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Flipped classroom as a learning strategy for university students: A systematic review

Aula invertida como estrategia de aprendizaje de estudiantes universitarios: una revisión sistemática

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Abstract

The flipped classroom model has gained relevance in higher education as a pedagogical strategy that promotes active and autonomous learning among university students. Therefore, this study analyzed its implications for improving learning in university contexts through a systematic review, guided by the PRISMA guidelines. The search was conducted in Scopus and SciELO using the descriptors “flipped classroom,” “learning,” and “flipped learning,” combined with the Boolean operator AND. Scientific articles published between 2020 and 2025 were included, applying predefined inclusion and exclusion criteria. Of the studies identified, 21 met the eligibility criteria and were analyzed. The results show that the flipped classroom improves academic performance, increases student motivation and active participation, and fosters self-regulated learning and academic satisfaction. In conclusion, it is positioned as an effective and innovative strategy for optimizing teaching and learning processes in higher education, especially when integrated with active methodologies and educational technologies.

Keywords: flipped classroom, university learning, higher education.

Resumen

El modelo de aula invertida ha ganado relevancia en la educación superior como estrategia pedagógica que promueve el aprendizaje activo y autónomo en estudiantes universitarios. De allí que, este estudio analizó sus implicancias para mejorar el aprendizaje en contextos universitarios mediante una revisión sistemática, guiada por los lineamientos PRISMA. La búsqueda se realizó en Scopus y SciELO con los descriptores “aula invertida”, “aprendizaje” y “*flipped learning*”, combinados mediante el operador booleano *AND*. Se incluyeron artículos científicos publicados entre 2020 y 2025, aplicando criterios de inclusión y exclusión predefinidos. De los estudios identificados, 21 cumplieron los criterios de elegibilidad y fueron analizados. Los resultados muestran que el aula invertida mejora el rendimiento académico, incrementa la motivación y participación activa de los estudiantes, y fomenta el aprendizaje autorregulado y la satisfacción académica. En conclusión, se posiciona como una estrategia eficaz e innovadora para optimizar los procesos de enseñanza-aprendizaje en la educación superior, especialmente al integrarse con metodologías activas y tecnologías educativas.

Palabras clave: aula invertida, aprendizaje universitario, educación superior.

Introduction

The flipped classroom approach has gained increasing prominence in higher education as a pedagogical strategy tied to the use of educational technologies and active methodologies. Various studies indicate that this model responds to the need to move beyond the limitations of traditional lecture-based instruction, promoting more dynamic, student-centered learning environments (Divjak et al., 2022; Yıldız et al., 2022). In this context, the pedagogical use of technology becomes a key resource for increasing motivation, participation, and academic engagement among university students (Hwang, 2024).

From a methodological standpoint, the innovative character of the flipped classroom lies in the reorganization of learning time and space. In the traditional model, theoretical exposition occupies face-to-face time, relegating practical activities and question-solving to autonomous work outside the classroom. This dynamic tends to place the student in a passive role. By contrast, the flipped classroom reverses this logic, allowing theoretical content to be addressed beforehand through digital resources, while class time is devoted to collaborative activities and tasks requiring higher-order cognitive engagement (Colomo-Magaña et al., 2020).

The incorporation of technological resources, such as educational videos and digital platforms, enables students to manage their own learning pace while simultaneously fostering the development of technological competencies in both instructors and learners (Huang et al., 2023). Likewise, this model promotes ongoing interaction, collaborative work, and pedagogical support, all of which strengthen teaching and learning processes in university education (Güler et al., 2023).

The flipped classroom also falls within blended learning approaches, in which asynchronous and face-to-face activities are strategically articulated to enhance autonomous and meaningful learning. In this sense, problem-solving and group work during in-person sessions contribute to the development of higher-order skills (Aghaei et al., 2020). From a sociocultural perspective, the instructor's role proves fundamental, as they act as a learning mediator, providing progressive scaffolding that allows students to gradually develop academic autonomy (Xiao et al., 2018).

Theoretically, the flipped classroom finds support in the constructivist paradigm, which emphasizes active learning and the student's central role in knowledge construction. This approach promotes the integration of prior experiences with new content, favoring deep learning processes, critical thinking, and problem-solving (Sharma, 2018). Consequently, the application of active methodologies grounded in constructivism is associated with improved learning quality and student participation (Astleitner, 2018).

Nevertheless, despite existing theoretical and empirical contributions, further analysis of the implications of the flipped classroom for university learning remains necessary. Within this framework, the research problem guiding this study is: what are the implications of the flipped classroom for improving learning outcomes in university students? Accordingly, the objective of the present study is to analyze the implications of the flipped classroom for enhancing university student learning, based on a systematic review of recent research on the topic.

Methodology

This study was developed under a qualitative approach, as it is oriented toward the comprehension, interpretation, and critical synthesis of existing scientific evidence on the implications of the flipped classroom for university learning. This approach is appropriate when the research interest lies not in the statistical measurement of variables but in the in-depth analysis of conceptual and empirical contributions produced within a specific field of knowledge (Hernández-Sampieri et al., 2018).

Consistent with this approach, a systematic literature review was adopted as the research method, which allows for the rigorous identification, evaluation, and synthesis of relevant available studies, ensuring transparency and replicability in the research process (Tramullas, 2020). Likewise, the systematic review constitutes a valid strategy for consolidating the state of the art and theoretically supporting academic and educational decision-making (Ferreras, 2016).

The study corresponds to descriptive-analytical research, given that it seeks to characterize and analyze the main implications of the flipped classroom model for university student learning, drawing on findings reported in previous studies. The design is observational and cross-sectional, as it analyzes studies published within a specific period, without direct manipulation of variables or longitudinal follow-up of the phenomena under study (Hernández-Sampieri et al., 2018).

To ensure methodological rigor, the review was conducted following the guidelines of the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which establishes clear criteria for the

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identification, selection, eligibility, and inclusion of scientific studies, thereby strengthening the transparency and quality of the review process (Page et al., 2021).

The procedure was structured into four fundamental phases, consistent with methodological proposals for systematic reviews in the educational field (Codina, 2018):

Phase 1. Information search

An exhaustive search was carried out in the Scopus and SciELO databases, selected for their academic recognition and contribution to the dissemination of high-quality scientific research. The descriptors "aula invertida" AND "aprendizaje," as well as their English equivalent "flipped learning," were employed as keywords, using the Boolean operator AND to ensure result precision. The temporal range was set between 2020 and 2025, considering publications in both Spanish and English.

Phase 2. Evaluation and selection of studies

In this stage, the titles and abstracts of the identified articles were reviewed to determine their relevance to the study objective. Inclusion criteria encompassed original scientific articles and systematic reviews published in journals indexed in Scopus and SciELO, with full-text access and a focus on higher education. Articles with restricted access, theses, conference proceedings, and studies that did not directly address the flipped classroom and its relationship with university learning were excluded.

Phase 3. Information analysis

The selected studies underwent a thorough full-text reading to extract relevant information pertaining to the educational context, methodological approach, study population, and main findings. Documentary review was used as the data collection technique, supported by an analysis matrix that allowed for the systematic organization of extracted information, facilitating comparison and critical analysis of the findings (Codina, 2018).

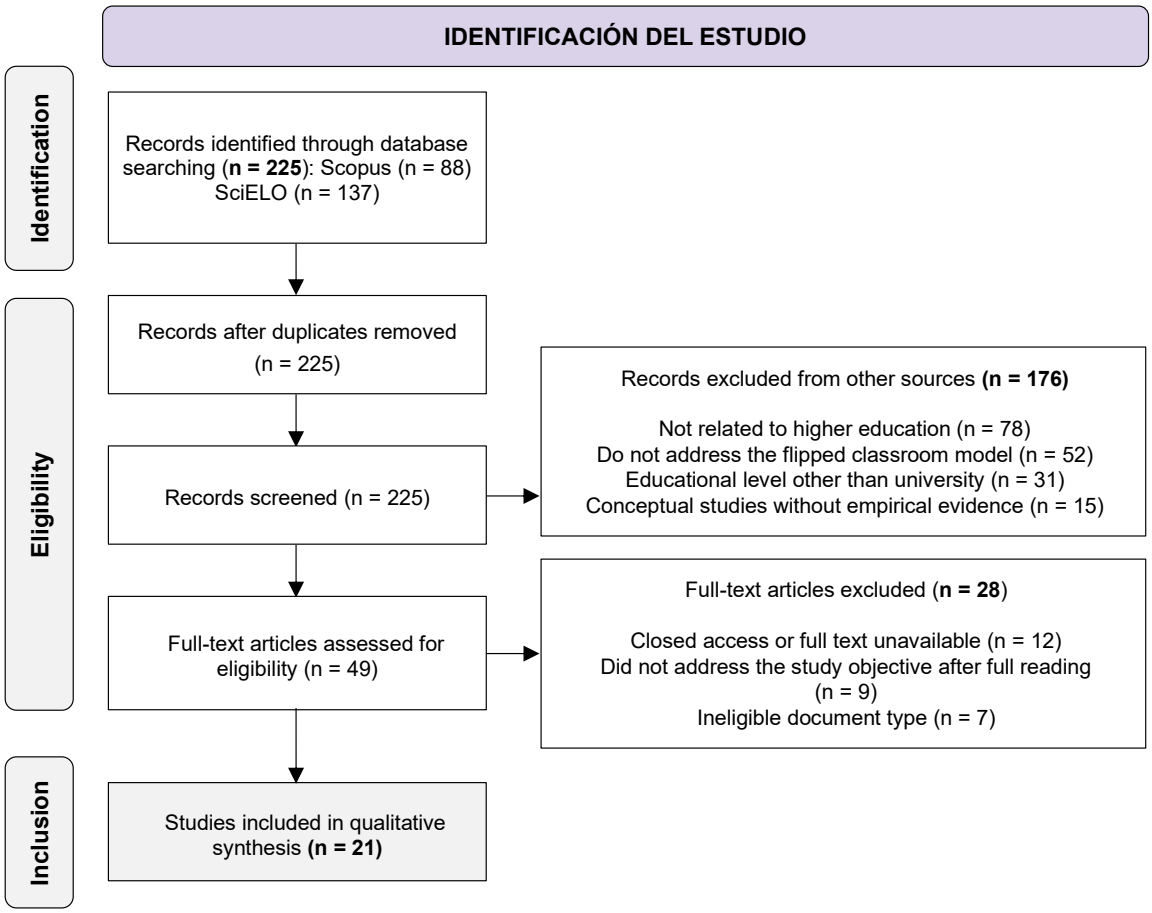
Phase 4. Synthesis of results

Finally, an integrative synthesis of the findings was conducted, identifying trends, convergences, and divergences among the analyzed studies. This process enabled the formulation of well-founded conclusions regarding the implications of the flipped classroom for university learning, consistent with the stated objective and the principles of qualitative research (Tramullas, 2020).

As a result of the initial search process, 225 scientific articles were identified, of which 88 corresponded to the Scopus database and 137 to SciELO. Following the rigorous application of inclusion and exclusion criteria, a final sample of 21 articles was selected, comprising 18 studies indexed in Scopus and 3 in SciELO, which were deemed relevant and sufficient for analysis. The selection process is represented graphically in Figure 1, following the PRISMA flow diagram.

The study respected the ethical principles of scientific research, ensuring responsible use of information, proper citation of sources, and acknowledgment of the intellectual authorship of the works analyzed. Among the study's limitations, it is recognized that the results depend on the availability and methodological quality of the selected articles, as well as the databases consulted, which may restrict the generalizability of the findings.

Figure 1
PRISMA flow diagram



Results and discussion

Table 1
List of studies

Authors	Title	Year	Findings
Alyoussef	Acceptance of a flipped classroom to improve university students' learning: An empirical study on the TAM model and the Unified Theory of Acceptance and Use of Technology	2022	The study provides evidence that acceptance of the flipped classroom in higher education is strongly influenced by attitudes toward blended learning and intention to use the model. Students perceive the approach as useful and compatible with digital technology use, which favors its adoption and pedagogical sustainability.
Colomo-Magaña et al.	University students' perception of the usefulness of the flipped classroom methodology	2020	Findings indicate that the flipped classroom optimizes class time and strengthens active, student-centered methodologies. It also promotes the strategic use of technological resources and facilitates personalized learning in university contexts.

Naing et al.	The effects of flipped classrooms to improve learning outcomes in undergraduate health professional education: A systematic review	2023	The systematic review concludes that the flipped classroom improves academic performance and student satisfaction in undergraduate health programs. The model fosters more active participation and deeper learning compared to traditional approaches.
Faro et al.	Improving student engagement with a flipped classroom instruction model in Ethiopian higher education institutions	2024	Significant improvement was observed in the behavioral, emotional, and cognitive dimensions of student engagement. The flipped classroom creates active learning environments that strengthen interaction and academic commitment.
Bashir & Hamid	Pharmacy students' perception of learning and engagement in a flipped classroom of a physiology course	2021	Findings indicate that the flipped classroom contributes to active learning and greater student participation. Students positively value the hybrid approach as an effective tool for enhancing the educational process.
Khlaisang et al.	Acceptance of a flipped smart application for learning among Thai university students	2021	Results show that intention to use the flipped classroom depends on factors associated with technology acceptance. Perceived usefulness and ease of use directly influence adoption of the model.
Gondal et al.	Impact of the flipped classroom on students' academic performance and satisfaction in pharmacy education	2024	The study reports improvements in academic performance and student satisfaction. The flipped classroom consolidates as an effective pedagogical approach for promoting meaningful learning.
Zhong et al.	Towards the pivotal factors for the influence of flipped classroom on students' self-regulated learning and EFL speaking competence	2024	Findings indicate that flipped classroom design factors influence self-regulated learning and oral competence. Self-confidence and instructional materials emerge as key determinants.
Kuo et al.	Student learning effect using flipped classroom with WPSA learning mode	2022	The study notes that the effectiveness of the flipped classroom depends on prior student engagement. Lack of pre-class preparation reduces the expected impact of the model.
Huang et al.	Effects of artificial intelligence-enabled personalized recommendations on learners' engagement and outcomes in a flipped classroom	2023	Evidence shows that integration of artificial intelligence improves academic performance, interaction, and collective knowledge construction in flipped classrooms.
Baig & Yadegaridehkordi	Flipped classroom in higher education: A systematic literature review and research challenges	2023	The review confirms benefits of the flipped classroom for participation and learning but identifies challenges related to instructional design and teacher preparation.
Hwang	Impacts of backgrounds on students' self-regulated learning in a flipped classroom setting	2024	Results demonstrate improvements in self-regulation, particularly in time management, goal setting, and learning strategies.

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Karaoğlan	An investigation into the role of course satisfaction on students' engagement and motivation in a mobile-assisted flipped classroom	2021	Student satisfaction is identified as a significant predictor of engagement and motivation in mobile flipped classroom contexts.
Yalcinkaya et al.	A hybrid-flipped classroom approach: students' perception and performance assessment	2023	An increase in academic success rates and positive student perceptions of the hybrid model were observed.
Chen & Hsu	Do flipped learning and adaptive instruction improve student learning outcomes?	2022	Findings indicate that adaptive teaching complements the limitations of the flipped classroom, enhancing learning effectiveness.
Barahona et al.	Transforming the learning experience in pre-service teacher training using the flipped classroom	2022	The flipped classroom improves perceptions of technological competencies and the pedagogical use of technology among future teachers.
Latorre-Cosculluela et al.	Facilitating self-efficacy in university students: an interactive approach with Flipped Classroom	2021	Evidence shows that academic self-efficacy improves according to implementation modality and predisposition toward innovation.
Adhami & Taghizadeh	Integrating inquiry-based learning and computer-supported collaborative learning into flipped classroom	2024	Results demonstrate improvements in academic writing, motivation, and participation through collaborative learning.
Chicaiza	Flipped classroom model for English vocabulary learning	2023	The study concludes that the flipped classroom significantly improves vocabulary learning in university students.
Donato	Levels of satisfaction in flipped classroom implementation through virtual education	2023	Student satisfaction is reported in terms of autonomy, collaborative work, and flipped classroom management.
Strelan et al.	The flipped classroom: A meta-analysis of effects on student performance	2020	The meta-analysis provides evidence of moderate positive effects of the flipped classroom on academic performance in higher education.

Importance of the flipped classroom for improving university learning

Recent scientific evidence confirms that the flipped classroom has consolidated as an effective pedagogical strategy in higher education, primarily due to its capacity to integrate digital technologies and promote an active student role. Acceptance of the model is associated with positive attitudes toward blended learning and the perception of technological usefulness, factors that are determinant for institutional adoption (Alyoussef, 2022). In digitally mediated educational environments, this methodology optimizes classroom time, favors personalized learning, and strengthens student autonomy (Colomo-Magaña et al., 2020).

From an operational perspective, the flipped classroom reorganizes teaching time, shifting content delivery outside the classroom and allocating face-to-face space to collaborative and guided activities. This inversion of the didactic process has demonstrated positive effects on academic performance and student satisfaction, particularly in university health programs (Naing et al., 2023). Likewise, significant increases in behavioral, cognitive, and emotional participation have been observed when the model is implemented in a structured manner (Faro et al., 2024), reinforcing active learning (Bashir & Hamid, 2024).

Studies also highlight the role of technology acceptance and the use of smart applications as key variables for successful flipped classroom implementation, particularly when theoretical models such as TAM are extended (Khlaisang et al., 2021). Consistently, quasi-experimental research confirms simultaneous improvements in academic performance and student satisfaction in specialized university contexts, such as pharmacy and professional education (Gondal et al., 2024).

Regarding the development of transversal competencies, the flipped classroom promotes self-regulated learning, self-confidence, and specific skills such as oral competence in a foreign language, provided coherence exists among instructional design, materials, and quality of teacher guidance (Zhong et al., 2024). Nevertheless, some studies caution that the model's effectiveness depends on student commitment to pre-class preparation and the availability of adequate pedagogical supports (Kuo et al., 2022). In this regard, the incorporation of artificial intelligence tools and personalized recommendations enhances engagement, motivation, and learning outcomes (Huang et al., 2023).

Overall, evidence synthesized in systematic reviews and meta-analyses confirms that the flipped classroom generates moderate positive effects on university academic performance, consolidating its empirical validity as a pedagogical approach in higher education (Baig & Yadegaridehkordi, 2023; Strelan et al., 2020).

Implementation strategies of the flipped classroom for improving university learning

The implementation strategies of the flipped classroom directly influence its effectiveness. Various studies highlight that the model positively impacts self-regulated learning skills, such as goal setting, time management, and academic help-seeking (Hwang, 2024). Likewise, student satisfaction, particularly in dimensions such as usability, communication, and interaction, acts as a predictor of engagement and motivation in flipped classroom environments mediated by mobile technologies (Karaoğlan, 2021).

Hybrid modalities, which combine face-to-face sessions, virtual sessions, and asynchronous recordings, have shown sustained increases in academic success rates and positive student perceptions (Yalcinkaya et al., 2023). However, it is also recognized that content standardization may limit attention to individual needs, a situation that can be mitigated through adaptive teaching strategies (Chen & Hsu, 2022).

In teacher education, the flipped classroom facilitates the development of digital competencies and transforms the perception of pre-service teachers regarding the pedagogical use of technology (Barahona et al., 2022). Similarly, it has been confirmed that implementation modality and predisposition toward innovation influence self-efficacy and academic performance in university settings (Latorre-Cosculluela et al., 2021). Finally, integrated approaches that combine the flipped classroom with inquiry-based learning and digital collaboration improve specific skills such as academic writing, English vocabulary, and overall student satisfaction (Adhami & Taghizadeh, 2024; Chicaiza, 2023; Donato, 2023).

Conclusions

Based on the stated objective and the analyzed evidence, it is concluded that the flipped classroom model consolidates as a pertinent and effective pedagogical strategy in higher education. The reviewed studies coincide in that this methodology favors active student participation, reorganizes face-to-face time more efficiently, and promotes a leading role for the student in their own learning process. These elements help to explain why the flipped classroom has been widely adopted across different university contexts and fields of knowledge.

Likewise, the findings show that implementation of the flipped classroom consistently contributes to improved academic performance and higher levels of student satisfaction. Ongoing interaction with digital resources, collaborative work, and teacher accompaniment during in-person activities generate more dynamic, reflective, and problem-oriented learning environments. This approach not only impacts academic outcomes but also the development of transversal skills such as autonomy, self-regulation, and motivation for learning.

Nevertheless, the review also reveals that the effectiveness of the flipped classroom depends on specific conditions, such as the quality of instructional design, access to adequate technological resources, and the pedagogical preparation of faculty. In this sense, questions persist regarding optimal implementation criteria, adaptation of the model to different student profiles, and its long-term sustainability across diverse educational settings. These limitations open future research lines oriented toward deepening hybrid models, adaptive approaches, and strategies that maximize the impact of the flipped classroom in higher education.

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