Chapter 9 / Capítulo 9

Emerging pedagogies: AI, territory, and situated knowledges (English Version)
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Lessons learned on the use of digital tools to strengthen critical thinking in university students: Systematization of experiences

Lecciones aprendidas sobre el uso de herramientas digitales para el fortalecimiento del pensamiento crítico en estudiantes universitarios: sistematización de experiencias

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ABSTRACT

Daily life in the 21st century unfolds in an environment profoundly mediated by technology. This study aimed to systematize the teaching experiences implemented in the Communication and Language course of the Biomedical Engineering program at the University of Zulia, Eastern Coast of Lake Maracaibo Campus, which promote the strengthening of communicative competencies and the stimulation of critical thinking. Among the lessons learned, it is highlighted that technological tools can become allies in the teaching and learning process, given that current generations operate within a digital ecosystem; however, their use must remain under the guidance of the teacher to avoid student dependence and ensure that technologies are instruments and not ends in themselves. Furthermore, the flipped classroom facilitates learning at the student's own pace, which requires teacher supervision to guarantee the achievement of objectives and autonomy in knowledge construction. Finally, the incorporation of digital resources enhances communicative competencies: students use tutorials and multimedia resources and utilize artificial intelligence to translate, improve, and correct their writing.

Keywords: Communication Skills; Flipped Classroom; Artificial Intelligence.

RESUMEN

La vida cotidiana del siglo XXI se desarrolla en un entorno profundamente mediado por la tecnología. El presente estudio tuvo como objetivo sistematizar las experiencias docentes implementadas en la asignatura Comunicación y Lenguaje del programa de Ingeniería Biomédica de Universidad del Zulia, Núcleo Costa Oriental del Lago, que favorecen el fortalecimiento de las competencias comunicativas y el estímulo del pensamiento crítico. Entre las lecciones aprendidas, se destaca que las herramientas tecnológicas pueden convertirse en aliadas del proceso de enseñanzaaprendizaje, dado que las generaciones actuales se desenvuelven en un ecosistema digital; sin embargo, su uso debe permanecer bajo la orientación del docente para evitar la dependencia estudiantil y asegurar que las tecnologías sean instrumentos y no fines. Además, el aula invertida facilita el aprendizaje al ritmo del estudiante, lo que exige supervisión docente para garantizar el alcance de los objetivos y la autonomía en la construcción del conocimiento. Finalmente, la incorporación de recursos digitales potencia las competencias comunicativas: los estudiantes emplean tutoriales y recursos multimedia y recurren a la inteligencia artificial para traducir, mejorar y corregir sus redacciones.

Palabras clave: Competencias Comunicativas; Aula Invertida; Inteligencia Artificial.

INTRODUCTION

This paper presents the experience developed in the educational context of the University of Zulia (LUZ), specifically with two sections of the Communication and Language course (first semester), part of the Biomedical Engineering Program, East Lake Campus, specifically in the municipality of Cabimas, Zulia state – Venezuela, during the first academic period of 2025, between April and July.

Daily life in the 21st century drives development in a world where everything is tied to technology. Information circulates at the speed of light, digital tools emerge as windows and mirrors; in this last comment, attention should be focused on teaching, because technological tools reflect weaknesses in the teaching-learning process at different educational levels.

That is why this systematization brings together the author's experiences teaching biomedical engineering students, with whom he explored and used digital platforms and environments that enabled him not only to facilitate learning but also to incorporate the development of habits for inquiry, argumentation, and critical-reflective decision-making. This document brings together practices, evidence, and lessons that can be useful to teachers and institutions interested in using technology as an effective scaffold for autonomous thinking.

One aspect that cannot be overlooked is the crisis arising from COVID-19, in which education systems had to adopt various measures to ensure teaching and learning continued.

This led to the use of Information and Communication Technologies (ICT), which had been used before, but not on such a large scale. Now, rather than being optional, they are mandatory, even for teachers who say, "I do not believe in technology for my classes," yet respond via email or instant messaging.

It should be noted that in Venezuela, teaching combines face-to-face and virtual modalities to foster meaningful learning among students, recognizing that the new generations arrived at university with digital technology in their everyday environments, which shapes their modes of communication, access to information, and educational expectations. This convergence requires teachers to adopt and adapt different strategies so that students can transform and strengthen their communication and critical thinking skills.

In terms of methodology, the approach adopted was that of Jara (2018), which holds that the systematization of experiences in complex processes must be recorded and shared so that others can benefit from what has been learned. This study compiles teaching practices and records related to the use of technological tools based mainly on Artificial Intelligence (AI) that facilitate hybrid modality training in Biomedical Engineering, thereby contributing to the development of critical thinking in future professionals.

Based on interventions using various technological tools in the hybrid modality, evidence, obstacles, and conditions for success have been identified, allowing the formulation of operational recommendations and criteria to promote critical thinking among students. The objective of this study was to systematize the teaching experiences developed in the Communication and Language course of the Biomedical Engineering program at LUZ, on the Costa Oriental del Lago Campus, that foster the improvement of communication skills and stimulate critical thinking among students.

Incorporation of technologies

An indispensable aspect of education at any level is the incorporation of ICT-based strategies and tools. In the university context, it has been shown that they have transformed the teaching-learning process. Technological advances have made it possible to implement teaching methods that, until a few decades ago, seemed to belong only to the world of cartoons; at that time, many observers doubted that such practices could become a reality in education. As reinforced by Faúndez et al. (2023), thanks to these technologies, it has been possible to meet students' needs, as they are immersed in this digital ecosystem.

To reinforce the above, the COVID-19 pandemic abruptly accelerated the adoption of distance learning in university education. In fact, in mid-2020, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) stated that more than 1,200 students at different levels of education had moved away from face-to-face classes and enrolled in virtual classes to cope with the health crisis at the time. (UNESCO, 2020). Similarly, Pico y Vaca (2023) highlight that when ICTs are used in the educational process, the results are favorable, as they are innovative resources and enable activities that capture students' interest. This fosters meaningful learning among students and encourages them to use the knowledge they have acquired better.

According to Aguilera et al. (2017), the incorporation of technologies aims to transform students› passive attitude to promote autonomous learning. Hernández et al. (2021) agree that the use of technological tools develops students› individual skills that will be useful in their future professional performance, as well as opening more doors for their entry into the labor market.

For their part, Fajardo et al. (2023) consider artificial intelligence (AI) in university education a significant and growing trend that focuses on personalized teaching, enabling students to understand the material better. Therefore, these become enriching experiences tailored to each student when AI is used responsibly to address current educational challenges.

Additionally, thanks to AI, students can reap greater benefits. However, it should not be overlooked that, as multiple opportunities arise, so do deficiencies. This is where teachers must exercise appropriate control in the use of these tools, so that students can use them to support their learning, generating more meaningful and practical learning, as long as they are used as a support and not as an end in themselves.

In the context of the reasoning that has been presented, it is necessary to mention Garcés et al. (2023) because they point out that social networks have become great allies in the teaching-learning process, which would make these tools avoid wishful thinking and develop critical thinking, ensuring that they are more objective with the knowledge acquired, since they are linked to research, creativity, transformation, and innovation.

An added value to the flipped classroom

Although a definition has not yet been standardized, it is most commonly referred to as the flipped classroom, a method used in blended learning across different educational levels. In this regard, Goedhart et al. (2019) consider it a way to diversify what is learned and improve student performance. In this model, learning is anticipated before class, using a series of remote technological resources. Students can review the theoretical content of the curriculum unit through tutorials, documentaries, recorded classes, multimedia presentations, games, and other resources that allow them to learn at their own pace and reflectively.

To maintain continuity with this modality, the aforementioned authors emphasize that the teacher in the classroom applies strategies that require putting into practice the theoretical reference that students must have previously accessed to achieve a deeper understanding through interaction with their peers and the teacher. Additionally, one advantage of the flipped classroom is the variety of technology-based formats for sharing content, allowing students to choose how to use them. This way, they are not overloaded with information and can build knowledge progressively.

It is worth incorporating the contribution of Sarango et al. (2024), who emphasize that, in this modality, students become permanent users of technological resources, which promotes more autonomous learning. According to these authors, using technology gives students access to up-to-date content; in this context, the teacher assumes responsibility for guiding the process to encourage critical and reflective thinking and promote innovative learning through methodologies that, for some, are beginning to surpass traditional practices.

However, Mayorga (2024) points out that although this inverted method encourages students' investigative skills, promotes a culture of responsibility through active participation, and improves social skills, it can also limit the teacher's guiding role, since teachers do not always present their own methodological innovations, but sometimes represent a change of labels in a stressful social context that is mainly based on the perceptions of learners.

Design and methodological context

This paper proposes the reconstruction and systematization of teaching experiences that generated meaningful learning and transformations in the way biomedical students assume communicative skills in the environments in which they operate.

Following Jara (2018), it is assumed that systematization is a procedure for recovering and organizing complex processes to share valuable lessons with students and teachers, particularly in contexts involving the incorporation of technological tools.

Likewise, in line with Villa (2019), the systematization of experiences is conceived from a critical and reconstructive perspective: interpretive narrative is privileged as a tool for reconstructing knowledge and intentional practices, and is framed within a qualitative approach that considers the ordering, reconstruction, and critical interpretation of lived experience as inputs for the production of knowledge and the communication of results.

Specifying the context of systematization, these experiences were developed with two shared sections of the Biomedical Engineering Program.

One section focused on biomechanics and the other on bioinstrumentation. Each section had 27 students enrolled. In order to comply with the provisions of the National Regulations on Multimodal University Education Systems (2021), these sections implement a mixed education modality, where face-to-face and virtual education coexist, in a way that is in accordance with the regulations. This applies to the first academic period of 2025 in the aforementioned program, specifically to the curricular unit Communication and Language.

DEVELOPMENT

In accordance with the above developments, the exercise of systematizing experiences resulted from interaction with biomedical engineering students at the University of Zulia (LUZ), East Lake Campus, Cabimas municipality. This section describes how the exercise was carried

out, the phases completed, the participation of each actor, and the reflections and significant learnings achieved with the students.

It is important to emphasize that these phases are not the result of a strict sequential logic, because the dynamics of systematization allow for ongoing initial reconstructions in encounters with these actors, leading to new reflections and, from there, to future scenarios functional for learning.

For this reason, the systematization of experiences was chosen to carry out the research exercise and generate knowledge, based on the experiences of the participating subjects, in order to deepen the relationship between teachers and students, specifically in a curricular unit that, over the years, has been underestimated and confined to the mere practicality of writing and speaking well, when it brings together a whole component so that social actors can function efficiently and effectively in the environments where they find themselves.

For all the above reasons, this systematization is the product of a collective process of knowledge construction, which emerged from five face-to-face and eight virtual academic meetings, in which reflection and participatory interpretation provided the necessary value for the students themselves to identify the benefits and potential of exercising the communication process in different contexts of their daily lives and to stop seeing communication as a subject that must be passed in order to advance in their professional training.

First contacts

In April 2025, the first academic period established by the university began, which was the one indicated to start the first cohort of the Biomedical Engineering degree program, after more than a decade of procedures and processes to finalize its launch in the locality. Technological tools were the first support for making initial contact with students. From the moment of enrollment, students must contact each teacher via email or text message to establish the dynamics of attention, in accordance with the regulations of the multimodal systems that govern Venezuelan education. Initial interactions took place through a WhatsApp group where the first class session was held, scheduled by the coordinators for Fridays from 8:00 to 11:30 a.m.

Given the above, it may seem trivial because the use of instant messaging groups has become normalized, driven by the 2020 health crisis. One of the key aspects for the teacher is that this space should not be limited to one-way communication or neglected, as often happens for various reasons. Students were encouraged to see it as the official space for conducting activities, whether in person or via digital tools, as well as for everything related to the curriculum unit. They quickly joined, either through direct contact or through a link shared by the teacher or one of their classmates.

To capture the lessons learned from using digital tools with this group of university students, the aforementioned messaging group documented the typical tension among students in a week when they are just beginning to interact with their classmates and teachers, even before the first contact. One of the first actions was to register in the virtual classroom on the Classroom platform, so that they could become familiar with the technological space that would complement their academic training. They also shared links to YouTube tutorials that explained how to register and use it.

In the first face-to-face class, on April 18, 2025, the aim was to make the welcome more

interactive. A group activity was carried out in which those present formed pairs and, in addition to their personal details, discussed their use of social networks and the technological platforms they most frequently used. They then had to share this information to introduce their partner at the end. In this way, without the formalities of academic research, it was possible to obtain valuable information about students' levels of knowledge and use of technological tools.

During the presentations, the teacher recorded data using the notes feature on his cell phone. He noted that TikTok and Instagram are the social networks these young people use most, that they identify with WhatsApp messaging, and that they are attentive to the latest news about artificial intelligence, which is reported practically daily. Few were familiar with the Classroom platform, but they were beginning to learn about it through the tutorials. However, what remained of these first contacts in this student-teacher-technological tools relationship? That was the first question that arose at the end of the initial interaction. The students' comments ranged from general to more reflective.

Among the responses obtained, beyond "we all like to watch TikTok videos," others emerged such as "with these technologies we can communicate better"; or a statement that leads to reflection on technological dependence, "with the phone, everything is easier, faster, I do not know what I would do if I did not have it"; and one that many took as a joke, but which goes deeper: "With AI, everything has become easy, but I do not know if I am going to lose my job." Regarding the phrases that carried emotional charge or underlying meaning, the content development began, although the plan was to present and organize the class as a whole.

University students starting their careers use technology as an ally because it helps them interact more. It makes it easier for them to complete their tasks, although some worry about not having a cell phone because they feel they would not be able to do them, which is clearly a dependence on these tools.

The topic of AI cannot be left out. It was clear from the responses that they are using it extensively, but some students are afraid that it will take away their jobs in the future.

This led to shared reflection among the students, who reached consensus that humans will always be needed because, beyond the intelligence of a machine, empathy and critical thinking are qualities that only humans can develop.

Now, addressing critical thinking, one of the central themes of the systematization, the students expressed what they understood by thinking critically or autonomously. "It is not that criteria are imposed on me, it is that I decide whether something is good or not and then decide to share it," said one of them; another pointed out, "I thought it was criticizing, like in the meme where a group of women gather in front of a house and talk about all the neighbors." One student said, "I really did not understand it, but after reviewing the videos in the virtual classroom, I am starting to get it." This was the final topic of the first class, but it was left open for those students who had not yet explored it in depth. Those who shared their perceptions were correct because what is important is that they can discern and, if they have doubts, investigate further, as did the participant who, beyond registering in the Classroom, began to review the content.

In these initial encounters, mediated by technology, the willingness of young people to use it in their daily activities stood out, as suggested by Faúndez et al. (2023). They feel satisfied with these advances because they were born into a digital ecosystem, though for some students, the

future of Artificial Intelligence remains unclear. However, it is clear that they depend on it, an aspect that teachers must address strategically so that students use it as a support tool, not allowing artificial intelligence to make decisions, and constantly emphasizing the message that "AI can make mistakes." It is important not to demonize these advances and try to continue teaching without them. A balance must be sought between ethical and responsible use for relevant results.

Evidence of the flipped classroom

In this regard, from the outset, the teacher made it clear to participants that he would use the flipped classroom to develop the content.

In the first few days of class, some students expected the teacher to give them a lesson, as is customary. However, they gradually came to understand that each of them, at their own pace, would review the theory and aspects related to the topics of the Communication and Language subject, so that in the meetings with the teacher, they could clarify doubts, delve deeper into some aspects that caught their attention, and explain details about the assigned activities.

The platform chosen for the virtual classroom was Classroom, which enabled us to present all the topics to be covered from the outset. In accordance with the course syllabus, the course was divided into four units—verbal and nonverbal communication; expression of ideas in everyday life; multiple contexts and communicative situations; and communication in work groups—which seek to develop the communication skills of future biomedical engineering professionals. Some details of the aforementioned platform are shown in the following figure:

Figure 9.1. Collage of reference images of the content shared in Classroom

With the support of technology, students had access to the course's theoretical content, including summaries of the topics, links to further information on related aspects, videos, articles, and additional books. This experience confirmed that most students were able to

interact continuously with technology to support more autonomous learning, as noted by Sarango et al. (2024). However, there were some cases in which their investigative skills were practically non-existent, coupled with a lack of responsibility and participation in the classroom that the flipped classroom model should promote, as Mayorga (2024) pointed out. Therefore, teachers must promote strategies in these situations that achieve the integration of participants, as well as the investigative culture that they must put into practice.

Following the experience of using the virtual classroom, at the face-to-face meeting on May 9, 2025, an activity called Living Numbers was carried out, in which two groups of students were formed and given printed numbers—from zero to 9—and as the teacher indicated six-digit amounts, they had to arrange themselves in such a way that the number could be read, with the team that did so first scoring a point. The students were then asked to relate the activity to the theoretical content covered: "We had to communicate to put the numbers together"; they also commented, "We also had to have a leader, and our team lost because no one took on that role"; one of the participants mentioned, "We exchanged the roles of sender and receiver, making communication more dynamic"; Finally, another participant said, "We maintained verbal and nonverbal communication, we focused on the signals from a classmate, and that way we put the numbers together more quickly."

The above is another demonstration of how students take advantage of the flipped classroom. During the reflection, participants supported their peers, and it was clear that they related the topics of the first unit to the process of verbal and nonverbal communication. They also understood how important it is to communicate effectively in work teams to achieve good results, as well as the need for leadership to achieve organizational goals. Likewise, when asked, a large proportion of the students indicated that they best understood the content through the shared videos. One of them highlighted, "and from the videos you leave us, others continue to appear that talk about the topic, and so you learn more," another example of the investigative capacity that this strategy develops in them.

Communication skills

The dynamic that combined multimodality enabled progress in the theoretical content, and the students were also encouraged to put it into practice. They were able to organize themselves and understand the subject content at their own pace and, in meetings with the teacher and their classmates, exchange experiences that helped expand their knowledge. Another experience with significant learning was related to oral expression techniques, where each student could not only review what the specialized literature addresses on the subject but also select from a series of YouTube videos that explained, practically, a series of tips for learning or improving public speaking skills.

In relation to this last point, the main weakness shown by the participants was stage fright. During the face-to-face class on May 16, 2025, an attempt was made to encourage attendees to volunteer to give a demonstration to their classmates. Only three did so, but most of them appeared nervous when asked to give a presentation. In response, the teacher intentionally gave a demonstration in which he used filler words, did not make eye contact, kept his hands in his pockets, was completely static at times and overly animated at others, among other things that public speaking experts recommend avoiding during a public presentation. He then led a discussion based on the "mistakes" he had made.

In this exercise, the students identified flaws and pointed out what the teacher did. "The teacher never looked us in the eye," said one of them, while another participant mentioned,

"When he talked and moved around so much, I lost my concentration." Another student commented, "He practically never took his hands out of his pants, and when he did, he crossed his arms behind his back." These comments show that the participants reviewed and watched the shared videos, but they still needed to work on their stage fright. The teacher shared brief examples of how other students had overcome this. He assigned them to record an individual or group video on a topic of their choice and upload it to the platform for evaluation. The results improved, with most students feeling more confident about recording, and others recognizing that talking about a topic they were passionate about made the task easier.

It is clear, then, that students should be encouraged to address topics related to the subject area, but on their own initiative. Among other comments, one student said in the video, "I feel better in front of the camera than in the classroom, but I am learning to overcome my fears." Another, with a laugh, acknowledged, "I have recorded more than 15 times, and I cannot stop laughing when I start recording." One of the students who did not participate much in face-to-face activities was emphatic: "With this video, teacher, for the first time, I am not so scared, because I followed what people recommend on YouTube." These responses encompass several aspects, some of which relate directly to stage fright and the different ways in which it is expressed. Some people freeze up, others cannot stop laughing, and those who do exercises or follow the experts' tips begin to notice improvements.

The following figure shows screenshots of the students' recorded videos, highlighting improvements or persistent difficulties, as well as the resources they used during the presentation. However, what is relevant is that the vast majority have identified their main weaknesses and are beginning to work on them to strengthen them.

Figure 9.2. Screenshots of recordings during oral presentations

So far, the findings of Goedhart et al. (2019) have been confirmed. They consider that using the flipped classroom is a way to diversify learning and improve student performance. In the Communication and Language class, students were able to access a variety of content provided by the teacher, as well as content they found themselves, according to their preferences,

thereby improving their oral expression. Therefore, if university students are provided with content in this way, their understanding will be more profound, because it will allow them to form their own opinions on a particular topic, as well as to discern what they consider to be their shortcomings or, during interactions with the teacher and their peers, to accept whether they have transformed their form of expression or whether they still maintain it.

Support in translation and writing

As shown, oral and written communication skills can be developed using digital tools. Another assigned activity was a simulation of a biomedicine situation, with the topic left open to allow greater freedom. In addition, they had to locate scientific literature in other languages to use AI tools for interpretation into Spanish. The assignment culminated in a reflection on the benefits that these technological advances offer students. The task was accomplished because the students were able to see the full potential they have at their fingertips when using these tools ethically and responsibly.

Among other responses, one student emphasized, "As a future biomedical engineer, I must be able to exchange ideas and solutions in various languages. Thanks to online translators, I was able to access sources in German and Russian, as well as English, which opens doors for us internationally." Another participant commented, "I told my mom about the assignment with the translators, and she said that in her day, she had to carry an English dictionary under her arm to try to understand other texts. How nice that it is easier for them today."

The benefit of technology in enabling access to literature in other languages that previous generations did not have access to is clear. This was one of the key points highlighted by the students after discussing their experiences of using these tools for their academic work. One student also said, "I am taking an English course, and it also helps me understand the technical use of certain words."

As we have seen, the use of these artificial intelligence-based tools in the university context continues to grow. It supports the trend toward more personalized learning, helping students understand much better, as indicated by Fajardo et al. (2023). During the reflections, the students were sincere in stating that AI makes their path easier, but one of them pointed out, "I like using AI, but we must be careful. I asked it about some materials for prosthetics, and its answer seemed great, but half of what it said was wrong, and I checked it with a material that our Physics I teacher gave us."

The previous comment sparked a discussion that went beyond class time, with students accepting and sharing their classmates' opinions. They highlighted other cases where AI responses were hallucinations and that blindly believing what these tools share would lead to serious problems, especially when the biomedical engineering degree is linked to human health. In the students' opinion, this session was very enriching. "I really liked it, Professor. That is why we have to master AI and not let it master us," said another participant.

It should be noted that during the face-to-face meeting on June 4, 2025, the class began by sharing a meme in the WhatsApp group that references Descartes and his famous phrase "I think, therefore I am." This meme combines humor and philosophy and went viral on social media and various websites, where the philosopher's image was used to satirize human beings' mentality in the digital age. This image sparked a discussion that tied in with previous reflections.

In addition, the teacher helped students understand how technology can cause them to

make serious mistakes. A few decades ago, with the advent of the internet, to acquire any information, one only needed to search directly in a search engine; hence, one of the most popular is Google. Today, we are seeing a paradigm shift: content is still replicated, but now it is generated by artificial intelligence models. The following figure shows the meme shared in class:

Figure 9.3. Humorous meme about Descartes

Students' position

The approaches presented have focused on what the teacher of the curricular unit developed with their students. In the last face-to-face activity, they were able to express their positions on how they experienced the course and what they learned in Communication and Language. The face-to-face class on July 25, 2025, was dedicated to listening to them. Among the comments, they emphasized that the teacher did not prohibit them from using AI, as happened in another subject. "Teacher, I really liked that you let us use AI, and you repeated many times that we should use it responsibly," said one of the students. Another member of the class mentioned, "Thank you, teacher, because you helped us understand that it is not just a prompt, that we have to communicate with the intelligence, which is why every time we use it, it is a chat."

Likewise, one of the students emphasized, "I stopped copying the teachers' work verbatim. Now I ask for a role, give instructions, review the responses, but I feel confident with the activity." Another student recalled, "The activity I liked the most was putting together sentences with the words the teacher gave us, and then we looked for information on those topics with AI." A participant who did not participate much said, "The exercise of talking in front of the mirror helped me loosen up a little." Among them, they also pointed out aspects that they observed that other classmates corrected or improved. "During presentations, Felipe no longer stands with his hands in his pockets," said one. "Angela makes a lot of eye contact when she talks to me," said another student jokingly. For his part, Victor acknowledged, "I thought this subject was boring, which is why I did not attend the first few classes, but I realized that is not the case and that we need to communicate better as future biomedical engineers."

Luis Armando, another student who also said that the course helped him become more

critical, added, “Before, I did not pay attention to many details of what you find on the internet, but now I try to corroborate what I find, so that it really contributes to what I am researching.” Finally, Ruth said, “Teacher, I cannot measure what I have learned. One word would be too much, but all of it will help me for the rest of my degree and my life. Thank God for giving us this opportunity for growth.”

Broadly speaking, the students recognized the openness to the responsible use of AI in academic spaces. This freedom led them to critically appropriate different digital tools. The following figure shows part of the incorporation of technology in the classroom. It shows how high school students used digital tools alongside manual activities, ultimately leading them to think critically.

Figure 9.4. Integration of technological tools in learning

CONCLUSIONS

Based on the systematization, the following lessons learned about the use of digital tools for the development of critical thinking and communication skills in university students are summarized:

First lesson learned: any technological tool, no matter how simple it may seem, can become an ally in the teaching-learning process because current generations were born into the so-called digital ecosystem.

Second lesson learned: the use of technology must be guided by the teacher to avoid student dependence and ensure that they recognize these tools as means to an end rather than the end of teaching itself.

Third lesson learned: the flipped classroom allows students to take advantage of the opportunity to learn at their own pace, which requires the teacher to guide and supervise the process to ensure that the objectives are achieved; it is not a question of abandoning students to a programmatic content without guidance, but instead of creating conditions for them to build and expand their knowledge autonomously.

Fourth lesson learned: the incorporation of digital tools strengthens communication skills; students use a variety of multimedia resources to expand their knowledge and also employ artificial intelligence-based tools to translate texts, improve their writing, and correct their work.

Fifth lesson learned: This is linked to the limitations of the study, which did not sufficiently address the gaps in access and technological literacy, or the dependence on external platforms. Consequently, it is recommended that future research expand the contexts and number of participants, and consider longitudinal designs that allow for sustained observation of technologies and help mitigate the biases associated with the study.

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AUTHORSHIP CONTRIBUTION

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