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Inverted Learning and Lifelong Learning: Synergies for 21st Century Education

Aprendizaje invertido y aprendizaje a lo largo de la vida: sinergias para la educación del Siglo XXI

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Abstract

This study explored the perceptions of Ecuadorian students about the Flipped Learning (FL) model in Research Methodology, using mixed methods (questionnaire N=18, focus group N=7). The results revealed a positive assessment of FL, highlighting the flexibility and usefulness of videos to reinforce learning. However, challenges such as lack of engagement and difficulty in formulating questions during video viewing were identified. The length and quality of the videos were also critical factors. It was concluded that FL can be effective in this context, but requires careful planning that considers the selection of materials and promotion of interaction. It is suggested to investigate the long-term impact and variables such as gender and digital competence, recognizing the convergence of FL and lifelong learning as a comprehensive educational paradigm.

Keywords: flipped learning, perceptions, lifelong learning, higher education, Ecuador.

Resumen

Este estudio exploró las percepciones de estudiantes ecuatorianos sobre el modelo Flipped Learning (FL) en Metodología de la Investigación, empleando métodos mixtos (cuestionario N=18, grupo focal N=7). Los resultados revelaron una valoración positiva del FL, destacando la flexibilidad y la utilidad de los videos para reforzar el aprendizaje. Sin embargo, se identificaron desafíos como la falta de compromiso y la dificultad para formular preguntas durante la visualización de videos. La duración y calidad de los videos también fueron factores críticos. Se concluyó que el FL puede ser efectivo en este contexto, pero requiere una planificación cuidadosa que considere la selección de materiales y la promoción de la interacción. Se sugiere investigar el impacto a largo plazo y variables como género y competencia digital, reconociendo la convergencia del FL y el aprendizaje a lo largo de la vida como un paradigma educativo integral.

Palabras clave: aprendizaje invertido, percepciones, aprendizaje a lo largo de la vida, educación superior, Ecuador

1. Introduction

In the context of the current digital era, higher Education faces the challenge of preparing students for a dynamic work environment where lifelong learning, adaptability, and autonomy are key competencies. In this scenario, the Flipped Learning (FL) model has emerged as an innovative pedagogical strategy with the potential to foster lifelong learning by promoting active participation, self-regulation, and the development of transversal competencies (Li et al., 2021; Martínez-Clares et al., 2024). Unlike the traditional approach, flipped learning is a pedagogical approach in which direct instruction is moved from the group learning space to the individual learning space. The resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and creatively engage with the subject matter (Flipped Learning Network, 2014). This reorganization of learning time and space not only increases flexibility but also responds more effectively to the individual needs of students, regardless of their age, academic level, or sociocultural context.

Several studies have documented the benefits of FL in Higher Education, highlighting significant improvements in student motivation (Akçayır & Akçayır, 2018), self-regulation of learning (Campos-Martínez & Duran-Llaro, 2023), and academic performance (Hew & Lo, 2018; Sola Martínez et al., 2019). Likewise, it has been observed that this methodology favors more effective feedback (Kim, 2017), strengthens student self-efficacy (Sun et al., 2018), and fosters a deeper understanding of content, stimulating critical thinking, collaboration, and the development of higher-order cognitive skills (Blau & Shamir-Inbal, 2017; O'Connor et al., 2016; Pence, 2016).

Although much of the literature originates from European contexts, it is acknowledged that the applicability of FL extends beyond these scenarios, demonstrating a high potential to adapt to diverse educational realities (Sánchez-Soto & García-Martín, 2022). However, its implementation in contexts marked by structural inequalities, as in many Latin American countries, faces significant challenges. The digital divide and socioeconomic disparities can exacerbate differences in access and academic performance (Malo Álvarez et al., 2020), underscoring the need to critically examine the viability and effectiveness of FL in these environments.

The model is based on student-centered learning theories, where pre-class preparation and active participation during face-to-face sessions are key elements of the learning process (Abeysekera & Dawson, 2015; Lee & Choi, 2019; Li et al., 2021). However, their adoption may be limited by factors such as resistance to change, lack of institutional support (Urgilés et al., 2019), the need for additional pedagogical accompaniment, and poor prior preparation of the student body (Choi et al., 2015; Hung, 2015; Pence, 2016).

The limitations of the model, including gaps in access to technology, the need for well-developed autonomy, limited teacher training, a solid technological infrastructure, and dependence on instructional design, underscore the need for a carefully planned implementation (Lee, 2023). Among the main limitations for students are the high demand for time and effort, the lack of familiarity with collaborative work, and the low perceived value of feedback. On the part of teachers, they highlight the need for a greater investment of time in lesson planning and limited training in the use of digital tools, which can make it challenging to take advantage of the available technological platforms (Quinde-Herrera et al., 2023b).

In this context, the present study aims to investigate students' perceptions of the implementation of the FL model in an Ecuadorian public university. Specifically, this study seeks to answer the following research questions:

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How do college students perceive the FL model in terms of their learning experience, including participation, attitudes, and emotional aspects?

What factors influence the effectiveness of the FL model in a university context with inequalities, and what recommendations can be derived to optimize its implementation and promote lifelong learning?

The main objective of this study is to understand how the FL model can be adapted and optimized to promote lifelong learning in unequal educational contexts, thus contributing to equity and quality in higher Education. It has two specific objectives: 1) to analyze the factors that condition student participation in the FL model and 2) to identify students' qualitative perceptions of the benefits and challenges of the model. This study is distinguished by its focus on a Latin American context with inequalities, which enables the generation of relevant empirical evidence for adapting and optimizing the FL in similar environments. The findings of this research have the potential to inform educational policies and practices that promote equity and quality in higher Education, thus contributing to the development of more just and equitable societies.

2. Materials and methods

A mixed-methods approach was employed, utilizing a sequential explanatory design that began with quantitative data to establish trends and then interpreted the results qualitatively (Creswell, 2009). Table 1 shows the participants in this study and the instruments for data collection.

2.1. Context

The study was applied in two didactic units of the Research Methodology course in the third year of an undergraduate degree at a public university in Ecuador. The intervention consisted of preparing the instructional design based on the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) between the researchers and the teacher who taught the classes, considering that it is the first experience applying the FL model for all participants. The instructional design phases and recommendations were based on the proposals of Quinde-Herrera et al. (2023a; 2022).

Table 1: Research design, instruments, techniques and participants
Source: Own elaboration.

Explanatory Sequential Design	Data collection instruments and techniques	Number of participants
Phase 1 (quantitative data)	LF Perceptions Questionnaire	18
Phase 2 (qualitative data)	Focus group	7

2.2. Participants

This is a non-probabilistic purposive sampling, following the inclusion criteria: i) public university; ii) teacher with no experience in the use of FL; iii) students who have not received classes under the FL model.

2.2.1. Student profile

In the FL course, 22 students participated (16 female, six male), with an average age of 21.5 years (SD = 1.34). All had a computer at home, but 64% used it less than three hours a day. The most commonly used technological tools were

email, instant messaging, and web browsers. Seventy-seven percent of the students studied mainly at home.

2.2.2. Sample

Of the 22 students who attended the class, 18 completed the perception questionnaire (female, N = 16; male, N = 2) individually immediately after their last FL class session. Qualitative information was obtained through a focus group, in which seven female students participated, selected for their willingness to delve deeper into the questionnaire responses and their active class participation.

2.2.3. Teacher profile

The teacher who participated in the study has taught for more than 10 years in the health area and offers the subject of research methodology. He has not taught using the FL model. To learn more about his profile, an interview was conducted. According to the interview, the primary technological tool she usually uses to communicate with her students is email, as they prefer to resolve their doubts personally. Generally, she uses MS PowerPoint presentations during classes. She does not use more tools due to her limited knowledge and lack of time to prepare for the classes. As for class activities, she usually does group work of up to three people to motivate and maintain student participation. In addition, she uses strategies such as calling them by name and asking direct questions. Finally, she noted that due to time constraints, it is challenging for her to effectively integrate technologies in large classes.

2.3. Data collection instruments

Quantitative and qualitative data were collected through two instruments. In the quantitative phase, a questionnaire was administered to assess students' perceptions of the LF, and in the qualitative phase, a focus group was conducted.

2.3.1. LF perceptions questionnaire

To investigate students' perceptions of FL, a paper-based questionnaire was developed based on Hung (2015), which presents three sections that included open and closed questions: i) student participation, addresses the time and effort dedicated by students outside the classroom; ii) learning attitudes: evaluates learning engagement and satisfaction with the design of the material; and iii) learning experiences: investigates students' emotional aspects. Additionally, an open-ended question was included at the end, asking students to provide any relevant observations that could improve the teaching and learning process. To adapt the questionnaire to the local context, it was translated into Spanish, maintaining the semantic and conceptual fidelity of the original. Subsequently, a pilot test was conducted with a group of 20 students from another university in the same city, who had characteristics similar to those of the study participants. The objective was to verify the clarity and coherence of the items in the new linguistic and cultural context. Based on the comments and observations of the pilot group, minor adjustments were made to the wording of some items to ensure their comprehension. Although no formal statistical validation was conducted, this process ensured the instrument's adequacy before its final application.

2.3.2. Focus group

This technique was used because it can be applied in any area, context, and population and allows for clarifying the answers to quantitative surveys (Escobar & Bonilla Jimenez, 2009). The focus group was conducted with seven students who participated voluntarily. This group was selected from the 18 students who completed the questionnaire; 7 agreed to collaborate, as they were in the final week of the semester. The selection criterion was the availability and willingness to contribute with their experiences, maintaining variety in terms of levels of participation and perception of the model. The focus group was conducted once the questionnaire data had been processed, approximately one month after the FL was applied. The activity was conducted in a university meeting room; conversations were recorded with prior informed consent and also documented in notes. They were asked to provide their honest opinions about their experience with the FL model in order to improve its application. The duration was approximately 45 minutes, and

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a natural conversation was maintained throughout the session.

The focus group guide included semi-structured questions, elaborated based on the quantitative results of the first phase and the gaps identified in the data. For example, questions aimed at exploring the reasons why students did not watch the assigned videos were included, a finding that emerged from the analysis of the questionnaire. However, the focus group development was flexible, allowing most of the questions to emerge naturally during the conversation, enabling a deeper exploration of relevant topics and new ideas. A verbatim transcription of the recording was made for analysis.

2.4. Data analysis

For the quantitative analysis, a descriptive analysis was conducted on the responses to the closed-ended questions of the questionnaire, using frequencies and percentages of the data. In addition, a qualitative analysis was conducted to study the responses to the open-ended questions (Piñuel Raigada, 2002) using Atlas. Ti. 22.1.3.0 program.

To carry out the qualitative analysis, the following coding was implemented: C.A4, where C denotes an open response, and A4. Represents the section (A) and the question number (4), followed by a number that identifies the Student. For example, code C.A4.1 refers to an answer provided by student 1.

For the focus group response analysis, the responses were coded as follows: GF to indicate that it was a response from the Focus Group, and E, which stands for Student, plus a number indicating the Student's number. For example, GF.E1 indicates that it refers to a response from the focus group, specifically from student 1.

The analysis was conducted through basic thematic coding, where the main ideas were identified and grouped into categories inductively constructed from the responses and then contrasted with previous studies to ensure coherence and interpretative fidelity. The exercise enabled comparison and complementation of the quantitative findings with a more contextual and meaningful perspective from the students themselves.

2.5. Ethical considerations

All participants signed an informed consent form before participating in the study. To ensure confidentiality and anonymity, all personal information was coded in a manner that prevented participants from being identified.

3. Results

3.1. Student perceptions of the FL model

The findings show that students perceive the FL model as a strategy that fosters participation, influences their attitudes toward learning, and has an impact on emotional aspects.

Participation in preparation for learning

Students spent an average of 83 minutes studying the material before each class, with a range of 10 to 180 minutes (SD = 61.48). Regarding video viewing, the average time was 59 minutes, although the maximum duration of the videos provided was 24 minutes. Additionally, students reported that they needed to view the videos on average 2.33 times to thoroughly assimilate the content. Table 2 presents the descriptive statistics on study time

Table 2: Student participation in the LF
Source: Own elaboration.

Study time	N	Min.	Max.	Media	SD
How many minutes do you study outside of class each lesson provided by the teacher?	18	10	180	83,06	61,48
How long does it take you to watch the videos related to each lesson?	18	10	120	59,17	36,95
How many times do you have to watch a video until you assimilate the content?	18	2	3	2,33	0,48

Attitudes towards learning with the FL model

Variables such as commitment to learning and satisfaction with the design of the material were considered as attitudes toward the FL model. A commitment to learning was reflected in the fact that 100% of the students expressed the need to delve deeper into a topic before feeling satisfied with their understanding. However, only 44.4% attended class with specific questions, while 38.9% limited their study to the material taught in class. In addition, 27.8% prioritized memorizing key points over understanding the content, and a similar percentage considered that the best strategy for passing an exam was to remember answers to possible questions. Table 3 presents the results of learning engagement.

Table 3: Students' perceived commitment to learning
Source: Own elaboration.

Commitment to learning	No.	%
I have to do more work on a topic in order to form my own conclusions before I am satisfied.	18	100
My goal is to pass the course while making as little effort as possible.	2	11,1
I seriously study only what is given in the classroom.	7	38,9
Memorizing key points helps me get a better grade rather than trying to understand them.	5	27,8
I think the best way to pass an exam is to try to remember the answers to possible questions.	5	27,8
I have been spending a lot of my free time trying to find more information on interesting topics that have been discussed in the different classes.	3	16,7
The materials and videos provided by the teacher are not enough, so I have to look for more information about it.	3	16,7
I come to class with questions that I want answered.	8	44,4
I consider that it is not useful for me to study in depth topics that have not been covered in class.	1	5,6

Student satisfaction with the material design

94.4% of the students expressed satisfaction with the course content, while 66.7% rated the learning experience with the FL model positively. Regarding the integration of multimedia resources, 61.1% showed satisfaction, and 44.4% rated the formats and structure of the material positively. Table 4 shows the percentage of student satisfaction with the design of the material offered in the course.

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Table 4: Student satisfaction with the material design
Source: Own elaboration.

Satisfaction with material design	No.	%
I am satisfied with the contents and topics covered in the study material.	17	94,4
I am satisfied with the formats and structure of the study material.	8	44,4
I am satisfied with the integration of the multimedia resources provided.	11	61,1
I am satisfied with this new learning experience	12	66,7

3.2. Learning experience and emotional aspects

This section presents an analysis of responses to three open-ended questions regarding the learning experience, concerns encountered during the process, and changes in attitude following the implementation of the FL model.

Enjoy the learning experience

Of the 18 participants, three did not respond, and one did not enjoy the experience. Respondents expressed that they enjoyed the learning experience due to the use of technological resources (C.C1.11 Presentation of videos of professors) and that they were able to develop informational skills (C.C1.2 How to research and how to search for scientific articles correctly). It is interesting to note that they also stated that they enjoyed the process of elaborating the scientific article outline (C.C1.1: Making the article) and formulating research projects (C.C1.6: Research projects). In the focus group, they highlighted the value of active participation, group work, mutual learning, and increased interest in the subject. The experience motivated them to learn autonomously (Figure 1). Additionally, they emphasized the importance of group affinity and the benefits of collaborative work among groups.

GF.E7: I do like to work in a group, but it also depends on the group you have and the affinity.

GF.E2: or if something we were missing and another group had it, then it also helps us to complement each other's knowledge.

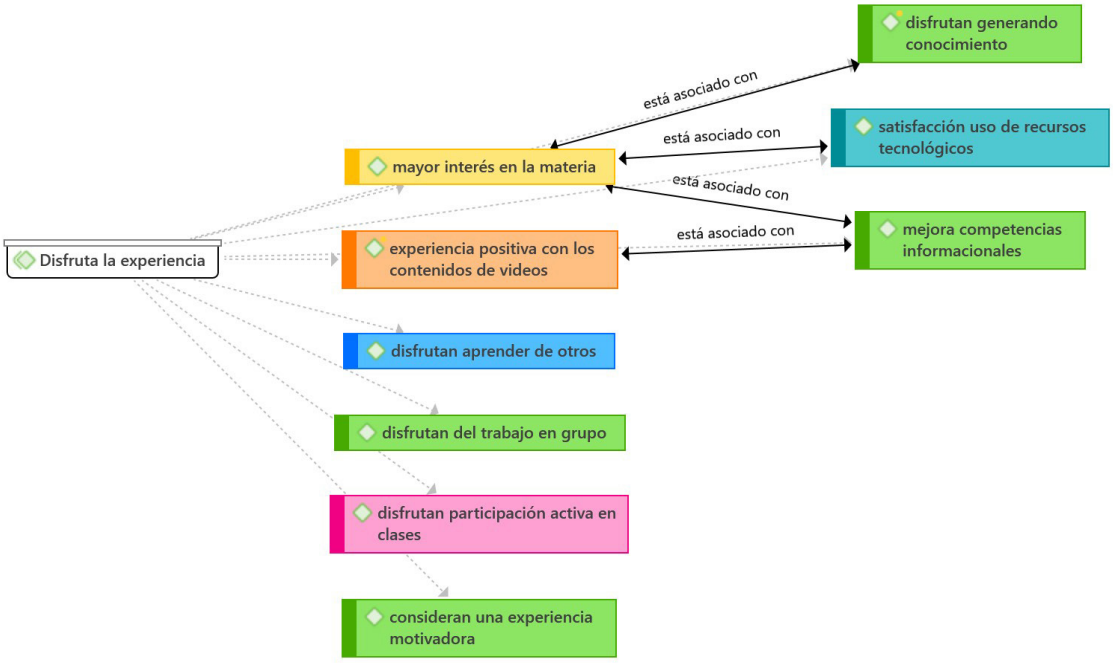

Figure 1: Enjoyment of the FL Learning Experience
Source: Own elaboration.

Difficulties and concerns of the learning experience.

Of the 18 respondents, 27.78% had no difficulties. The remaining 13 had difficulties with comprehending the content and videos. In the focus group, students expressed frustration with the impossibility of asking questions during the viewing of videos and mainly found difficulties with their duration (GF.E7: maximum about 10 minutes.... [interrupts] GF.E3: yes, or eight... it's a lot, GF.E7: aha! Or saying that they have already abused us, 15!) and they mentioned that sometimes they do not finish visualizing them (GF.E7: I do not see, I did not finish seeing), they lose concentration (GF.E4: one gets distracted by anything, so I was also watching [makes a bored gesture] and pausing, because I was about to leave, and I would come back, listen again, I think I was waiting, and from there I would go back, I would go to the patio, so... pause, pause, pause, as not to get bored), they make notes while they pause (GF. E3: I take notes [interrupts] GF.E4: Aha! I write down, I listen to what I am already more or less... I write down, I pause and then again, I write down and that's it, to have a reinforcement), and they pause to understand when they consider that the speaker speaks too fast (GF. E2: because he spoke very fast, we also had to stop). They also expressed concern that they could not access the articles because they were behind a paywall (C.C2.5, requiring a fee to find online articles) (Figure 2).

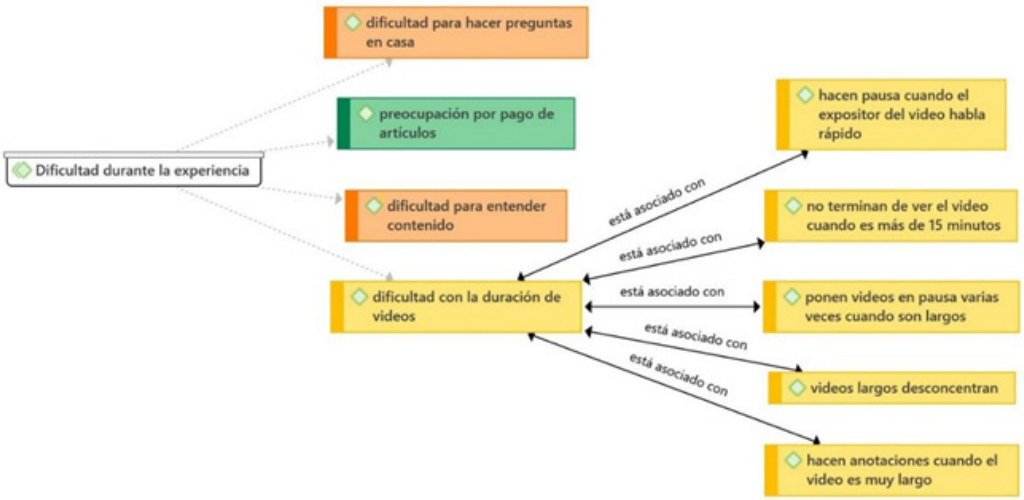

Figure 2: Concerns during the learning experience

Source: Own elaboration.

Four students (22.22%) reported difficulty with the videos. These reported difficulties were probed in the focus group. These discussions led to suggestions for improving FL implementation (Figure 3).

Students mentioned that the videos were handy for learning through tutorials that explain how to do something. For example, bibliographic searches and bibliographic managers (GF.E6: For instance, how to use Zotero, PubMed, etc.). They considered the content of the videos to be adequate. However, they expressed that it would be even better if they were accompanied by examples (GF.E2: I say, the content is acceptable, but it could be that after the video or during the video, an example is explained [interrupts] GF.E7: a hypothesis, C.G1: More examples from daily practice). They also indicated that the duration of the videos should be between 8 and 10 minutes (GF.E7: maximum about 10 minutes.... [interrupts] GF.E3: yes, or eight... it is a lot). The students relate the duration and quality of the videos to the boredom they feel when watching them (C.G1). Perhaps in terms of the videos, consider making them more didactic, as the ones provided were boring and monotonous; look for dynamic videos. They also prefer videos with concrete content and that are explained through figures or images (GF.E1: that is, that they give

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us videos, but those videos where... they make some maps, that is, of this... this, a summary [interrupts] GF.E2: of course the most important thing), preferably that they are professional (GF. E2: there is a page on the YouTube channel, I think it is Education, but it is like that in video, but no person is shown, but only spoken and they make squares).

Change regarding attitudes towards the learning experience with FL

Four students did not respond, and two indicated that there was no change. Of the remaining 12, several categories were identified in the analysis (Figure 4): greater interest in the subject (C.C3.13: The subject has made me search for information on my own, look for topics of interest and find them), use of technological resources (C.C3.4: Easier to use bibliographic managers), improve information competencies (C.C1.2: Yes, you know how to research and how to search for scientific articles correctly), seek to learn other topics through videos (C.C3.17: I am interested in searching for articles on different websites) and change in the way of learning (C.C3.2: I think that now instead of trying to memorize certain things, I am more concerned about the logic of how they work and thus have more knowledge without forgetting later what I have learned) (Figure 4).

Figure 3: Criteria for video selection

Source: Own elaboration.

Figure 4: Change in attitudes towards the learning experience

Source: Own elaboration.

Student recommendations for implementing the LF

Based on the participant's responses to the open-ended questions in the questionnaire and the focus group, recommendations were generated for two aspects of implementing the LF.

Suggestions for learning preparation

According to the learning experience with FL, participants prefer to select videos of 8 to 10 minutes in length, featuring concise and dynamic examples, preferably tutorials (Figure 4). Long videos can distract students, requiring them to repeat or pause to take notes (GF.E4:

One gets distracted by anything, so I was also watching and pausing...). They expressed that they had a positive experience with the videos, which provided relevant content for the subject (C.A4.3: How important is the literature review in conducting a research project). They also consider that the videos help reinforce and clarify the topics (C.A4.2: The videos helped me since I was able to reinforce the knowledge given in class and learn better) and support their learning and review process (C.A4.15: You learn more through repetition). Some students mentioned the usefulness of the technological resources used in the course, specifically the programs for quoting (C.A4.5: The programs for quoting) (Figure 5).

Figure 5: Suggestions for preparing for learning

Source: Own elaboration.

Suggestions for learning support

To explore students' perceptions of FL design and the use of digital technologies, the focus group inquired about their interaction with the platform and preferences for digital resources (Figure 6). Participants expressed satisfaction with Moodle, highlighting its ease of use. Some had previous experience with this tool (GF.E4: I think that more than anything when we came to class, it was a problem with the machines, and that is why it did not load or did not come up on some machines, but, in itself, I think that the platform was easy for everyone and something simple to learn...).

Regarding preferred resources before class, students mentioned that they prefer watching videos rather than reading texts (GF.E4: I prefer watching videos to reading a PDF, GF.E6: It is just that PDFs are too long...[laughs]).

The participants indicated that the use of digital technology enables them to integrate the practical aspects of the subject (C.B14.4: The use of technological methods contributes to integrating practice more effectively). However, in the focus group, the students reported difficulty with the video resource, which is mainly due to the lack of time due to the academic workload and university schedules (GF.E7: ... It is that at home it is more complicated because that is what many of the teachers do not understand that we come home to do homework, work, surveys, then... it is not that we have so much free time, that is the problem, GF.E6: besides, it is not just one subject, the 7 (emphasizes 7) subjects accumulate with the tests, with the work, with the lessons... besides, one also has to sleep, has to eat..., GF.E6: ...if we had classes only in the morning, whatever, but, many times we had classes until seven at night, all day at the university and then do more work and homework..., GF.E7: and on Saturdays we also had electives).

Likewise, in the focus group, students highlighted that it is difficult for them to understand the contents when new material is presented to them only through videos. Students expressed that videos are more useful to reinforce learning since they cannot ask questions while watching them (GF.E4: I know that maybe the next day one goes and asks, this or this, but it is not the same because at that moment, one already talks to the teacher, tells him/her that I did not understand, how can I do? Then you understand that moment, GF.E1: in our case, it could not be applied in all subjects because, for example, in physiopathology, we see disease and it is quiet... and we cannot learn only through a video, we can see the disease and to reinforce the video).

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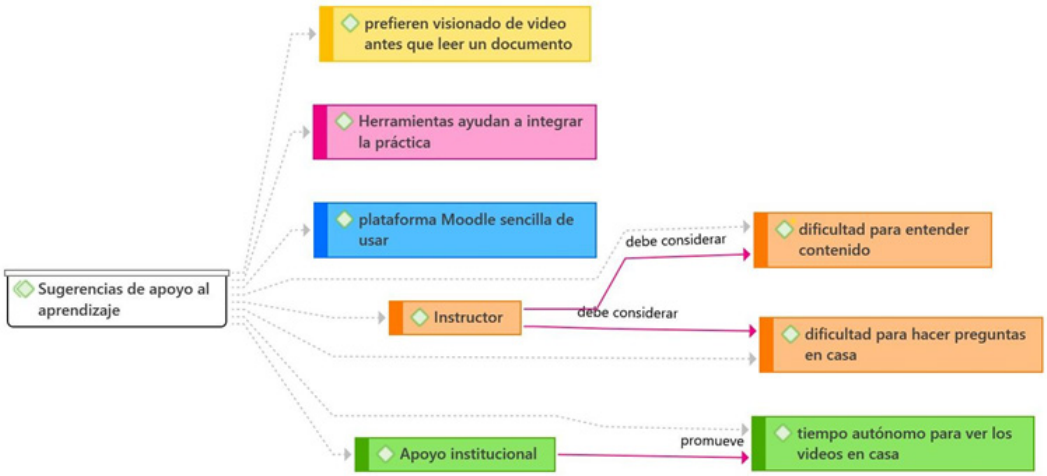

Figure 6: Suggestions for learning support

Source: Own elaboration.

4. Discussion

This study examined students' perceptions of implementing the FL model in a university subject in Ecuador, revealing a generally positive assessment of the approach, albeit accompanied by significant challenges.

Benefits of flipped learning

Participants recognized multiple benefits of FL, such as the flexibility to learn at their own pace and the usefulness of videos in reinforcing and clarifying content, which aligns with previous research (Lee, 2023). Most students agreed that FL constitutes a positive teaching approach and expressed their enjoyment of the learning experience thanks to the use of technological resources, especially the Moodle platform (Díaz Arévalo et al., 2021), as well as the development of research projects, which aligns with findings from Awidi and Paynter, (2019).

Likewise, the perceived usefulness of the FL influenced their adoption and the development of autonomous learning strategies, such as note-taking and group work (Alyoussef, 2023). In this context, students also recognized the benefits of strengthening autonomous research skills, self-efficacy, and motivation (Martinez-Clares et al., 2024). As Li et al. (2021) point out, active interaction, autonomy, and self-regulation are key elements in the context of FL, essential competencies for lifelong learning, which has become increasingly crucial in a world where technology and job demands are rapidly evolving.

Challenges encountered

Among the challenges identified, the lack of engagement of some students stands out, evidenced by the low proportion who attended classes with prepared questions, suggesting a possible disconnect during the pre-preparation phase. In addition, difficulty in formulating questions during video viewing was noted as a significant barrier, a concern also reported by 67.65% of students in the study by Han et al. (2023).

The implementation of repeatable audiovisual resources in FL environments highlights an

inherent tension between their benefits and risks: while these resources facilitate content assimilation (Choi et al., 2015; Gnaur & Hüttel, 2014), they can also increase the perception of workload among students (Lee et al., 2017; Xiu et al., 2019). Recognizing this tension is crucial for designing strategies that promote comprehension without compromising academic well-being.

Practical recommendations

Video duration and quality emerge as critical factors for effective learning in the FL model. Students expressed a preference for short-duration videos, between 8 and 10 minutes, which is consistent with previous studies suggesting an optimal duration of 10 to 15 minutes (Choi et al., 2015) or even up to 20 minutes (Bordes et al., 2021). Likewise, the quality of the audiovisual content was determinant in facilitating comprehension, which highlights the need to select or produce high-quality materials, as recommended by Lee (2023) and Pinos-Vélez et al. (2020). The difficulty reported in finding videos that fit specific learning needs underscores the importance of content curation by teachers.

5. Conclusions

- This study provides empirical evidence on the implementation of the FL model in a public university in Ecuador from the Student's perspective. Based on a mixed methodological approach, both benefits and challenges regarding the implementation of FL were identified. The findings allow us to reflect on the potential of FL to innovate educational practices and contribute to the development of competencies for lifelong learning. Based on the objectives set out, the following conclusions stand out:

- Flipped Learning as an Effective Strategy: The study's results show that the FL model is positively valued by students, primarily for its ability to foster autonomy, active participation, and continuous knowledge construction. These elements are considered essential for developing key competencies in lifelong learning.

- Critical factors for its implementation: The effectiveness of the FL depends largely on rigorous planning, which entails selecting high-quality digital materials, designing engaging face-to-face activities, and adapting the model to the Student's educational and sociocultural contexts.

- Convergence with lifelong learning: The FL model aligns with the principles of lifelong learning by promoting flexibility, personalization, and metacognition. These factors enable students to manage their learning and acquire skills relevant to their professional development.

- Future lines of research: It is recommended that the impact of FL on long-term academic performance, knowledge retention, and motivation be explored. It is also necessary to analyze variables such as gender, age, and digital competence in order to design inclusive strategies adapted to diverse student populations.

6. Limitations

This study has certain limitations that should be taken into account when interpreting the results. First, the sample size was relatively small (n = 18 for the questionnaire, n = 7 for the focus group), which limits the generalizability of the findings to other populations or educational contexts. In addition, the predominantly female composition of the sample could introduce a gender bias that influences the conclusions, as no male students chose to participate in the focus group. Additionally, the study was developed within a specific context research methodology course at an Ecuadorian public university, which limits the extrapolation of the results to other academic settings. Another relevant consideration is the novelty of the FL model for both students and teachers, a factor that may have influenced their perceptions and experiences. Finally, although the questionnaire used underwent a pilot test, the absence of a more exhaustive validation could affect the robustness of the quantitative data obtained.

7. Acknowledgments

The author, Cristina Valls, is a lecturer in the Serra Hunter program.

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