RESEARCH PAPER

Digital technologies in higher education: uses, perceptions, and challenges in the university classroom

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ABSTRACT

The study examines how Information and Communication Technologies (ICT) are integrated into higher education, focusing on their use, frequency, and perceived benefits among students at Universidad Autónoma de Nayarit. Using a quantitative descriptive design with 55 participants, results reveal frequent ICT use in academic activities, mainly through internet resources, word processors, and collaborative tools. Although professors often promote digital engagement, inconsistencies remain in providing electronic materials. Students recognize ICT as essential for accessing information, teamwork, and skill development, emphasizing its importance in enhancing learning, fostering autonomy, and preparing for digitally oriented professional environments.

Keywords: ICT integration, higher education, digital learning, student perceptions, academic innovation

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INTRODUCTION

In the context of higher education, the use of Information and Communication Technologies (ICT) has become a key component in enriching teaching and learning processes (González, 2012). Universities face the challenge of adapting to a constantly evolving digital environment, where technological tools not only complement face-to-face education but also transform traditional pedagogical dynamics. This transition demands that both instructors and students develop digital competencies that enable them to critically and effectively utilize the available resources.

The purpose of this study is to analyze the level of ICT integration in university teaching practices, as well as its impact on learning and academic interaction. To achieve this, aspects such as the frequency with which professors require the use of digital tools, the availability of electronic resources, access to technological devices in the classroom, technology-mediated collaborative work, and students' autonomy in finding and using digital materials are examined. Through this analysis, the study aims to provide an updated perspective on the role of ICT in professional training, identifying both progress made and areas that require improvement to strengthen a more flexible, participatory, and responsive education aligned with the demands of the 21st century.

The Importance of Information and Communication Technologies

Information and Communication Technologies (ICT) bring together telecommunications and computing systems with the goal of facilitating access to,

transmission, and processing of information (Peñafiel-Loor et al., 2022). These tools have transformed the way people interact, enabling long-distance communication, remote viewing of events, and the ability to carry out work tasks from virtually anywhere. Their development has significantly expanded the methodological possibilities in education, enhancing students' skills and supporting their academic performance. Moreover, ICT has become increasingly integrated into various aspects of daily life, allowing for a smooth and consistent use in both educational and personal contexts.

Likewise, Information and Communication Technologies (ICT) provide valuable support in teaching practices, as they allow educators to optimize their time and resources during classroom activities. By incorporating digital tools, teachers can design more dynamic and engaging lessons that facilitate student understanding and learning (Noldin, 2021). Furthermore, ICT offers an effective platform for preserving and disseminating traditions and culture, making it possible for such content to be known and appreciated beyond local contexts, thus promoting a sense of cultural identity and belonging among students.

New trends in education are strongly influenced by technological advancements, which have led to a significant shift in the methodologies used in higher education (Alvarado, 2022). In this context, teaching increasingly relies on the integration of digital tools that facilitate access to resources, interaction, and student-centered autonomous learning. This transformation involves a gradual reduction in the use of traditional educational methods, giving way to more dynamic, interactive, and student-focused approaches that leverage the potential of technology to enhance the educational process and align it with current academic and professional demands.

As a result, various pedagogical strategies are now being applied in education to optimize teaching and learning processes. These strategies are currently grounded in the use of technology as a key component, acknowledging its importance in enriching learning environments and fostering new ways of interaction and knowledge acquisition. Most of these technologies are audiovisual and digital in nature, which encourages more interactive and motivating learning experiences. These include virtual classrooms, which support distance education and access to online materials; interactive whiteboards, which stimulate active classroom participation; digital libraries, which provide immediate access to a wide range of academic resources; and self-learning applications, which allow students to progress at their own pace and strengthen their skills (Córdova, 2024). In addition, other ICT-related tools contribute to diversifying and enhancing educational experiences, adapting to contemporary demands and promoting students' holistic development.

Holistic Student Development and Its Connection with Technology

The educational environments of the future will emerge from the progressive fusion of traditional physical spaces with virtual digital platforms. This combination will enable the creation of new hybrid realities that will transform how the learning process unfolds, blending the tangible and the virtual to offer richer, more flexible, and innovative learning experiences (Cabero-Almenara, 2020). Likewise, integrating technology into higher education drives the transformation of pedagogical practices, allowing the development of more current and versatile teaching methods (Vargas-Zúñiga et al., 2024). This integration fosters student collaboration through digital platforms, facilitates the use of simulations that enhance content comprehension, and promotes techniques such as gamification, creating more innovative, engaging, and effective learning environments.

Therefore, the incorporation of Information and Communication Technologies (ICT) in higher education not only modifies teaching methodologies but also significantly impacts the quality of the relationship between teachers and students (Cuero et al., 2023). In this regard, collaborative interactions—based on trust, respect, and constant communication through digital tools—play a key role in strengthening the learning process. The proper use of these technologies promotes more inclusive, dynamic, and stimulating learning environments, which positively affect students' academic performance. Thus, the strategic integration of ICT not only transforms teaching practices but also strengthens pedagogical relationships and contributes to deeper, more flexible learning aligned with the demands of university-level education.

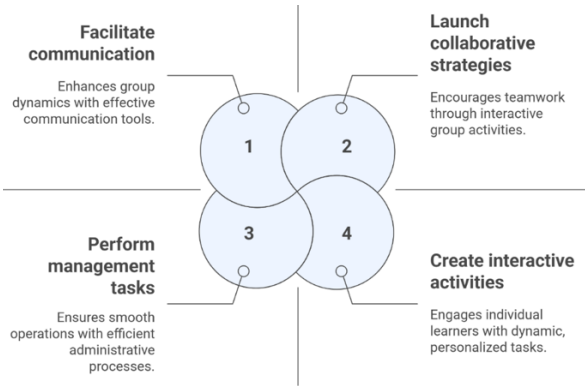
Technologies and Virtual Learning Environments (VLEs)

Understanding how Virtual Learning Environments (VLEs) function is a key element in strengthening the digital competencies of teaching staff (Quintero, 2024). Familiarity with these systems not only enables educators to efficiently manage educational technology platforms but also allows them to design, manage, and implement innovative pedagogical strategies tailored to the demands of the digital environment. By gaining a deeper knowledge of the tools, resources, and possibilities offered by VLEs, teachers develop greater autonomy, creativity, and the ability to foster more dynamic, personalized, and meaningful learning experiences. This, in turn, contributes to improving educational quality and promoting student-centered instruction.

Naturally, Virtual Learning Environments are recognized for being reliable and secure platforms, offering stable access free from technological disruptions. They are supported by protective measures designed to ensure user safety, particularly in educational settings (Jiménez & Jiménez, 2022). Their intuitive structure and design facilitate easy navigation and allow for multiple customization options. Moreover, they promote an interactive environment that encourages active student participation and enhances the teaching-learning process.

However, the use of these technological tools not only strengthens knowledge acquisition but also prepares students to face the challenges of an increasingly digital work environment with greater confidence (Calderón et al., 2025). By becoming familiar with virtual platforms and digital resources during their academic training, students develop key competencies such as autonomy, information management, critical thinking, and technological proficiency. These skills are essential in today's context, where digital transformation demands versatile professionals who can adapt to changing environments and effectively meet the needs of the global labor market. Based on the above, the main pedagogical features of Virtual Learning Environments (VLEs) are described below, as shown in Figure 1.

Figure 1. Pedagogical Characteristics of VLE



Source: Own elaboration based on Castro (2015)

In relation to contemporary educational models, virtual learning environments have become a key resource that effectively complements in-person education. These platforms not only enrich the learning experience, but also expand access to content, encourage continuous interaction between students and teachers, and promote student autonomy in the learning process (González & Granera, 2021). By integrating with traditional classes, virtual environments enable more flexible, personalized teaching that is aligned with the demands of the digital age, thereby fostering a more comprehensive and dynamic educational experience.

Main Objective

To analyze the frequency and modes of use of Information and Communication Technologies (ICT) by university students in their academic activities, as well as their perception of the benefits and importance of these tools in their educational process.

Research Question

How do university students use various digital technologies (internet, software, devices, communication platforms, and email) in their academic activities, and how do they perceive the impact of these ICT tools on their learning process and academic performance?

METHODOLOGY

The study was conducted using a quantitative approach with a descriptive statistical design. The sample consisted of 55 higher education students from the Universidad Autónoma de Nayarit, selected through non-probability convenience sampling. This technique involves choosing participants who are most accessible or suitable for the researcher—due to geographic proximity, availability, or ease of

contact—thereby facilitating data collection (Universo Formulas, 2025). To gather information, a structured questionnaire with closed-ended questions was administered, designed to collect precise and quantifiable data.

RESULTS

How often does your professor ask you to use digital technologies such as the internet, search engines, software, tutorials, email, or forums in your academic activities?

The majority of students (49.1%) report that they are regularly asked to use digital technologies in the development of their academic activities. Additionally, 34.5% indicate that this request occurs very frequently, reinforcing the notion of a sustained and consistent integration of technological resources by faculty members. Only 16.4% of students perceive that instructor request the use of technology occasionally, suggesting that low technological demands in class are relatively uncommon (Fig. 2). These results reflect a clear trend toward the integration of ICT in the university teaching-learning process, regularly promoted by professors. This may be linked to the growing digitalization of educational practices and the aim to foster students' digital skills.

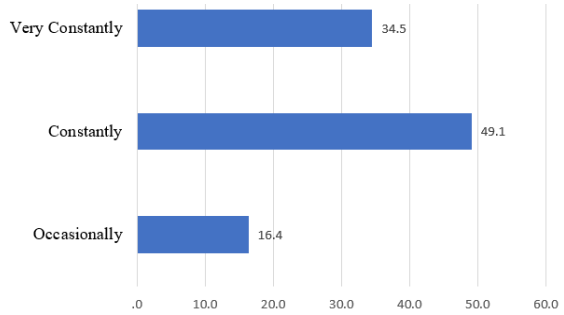


Figure 2. Frequency of Students Being Asked to Use Digital Technologies
Source: Own elaboration

How often do your professors provide you with electronic materials such as courses, assignments, quizzes, or digital exercises?

43.6% of students report that professors occasionally provide materials in electronic format, making this the most common response. Meanwhile, 38.2% indicate that this occurs regularly, showing a significant but not widespread incorporation of digital resources. Only 9.1% of respondents say that electronic materials are shared very frequently, suggesting that few professors currently use these resources intensively. Another 9.1% state that they have never received digital materials from their instructors, representing a notable minority and highlighting opportunities for improvement in digital resource integration. Although there is a clear effort from professors to include digital materials in their teaching process, this practice has yet to become uniform or systematic (Fig. 3). Most students perceive a moderate frequency in the use of these resources, which may be influenced by factors such as faculty training, institutional infrastructure, or the specific nature of the courses.

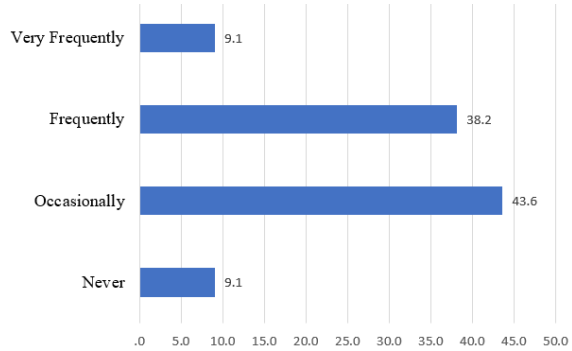


Figure 3. Provision of Electronic Materials
Source: Own elaboration

Use of technological tools such as projectors, computers, digital presentations, or spreadsheets during class activities

Forty percent of students report using these devices occasionally, indicating intermittent use of technology within the classroom. Meanwhile, 36.4% state that their use is constant, reflecting a significant technological presence during lessons. Additionally, 16.4% affirm very frequent use, showing that a portion of students operates in highly digitalized environments. Only 7.3% declare never using these devices in class, highlighting a marginalization of technology in some cases (Fig. 4).

Overall, most students have had frequent access to technological tools such as projectors, computers, or digital presentations in the classroom. However, the fact that the largest percentage falls under “occasionally” suggests that the integration of these devices is not consistently embedded in daily classroom dynamics. This could be due to differences in subjects, teaching styles, or resource availability.

Spreadsheets

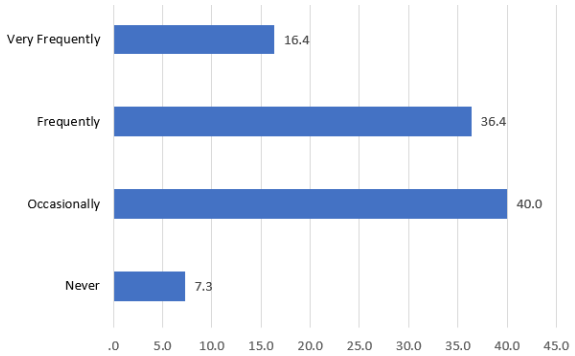


Figure 4. Use of technological tools such as projectors, computers, digital presentations, or
Source: Own elaboration

To what extent do you use the computer for teamwork in your academic activities?

A significant majority of students, 49.1%, report that they constantly use the computer to carry out collaborative tasks. Additionally, 34.5% indicate that their use is very frequent, which reinforces the idea that teamwork is strongly mediated by digital tools. Only 12.7% mention that they occasionally use the computer for these purposes, and just 3.6% state that they never use it in this context. The use of computers for teamwork is highly established among students, reflecting not only a change in collaborative dynamics but also a functional adoption of ICT in collective learning environments (Fig. 5). This pattern suggests that digital environments have become essential for coordinating, producing, and presenting group academic work, which may be linked to the use of shared platforms, online word processors, and communication applications.

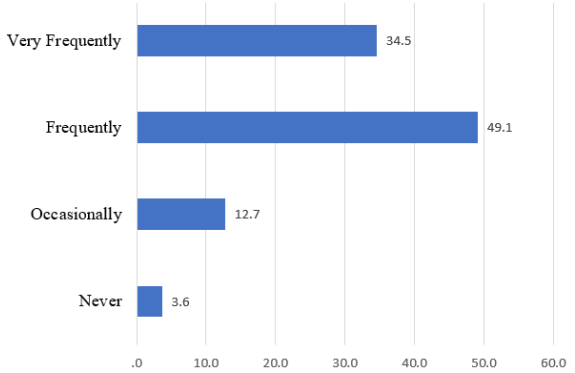


Figure 5. Use of Computers for Teamwork
Source: Own elaboration

Programs Used Consistently for Academic Tasks

The word processor is the most frequently used program, with 40% of responses, highlighting its central role in creating written assignments, reports, and academic tasks. Electronic presentation software follows at 32.7%, indicating that oral or visual presentations are common practices in the university environment. Spreadsheet programs (7.3%) and database software (9.1%) are used significantly less, likely linked to specific disciplines or courses that require quantitative analysis or structured data management. Additionally, 10.9% selected "other," suggesting that some students use alternative or specialized software not explicitly listed, such as design tools, video editing programs, programming environments, or collaborative platforms (Fig. 6). The most commonly used programs facilitate the production and presentation of academic content, aligning with the typical demands of higher education. The limited use of spreadsheets and databases points to an opportunity to strengthen more technical and analytical digital skills, depending on the desired educational profile.

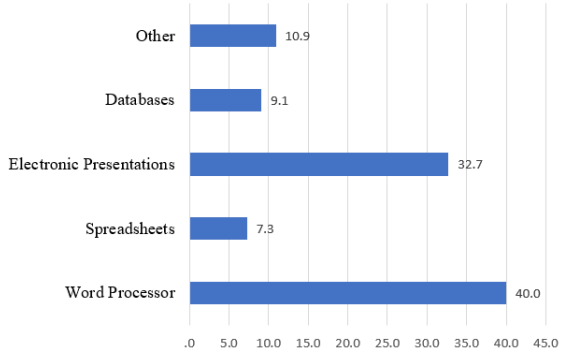


Figure 6. Programs Used for Academic Tasks
Source: Own elaboration

Frequency of Downloading Digital Resources from the Web

A total of 41.8% of students report that they constantly download resources from the internet, indicating a strong reliance on the digital environment as a source of information and supplementary materials. Meanwhile, 32.7% state they do so occasionally, suggesting that while it may not be a daily habit, it is regularly part of their study routine. About 16.4% describe this activity as very constant, highlighting a group of students with a high level of digital proactivity and intensive use of online resources. Only 9.1% mention that they never download such materials, representing a minority that may face technical, connectivity, or knowledge barriers regarding access to these resources (Fig. 7). Overall, most students demonstrate a significant tendency toward autonomous use of the internet for

academic support, accessing texts, tutorials, programs, and videos. This behavior underscores the importance of fostering skills in searching, selecting, and critically evaluating digital information to promote meaningful and ethical learning in virtual environments.

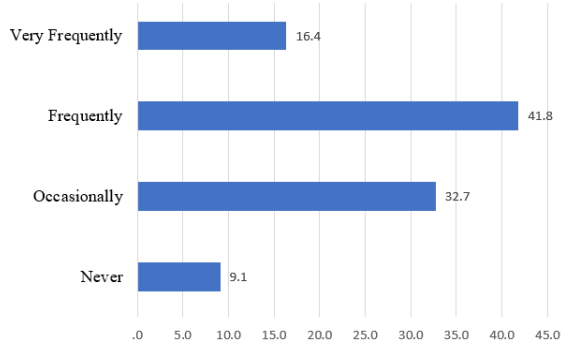


Figure 7. Downloads of Digital Resources from the Web
Source: Own elaboration

Use of digital communication platforms (chats, forums, instant messaging) for academic activities

The results indicate that 38.2% of students use digital communication tools occasionally, suggesting that while these platforms are present in many academic experiences, their use is not yet systematic. Meanwhile, 29.1% report consistent use, showing a more stable integration of these technologies in academic communication. Additionally, 20% state they use them very frequently, reflecting a substantial portion of students who have habitually adopted these tools as primary channels of interaction. Only 12.7% say they never use such platforms, which may be due to personal preferences, lack of training, or limited institutional implementation (Fig. 8). Overall, digital communication tools are part of most students' academic experiences but with varying frequency levels. These platforms facilitate interaction among peers and instructors, especially in hybrid or virtual environments. However, the fact that the largest group uses them only occasionally suggests there is still room to enhance their pedagogical use through collaborative strategies, online tutoring, or technology-mediated participatory activities.

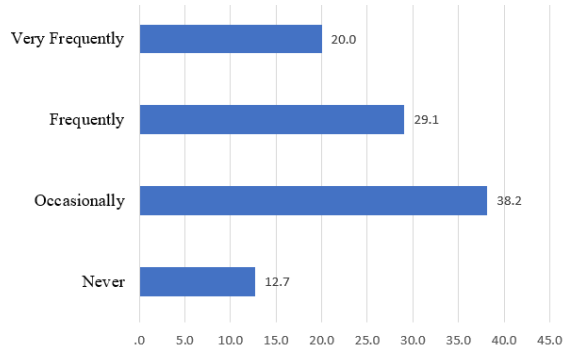


Figure 8. Use of Digital Communication Platforms
Source: Own elaboration

Do you use email to send assignments or academic documents as attachments?

41.8% of students report that they constantly use email to send assignments or other documents, reflecting a well-established practice in the academic environment. 32.7% mention that they do so occasionally, suggesting a functional but not systematic use of this tool. 16.4% state that their use is very frequent, indicating a group that relies on email as their primary means of communication and submission of work. Only 9.1% say they have never sent files through this medium, representing a minority possibly linked to the use of other digital platforms (such as LMS, Google Classroom, or WhatsApp) or a lack of specific digital skills (Fig. 9). Email remains a key tool for communication and management of academic tasks, especially for sending attachments. Most students regularly use this technology, demonstrating adaptation to formal digital communication environments. However, the occasional use by about a third of respondents and non-use by a small fraction may indicate the need to strengthen digital communication skills or to complement email with more integrated educational platforms.

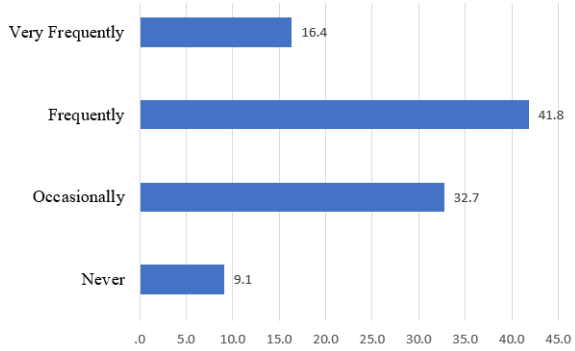


Figure 9. Use of Email to Send Academic Documents as Attachments

Source: Own elaboration

What benefits do you consider that ICT brings to your academic training process?

30.9% of students consider that ICT primarily provides them with knowledge, suggesting that they view these technologies as tools that go beyond mere access to data, helping to build meaningful learning. 29.1% identify that ICT offers them ease of learning, reflecting that many students find these tools as a way to access content more clearly, quickly, and understandably. 27.3% value that ICT provides them with information, implying that these technologies are still seen as primary sources for consultation and access to educational materials. 12.7% select the "other" option, suggesting that some students find additional benefits not directly contemplated, such as the development of digital skills, motivation, or autonomous learning.

Students recognize ICT as an integral value for their academic training, both in accessing information and in understanding and appropriating knowledge (Fig. 10). They also highlight its role in facilitating the learning process, which underscores the importance of proper pedagogical integration of technology. The "other" option opens the possibility of exploring new dimensions of ICT's impact, such as the development of transversal skills or the promotion of educational innovation.

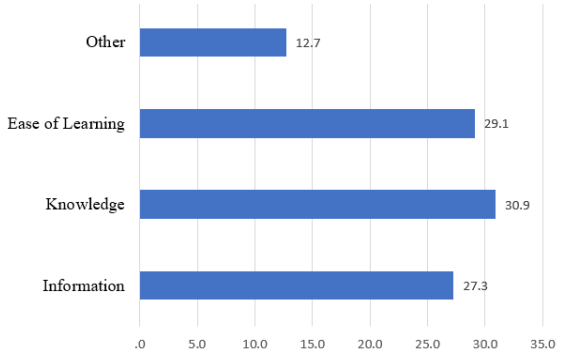


Figure 10. Benefits that ICT bring to the academic training process

Source: Own elaboration

How would you rate the importance of ICT for carrying out your academic activities?

A large majority, 52.7%, considers ICT important for their academic performance, reflecting widespread recognition of their usefulness and relevance in the university setting. Additionally, 43.6% of students rate ICT as very important, emphasizing their fundamental role as indispensable tools for studying, researching, communicating, and completing academic tasks. Only 3.6% believe that ICT is not important at all, representing a small and exceptional group, possibly linked to lower technological familiarity, resistance to change, or specific characteristics of their educational experience (Fig. 11).

These results demonstrate a strong appreciation for the role of ICT in student academic achievement. For most students, these technologies serve as essential resources for accessing knowledge, organizing tasks, collaborating with peers, and communicating effectively within the university environment. This perception confirms that integrating ICT is not merely a complementary pedagogical strategy but a crucial condition for effective learning in higher education.

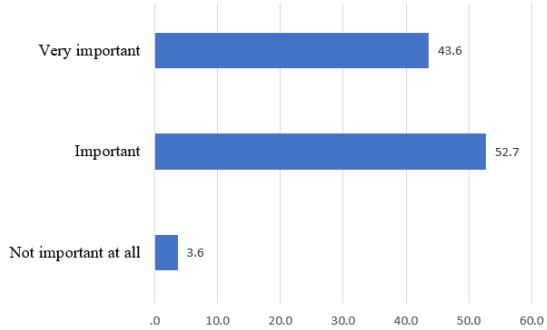


Figure 11. Importance of ICT for the Development of Academic Activities

Source: Own elaboration

DISCUSSION

The study's results reveal a clear trend toward the integration and frequent use of Information and Communication Technologies (ICT) within the university environment by both faculty and students. This trend aligns with the ongoing digitalization of educational processes and the imperative to cultivate digital competencies in academic training. Firstly, a significant majority of students (83.6%) report that their professors consistently or very consistently require the use of digital technologies such as the internet, search engines, software programs, tutorials, email, and forums. This demonstrates that educators are actively incorporating technological tools into their teaching, which supports the development of digital skills and promotes more dynamic, relevant learning methodologies suited to the current digital landscape.

However, despite the frequent demand for technology use, the provision of electronic materials by instructors is less consistent. While 43.6% of students indicate that such materials are provided occasionally, only 9.1% receive them very consistently. This disparity may be attributed to factors such as teacher training, institutional infrastructure limitations, or curriculum differences, highlighting an opportunity to enhance the systematic delivery of digital resources to support autonomous and flexible learning.

Regarding the use of technological devices in the classroom, the data show that most students have access to projectors, computers, digital presentations, and spreadsheets, primarily on an occasional (40%) or consistent (36.4%) basis, with only 16.4% using them very consistently. This suggests that although technology is present, its integration is not fully embedded across all class dynamics, possibly influenced by subject matter or teaching style. The marginalization of technology use by a small group (7.3%) could indicate inequalities in access or acceptance of technology.

In terms of collaborative work, computer use for group tasks is strongly established, with 83.6% of students reporting constant or very constant use. This finding highlights a transformation in academic collaboration, where digital platforms and collaborative applications facilitate coordination and joint production, critical aspects of contemporary professional training. Analysis of software used for academic activities confirms that word processors and electronic presentations are the predominant tools, while spreadsheet and database use is lower. This reflects a priority on producing and presenting written and visual content, but also reveals an opportunity to strengthen more specialized and analytical technical skills depending on the students' academic profiles.

Concerning autonomous access to digital resources, most students regularly download materials such as software, texts, videos, and tutorials, indicating a high level of digital proactivity. This behavior is essential for meaningful and autonomous learning but also underscores the need to develop critical competencies for searching and evaluating online information to avoid misinformation and promote ethical use of resources. The use of digital communication tools (chats, forums, instant messaging) is present among most students, although many use them more occasionally than consistently. This mode facilitates interaction and collaboration in hybrid or virtual settings; however, the predominance of occasional use suggests opportunities to strengthen their pedagogical integration for greater participation and collective knowledge building.

Email remains an essential tool for submitting assignments and documents, with a significant majority using it consistently or very consistently. Nonetheless, the fact that a notable portion uses email only occasionally or not at all could reflect coexistence with other digital platforms or a need to reinforce digital communication skills. Conclusively, students recognize ICT as fundamental elements in their academic development. About 74% associate ICT with knowledge acquisition and ease of learning, while a broad majority (96.3%) considers them important or very important for academic performance. This acknowledgment confirms that ICT is not merely a complementary tool but a vital component for academic growth and professional preparation in today's university context.

CONCLUSION

The findings of this study highlight the growing integration of Information and Communication Technologies (ICT) within the university setting, reflecting the ongoing digital transformation in education systems. This trend is evident among both faculty and students, who frequently use technological tools. Notably, 83.6% of students report that their professors regularly require the use of technologies such as the internet, search engines, digital platforms, and email, indicating a shift in teaching practices toward more interactive methodologies adapted to the digital reality.

However, the distribution of digital materials by faculty is not always consistent. While some instructors regularly provide these resources, a significant portion of students report receiving them only sporadically. This may be due to factors such as lack of technological training for teachers, institutional limitations, or curricular approaches that have yet to fully incorporate digital resources, representing an area for improvement in the educational experience.

Regarding technological equipment in the classroom, data show that most students have worked with projectors, computers, and programs like spreadsheets and electronic presentations, although

their use remains intermittent. While a considerable percentage of students use these resources occasionally or frequently, only a minority use them continuously. This may be influenced by the nature of the subject, teaching styles, or available infrastructure. Additionally, the small number of students who have not used these resources points to potential inequalities in access or technology adoption.

In terms of collaborative work, widespread use of computers for teamwork tasks was identified. This practice is well established and reflects a shift from traditional collaboration methods by leveraging digital platforms to organize, produce, and share information collectively—a key aspect of contemporary professional training. Analysis of the tools used reveals that word processors and electronic presentations are the most commonly employed programs, while more technical applications such as spreadsheets or databases are less prevalent.

This suggests that although students develop skills for content creation, there remains an opportunity to strengthen their more specialized technological competencies. Most students also demonstrate autonomous behavior in accessing digital educational resources, frequently downloading software, videos, texts, and tutorials. This initiative indicates motivation and commitment to their education but also poses the challenge of promoting appropriate criteria for critically evaluating digital information.

Regarding the use of digital communication channels like chats, forums, or instant messaging, many students use these tools, though often not regularly. This points to an opportunity to more actively integrate these platforms into the educational process to improve interaction and participation. Email remains a widely used means for submitting assignments and documents, although some students use it only occasionally, which may be due to the coexistence of newer platforms or a lack of digital communication skills. Finally, students express a positive appreciation of ICT in their education. Most associate these technologies with knowledge acquisition and easier learning, and a very high percentage consider their importance in the academic sphere to be significant. This recognition confirms that ICT is central to today's higher education, both for its ability to enrich learning and its role in preparing students for the professional environment.

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