

Challenges and Opportunities of Active Learning Strategies and Complex Thinking to Improve the Quality of Higher Education in Latin America in the 21st Century

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Abstract

The quality of higher education in Latin America faces challenges that require a profound transformation in its pedagogical approaches. This article explores the challenges and opportunities offered by active learning strategies and complex thinking to improve higher education in the region. Through a review of the recent literature, it is analyzed how these strategies promote the development of critical, creative and collaborative skills, necessary in the twenty-first century. In addition, the structural and cultural barriers that limit their effective implementation are examined and opportunities for further integration of these pedagogical approaches are identified.

Keywords: Active learning, complex thinking, higher education, Latin America, educational quality.

1. Introduction

In recent decades, higher education in Latin America has been immersed in a process of transformation in the face of the demands of an increasingly competitive, interconnected and dynamic global environment. However, one of the greatest challenges facing the region is to improve the quality of its education system to prepare students with the necessary skills to face the challenges of the twenty-first century (Ruiz, Hernández, & Villalobos, 2020). The reliance on traditional teaching methods, focused on the passive transmission of knowledge, has limited the development of critical and creative skills in students, which makes it difficult for them to adapt to a labor market that demands complex thinking and multidisciplinary problem-solving skills (Freire & Duarte, 2022).

Active learning, a methodology that places the student at the center of the learning process, has been proposed as one of the most effective strategies to address this challenge. Through activities that encourage reflection, analysis, and practical application of knowledge, active learning not only promotes greater student engagement, but also contributes to the development of skills such

as collaboration and critical thinking (González & Rodríguez, 2020). Despite its recognized benefits, the implementation of this approach faces significant barriers in the region, such as lack of teacher training, scarcity of technological resources, and institutional resistance to change (Silva & Mendoza, 2021).

On the other hand, complex thinking, a concept developed by Edgar Morin, offers a complementary perspective to active learning by highlighting the importance of understanding phenomena in a comprehensive and connected way (Morin, 2020). This approach, which challenges the fragmentation of knowledge characteristic of traditional education systems, is particularly relevant in a world characterised by complexity and the interdependence of global problems. In this sense, the adoption of complex thinking in higher education allows students to develop a more holistic vision, providing them with the necessary tools to address problems that transcend individual disciplines (Martínez & Paredes, 2021).

In the context of Latin America, the integration of active learning strategies and complex thinking faces a number of institutional and cultural challenges. Despite the advances, many universities continue to operate under rigid paradigms that do not favor pedagogical innovation, which limits the adoption of approaches that promote a more critical and creative education (García & Torres, 2022). However, there are also significant opportunities for the development of these strategies, especially in countries that are investing in the modernization of their education systems and the training of their teachers (UNESCO, 2021).

This article aims to analyze in depth the main challenges and opportunities associated with the implementation of active learning and complex thinking in higher education institutions in Latin America. Through a review of the most recent literature, the barriers that hinder its adoption will be addressed and potential strategies to overcome these obstacles will be identified, in order to contribute to a significant improvement in the quality of higher education in the region.

2. Theoretical Framework

The theoretical framework of this work focuses on two key approaches to the improvement of higher education in Latin America: active learning and complex thinking. Both approaches stand out for their ability to foster competencies necessary for the twenty-first century, such as critical thinking, creativity, problem-solving, and collaboration (González & Rodríguez, 2020). Each of these approaches and their implications in the context of higher education in Latin America is detailed below.

Active Learning

Active learning is a methodology that challenges traditional teaching methods, based on memorization and the passive transmission of information. This pedagogical strategy implies that students assume a leading role in their learning process, which includes activities such as debates, case studies, collaborative projects, and problem-solving in real or simulated environments (Silva & Mendoza, 2021). Active learning encourages active student participation,

promoting critical reflection, analysis, and synthesis of the information acquired (Freire & Duarte, 2022).

In a recent study, García and Torres (2022) showed that active learning significantly improves knowledge retention and the development of practical skills in higher education students in Latin America, particularly in contexts where traditional classes failed to capture students' interest. This is critical in a region where the dropout rate remains high due, in part, to ineffective pedagogical methods (UNESCO, 2021).

Below is a table with the main benefits and challenges of active learning in Latin America according to the literature review:

Benefits of Active Learning	Challenges of Active Learning
It improves critical thinking and problem-solving (González & Rodríguez, 2020)	Institutional resistance to change (Silva & Mendoza, 2021)
It encourages student participation and engagement (Freire & Duarte, 2022)	Lack of adequate teacher training (García & Torres, 2022)
It facilitates long-term knowledge retention (García & Torres, 2022)	Technological limitations in some institutions (UNESCO, 2021)
It promotes collaboration and teamwork (Silva & Mendoza, 2021)	Scarcity of innovative pedagogical resources (Freire & Duarte, 2022)

Complex Thinking

Complex thinking, proposed by Edgar Morin, advocates an integrative and non-fragmented vision of knowledge. This approach is essential in a world where global problems are increasingly interconnected and require multidisciplinary solutions (Morin, 2020). In the educational field, complex thinking invites students to understand phenomena from a holistic perspective, recognizing the interdependence of economic, social, cultural, and ecological factors (Martínez & Paredes, 2021).

In the context of higher education in Latin America, complex thinking is particularly relevant to confront challenges that require a critical and systemic vision, such as climate change, social inequality, and globalization. Universities in the region have begun to implement initiatives based on this approach, although adoption remains uneven (González & Rodríguez, 2020). According to Rodríguez et al. (2021), institutions that have integrated complex thinking into their curricula have observed a greater ability of their students to solve complex problems and adapt to changing work environments.

The following table summarizes the key characteristics of complex thinking and its impact on higher education:

Characteristics of Complex Thinking	Impact on Higher Education
It promotes a global and integrative vision of knowledge (Morin, 2020)	Greater capacity to address global and multidisciplinary problems (Martínez & Paredes, 2021)
It promotes the analysis of complex and interconnected systems (Martínez & Paredes, 2021)	Better preparation to solve problems in changing contexts (Rodríguez et al., 2021)
It integrates multiple perspectives and disciplines (González & Rodríguez, 2020)	Development of key competencies such as creativity and critical thinking (Freire & Duarte, 2022)

Characteristics of Complex Thinking	Impact on Higher Education
It challenges the fragmentation of knowledge (Morin, 2020)	Bridging the gap between theory and practice (García & Torres, 2022)

Convergence between Active Learning and Complex Thinking

The combination of active learning with complex thinking represents a powerful pedagogical tool for higher education institutions in Latin America. While active learning focuses on the development of practical and participatory competencies, complex thinking complements this approach by fostering a deeper and more critical understanding of global and multidisciplinary problems (Silva & Mendoza, 2021). Together, these approaches provide students with the tools they need to face an increasingly uncertain and demanding world of work (García & Torres, 2022).

In fact, recent studies have shown that students who participate in learning environments that integrate these approaches are more likely to develop advanced cognitive skills, such as the ability to perform critical analysis and synthesis of complex information (Freire & Duarte, 2022). In addition, the use of active methodologies combined with complex thinking has been shown to be effective in promoting more meaningful learning, which transcends the mere acquisition of theoretical knowledge (Rodríguez et al., 2021).

3. Methodology

The methodology used in this study is qualitative, based on a systematic review of recent literature (2019-2023) on active learning strategies and complex thinking in Latin American higher education. This methodological approach allows us to identify common patterns, challenges and opportunities in the implementation of these strategies, providing a comprehensive vision of their impact on educational quality.

Design of the Review

An exhaustive search of academic articles was carried out in specialized databases, such as Scopus, Google Scholar and ERIC. The inclusion criteria for the studies reviewed were:

- Publications between 2019 and 2023.
- Focus on Higher Education in Latin America.
- Studies that addressed the impact of active learning strategies or complex thinking.
- Peer-reviewed articles and empirical studies.

A summary of the inclusion and exclusion criteria used in the systematic review is presented below:

Inclusion Criteria	Exclusion Criteria
Studies published between 2019-2023	Studies prior to 2019

Inclusion Criteria	Exclusion Criteria
Studies focused on higher education in Latin America	Studies focused on other educational levels or regions outside Latin America
Articles that address active learning or complex thinking	Articles that do not focus on specific pedagogical strategies
Peer-reviewed publications or reports from recognized bodies	Non-peer-reviewed or non-academic reports

Study Selection Process

The initial search yielded a total of 150 articles. After applying the inclusion and exclusion criteria, 35 studies were selected for in-depth analysis. This process was carried out in three phases:

1. Initial Search Phase: Keywords such as "active learning", "complex thinking", "higher education", "Latin America", and "educational quality" were used. The search was limited to studies in Spanish, Portuguese and English.
2. Filtering Phase: Selected studies were manually filtered by reviewing titles, abstracts, and keywords. In this phase, duplicate articles and those that did not meet the inclusion criteria were removed.
3. Quality Assessment Phase: The 35 selected studies were evaluated in terms of their relevance, methodological rigor and contributions to the central theme of the study.

The following table shows the selection process for the reviewed articles:

Process Phases	Number of Studies
Initial search	150
After applying inclusion criteria	50
After applying exclusion criteria	35

Data Analysis

The analysis of the data obtained from the selected studies was carried out through thematic coding, which allowed the identification of the main trends and findings in relation to the implementation of active learning and complex thinking in higher education institutions in Latin America (Silva & Mendoza, 2021). The coding was organized around three key categories:

1. Impact on Educational Quality: This category focused on the effects of active learning and complex thinking on the development of critical, creative, and collaborative skills in students.
2. Barriers to Implementation: The main obstacles faced by universities in the region to adopt these strategies were analyzed, including institutional, cultural, and technological factors (García & Torres, 2022).
3. Proposals for Improvement: This category included recommendations based on the best practices observed in the reviewed studies, as well as proposals to overcome the barriers identified (Freire & Duarte, 2022).

Below is a table summarizing the main categories of analysis and the key indicators evaluated:

Analysis Category	Key Indicators
Impact on Educational Quality	Development of critical, creative, and collaborative skills (Silva & Mendoza, 2021)
Barriers to Implementation	Institutional resistance, lack of resources, technological limitations (García & Torres, 2022)
Proposals for Improvement	Teacher training, investment in technology, pedagogical innovation (Freire & Duarte, 2022)

Validity and Reliability

To ensure the validity of the results, several strategies were used, such as source triangulation, which made it possible to corroborate the findings from different studies and perspectives (Rodríguez et al., 2021). In addition, an internal peer review was adopted in which higher education experts reviewed the analysis of the data to ensure consistency and robustness of the conclusions (UNESCO, 2021).

4. Results

The results of this systematic review reveal a number of key findings on the implementation of active learning and complex thinking in higher education in Latin America. In general, a positive impact is observed on the development of critical, collaborative and creative competencies among students, although there are still important barriers that limit their massive implementation in the region.

Impact on Skills Development

Analysis of the studies reviewed shows that both active learning and complex thinking have proven to be effective in promoting essential competencies for the 21st century. According to González and Rodríguez (2020), students who participated in courses with active learning methodologies developed critical and problem-solving skills 45% more than those in traditional courses. This is due to the interactive and participatory nature of these methodologies, which encourage greater student involvement in their learning process.

Likewise, institutions that implemented strategies based on complex thinking reported a 35% increase in students' ability to address interdisciplinary and systemic problems (Freire & Duarte, 2022). This integrative approach allows students to understand phenomena from a global perspective, which is critical to addressing contemporary challenges, such as climate change and social inequality (Martínez & Paredes, 2021).

Below is a table summarizing the impact on competency development in the institutions that applied these methodologies:

Competencies Developed	Reported Increase	Fountain
Critical and problem-solving skills	45% more than in traditional courses	González & Rodríguez (2020)
Ability to address interdisciplinary problems	35% more than in traditional approaches	Freire & Duarte (2022)
Collaborative and teamwork skills	50% more than in traditional methodologies	Silva & Mendoza (2021)

Barriers to Implementation

Despite the observed benefits, the studies also identified a number of barriers that limit the widespread adoption of active learning and complex thinking in Latin American universities. One of the main barriers is institutional resistance to change, especially in universities where traditional pedagogical models are deeply entrenched (García & Torres, 2022). Teachers, in many cases, do not receive the necessary training to implement these methodologies, which makes it difficult to integrate them into the curriculum.

Another significant barrier is the lack of technological resources. Although the use of technologies is a key component of active learning, many institutions in Latin America do not have the appropriate infrastructure to support these pedagogical innovations (UNESCO, 2021). This lack is more pronounced in rural areas or in public universities with limited budgets.

Below is a table summarizing the main barriers identified in the studies reviewed:

Barriers to Implementation	Description	Fountain
Institutional resistance	Traditional pedagogical models, lack of support for innovation	García & Torres (2022)
Lack of teacher training	Teachers not trained to apply active methodologies and complex thinking	Freire & Duarte (2022)
Lack of technological resources	Inadequate infrastructure, especially in rural areas	UNESCO (2021)
Shortage of innovative pedagogical resources	Shortage of materials and tools needed to implement active strategies	Silva & Mendoza (2021)

Proposals for Improvement

In terms of proposals for improvement, studies suggest that teacher training and investment in technological infrastructure are key to overcoming the barriers identified. According to Silva and Mendoza (2021), institutions that have invested in the continuous training of their teachers have achieved a more effective implementation of active methodologies. This training should focus on providing teachers with the skills needed to design and manage dynamic and collaborative learning environments, tailored to the needs of their students.

Likewise, investment in educational technology is crucial for the success of active learning. García and Torres (2022) point out that institutions that have adopted technological platforms and interactive tools, such as virtual laboratories and simulations, have observed a significant improvement in student academic performance.

Below is a table with the main proposals for improvement extracted from the literature:

Proposals for Improvement	Description	Fountain
Continuous training of teaching staff	Training in active methodologies and complex thinking	Silva & Mendoza (2021)
Investment in technological infrastructure	Implementation of educational platforms and virtual labs	García & Torres (2022)
Innovation in pedagogical resources	Development of more interactive pedagogical tools	Freire & Duarte (2022)

Examples of Good Practices

Some universities in Latin America have successfully implemented active learning strategies and complex thinking. A prominent example is the University of São Paulo, which adopted a

multidisciplinary approach in several of its programs, combining practical activities with global case studies. According to Freire and Duarte (2022), this university reported a 40% improvement in academic performance and student motivation.

Another success story is the Pontificia Universidad Católica de Chile, which has developed advanced technological platforms to facilitate collaborative learning. These platforms allow students to work on joint projects from different geographical locations, which fosters more inclusive and participatory learning (Martínez & Paredes, 2021).

5. Conclusions

The findings of this review underscore the transformative potential of active learning and complex thinking strategies to improve the quality of higher education in Latin America. These approaches not only promote the development of essential competencies for the twenty-first century, such as critical thinking, creativity, and problem-solving skills, but also offer students the necessary tools to face global and complex challenges, such as environmental sustainability and social justice (González & Rodríguez, 2020; Morin, 2020).

Main Challenges

However, significant barriers to its effective implementation remain. In many institutions in the region, resistance to change remains a significant obstacle. Universities that continue to operate under traditional teaching models find it difficult to adopt more dynamic and student-centered approaches (García & Torres, 2022). The lack of adequate teacher training also limits the application of active learning and complex thinking, as many teachers are not prepared to manage more participatory and collaborative learning environments (Silva & Mendoza, 2021).

Another major challenge is the technology gap. Although the use of digital technologies has proven to be critical to the success of active learning, many institutions in Latin America, especially in rural areas or in public universities with fewer resources, lack the necessary infrastructure to implement these strategies effectively (UNESCO, 2021). Lack of access to quality technology tools limits opportunities for students to engage in interactive and collaborative activities, essential for active learning.

Opportunities and Proposals for Improvement

Despite these challenges, there are significant opportunities to improve the implementation of these strategies. One of the most prominent proposals is the continuous training of teaching staff, which could facilitate a more fluid transition towards active methodologies. According to Freire and Duarte (2022), institutions that have invested in training programs have observed a greater adoption of these practices, which translates into better student performance.

Investment in educational technology is another fundamental recommendation. In order for universities to adopt active learning effectively, they need to equip themselves with the right technological tools, such as collaborative learning platforms, virtual labs, and interactive educational management systems (García & Torres, 2022). Expanding these tools would not only

increase student engagement, but also reduce the gap between institutions with greater and lesser technological resources.

In addition, it is essential that universities adopt a holistic and flexible view of knowledge, as proposed by complex thinking. This approach allows students and teachers to overcome the fragmentation of disciplines and approach problems from a global and interdisciplinary perspective (Martínez & Paredes, 2021). If higher education institutions in Latin America integrate this approach in a systematic way, they will not only improve the quality of education, but also better prepare their students for the world of work and the global challenges of the future.

Final Thoughts

In short, active learning and complex thinking represent fundamental pedagogical approaches for the modernization and improvement of the quality of higher education in Latin America. However, its success will depend to a large extent on institutional commitment, teacher training, and investment in technologies that facilitate its implementation. The adoption of these approaches will not only contribute to a more inclusive education adapted to the needs of the twenty-first century, but will also allow the region to move towards an education system that responds to the challenges of an increasingly interconnected and changing world (UNESCO, 2021; Freire & Duarte, 2022).

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