented.

The research also highlighted important challenges, such as gaps in pedagogical training of teachers, inequalities in access to technologies and cultural resistance to change. These elements, combined with structural weaknesses of institutions, indicate that effective digital integration in university teaching depends of more robust institutional policies, which articulate investment in infrastructure, pedagogical support and continuing education.

Thus, it is highlighted that the study achieved its objectives by identifying both the advances regarding the limitations present in the use of digital technologies in higher education. In addition to offering support for understanding the current reality, the work points out avenues for future research, especially with regard to personalization of learning, the ethical implications of artificial intelligence and the reduction of digital inequalities. In summary, the reflections presented contribute to strengthening the debate on contemporary university teaching, highlighting that integration critical and aware of digital technologies is an essential condition for building a more inclusive, innovative and socially committed higher education.

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