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Comparative Study on Learning Innovation and Evidence-Based Teaching Strategies: A Collaborative Research between Indonesia and Brazil

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ABSTRACT
This study compares the implementation of evidence-based learning innovations in senior high schools in Indonesia and Brazil, using the Merdeka Curriculum and the Basic National Common Curriculum (BNCC). The background of this study stems from the similarities in the two countries' challenges, such as gaps in teacher quality, unequal access to technology, and the need to adapt strategies to local contexts. This study used a qualitative comparative case study design in six high schools (three in Indonesia and three in Brazil) selected through purposive sampling, involving 12 teachers with at least three years of experience. Data were collected through in-depth interviews, classroom observations, and analysis of learning documents. Data were analyzed using a thematic approach and cross-case analysis with triangulation of sources, researchers, and member checking to maintain validity. The results indicate that active learning and formative assessment are core strategies in both countries. Indonesia relies on formal Learning Management Systems such as Google Classroom and Kahoot, while Brazil utilizes WhatsApp, flipped classrooms, and peer teaching. Supporting factors in Indonesia include Subject Teacher Conference training and local government support, while in Brazil it comes from teacher communities and educational NGOs. Barriers in Indonesia include the digital literacy gap, while in Brazil limited devices and internet connectivity. The TPACK analysis shows that technology integration in Indonesia is more structured, while in Brazil it is more adaptive. Based on SAMR, innovation in Indonesia is at the Augmentation to Modification level, while Brazil has reached Modification to Redefinition. These findings emphasize the importance of local adaptation in implementing evidence-based strategies and recommend cross-border training and the exchange of good practices to strengthen educational innovation in developing countries.

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1. Introduction

In the era of globalization, improving the quality of education has become a top priority for developing countries to create competitive human resources (Tabroni & Karlina, 2022; Tuwoso et al., 2020; Yanti et al., 2024). This challenge requires education systems to emphasize not only mastery of material but also the development of critical thinking skills, creativity, and adaptability (OECD, 2022). One rapidly growing approach is evidence-based learning, a learning strategy designed based on empirical findings to ensure the effective use of educational resources (Aidarbekova et al., 2021; Krupko & Ternopilska, 2024; Төлеужан, 2022). While the effectiveness of this approach has been proven in various countries, its implementation often requires in-depth adaptation to be relevant to local social, economic, and infrastructure contexts (Davies &

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Donnelly, 2024a, 2024b; Turner, 2007; Zhou & Liang, 2021).

Indonesia and Brazil, two countries with large populations and vast geographic diversity, are currently at the forefront of education reform. In Indonesia, the launch of the Independent Curriculum in 2022 marks a transformational step aimed at creating more flexible, student-centered, and project-based learning (Amalia et al., 2025; Andrew et al., 2010; Haq & Wakidi, 2024; Qu & Li, 2024). However, its implementation still faces obstacles such as uneven technology distribution, disparities in teacher quality, and limited access to learning resources in remote areas (Ma, 2024; Rodriguez et al., 2025; Thieman & Cevallos, 2017).

On the other hand, Brazil implemented the Basic National Common Curriculum (BNCC) in 2021 as an effort to unify national learning standards (Hashizume, 2021; Jain, 2025). The BNCC emphasizes key competencies such as logical reasoning, scientific thinking, and creativity, in line with global education trends. However, Brazil faces similar challenges, including disparities between urban and rural schools, a lack of adequate teacher training, and unequal access to technology (Yupanqui, 2025).

While both countries display similarities in the scale of challenges and visions for education reform, comparative studies analyzing the implementation of evidence-based learning innovations in Indonesia and Brazil are limited. A literature search revealed that most research focuses solely on the national context of each country, thus failing to provide an in-depth understanding of cross-cultural adaptation strategies (Han & Huang, 2024; Moi & Hamdalah, 2025). This gap is crucial for effective adaptation of learning strategies to environments with similar characteristics.

Based on this background, this study aims to: (1) identify learning innovations implemented in high schools in Indonesia and Brazil, with a focus on alignment with the Independent Curriculum and BNCC; (2) analyze and compare evidence-based teaching strategies used by teachers in both countries; and (3) identify supporting and inhibiting factors for the implementation of learning innovations in each country, as well as lessons learned from each other. The primary contribution of this study is to provide cross-cultural empirical insights that can serve as a reference for policymakers, educators, and researchers in designing effective and contextualized educational interventions in developing countries.

2. Methods

2.1 Research Design

This research uses a qualitative comparative case study approach to analyze the implementation of evidence-based learning innovations in two different contexts, namely Indonesia and Brazil. This approach was chosen because it allows for in-depth exploration of educational phenomena within their original contexts (Phaf & Rotteveel, 2024; Simons, 1996). Furthermore, this comparative design facilitates the systematic identification of similarities and differences between cases, resulting in a richer understanding of the contextual factors influencing innovation implementation (DeLiema et al., 2023).

2.2 Locations and Participants

The selection of locations and participants was carried out purposively to ensure the relevance and depth of the data. This research was conducted in two countries with different geographic and social characteristics but similar educational challenges. In Indonesia, three high schools were selected from the East Kotawaringin Regency, representing both urban and semi-rural areas. Meanwhile, in Brazil, three high schools were selected from the states of São Paulo and Minas Gerais, also encompassing both urban and semi-rural environments. The selection of these locations was based on the school's active involvement in the implementation of the Merdeka Curriculum (Indonesia) and the Basic National Common Curriculum (BNCC) (Brazil) policies. This study involved 12 teachers, divided equally, with six from each country. Participant inclusion criteria were a minimum of three years of teaching experience at the high school level and direct involvement in implementing learning innovations. The number of participants was determined based on the principle of data saturation, where the collected data is deemed sufficient to answer the research questions.

2.3 Data Collection

Data were collected through source triangulation to achieve validity and completeness (Hartono et al., 2024; Mavi et al., 2022). Primary data were obtained through in-depth interviews and classroom observations (conducted twice per teacher) to capture teacher-student interactions, learning strategies, and classroom dynamics. To complement the primary data, document analysis was conducted on official documents such as Lesson Plans (RPP) and teaching materials. To ensure consistency and accuracy, interview and observation guides were standardized, and training was provided to the local research teams in each country. All interview transcripts and observation notes from Indonesian and Portuguese were translated into English for cross-national analysis.

2.4 Data Analysis

Data analysis was conducted in two main, systematic stages. In the first stage, thematic analysis (Gupta & Sharma, 2022) was applied to data from each country case separately. This process included familiarization with the data, initial coding, theme discovery and

review, and final theme definition. In the second stage, a comparative analysis (cross-case analysis) was conducted to compare findings from both countries. This analysis focused on identifying similarities and differences in instructional strategies, supporting factors, and barriers faced by teachers.

2.5 Research Ethics and Validity

All research procedures adhered to ethical guidelines, including maintaining participant confidentiality and obtaining written informed consent from each participant. The validity and validity of the findings were maintained through several strategies: data triangulation (comparing findings from interviews, observations, and documents), member checking (confirming data interpretations with participants), and researcher triangulation (a cross-validation process by the Indonesian and Brazilian research teams to minimize potential bias).

3. Results

3.1 Forms of Learning Innovation

Analysis of findings from interviews, observations, and learning documents indicates that in both Indonesia and Brazil, learning innovations are directed at creating learning environments that encourage active student engagement. However, the media and approaches used vary according to local contexts.

In Indonesia, teachers integrate Google Classroom as the primary platform for assignment management, material distribution, and feedback. Kahoot is used as an interactive assessment tool that motivates students through gamification elements. Furthermore, project-based learning (PBL) is implemented in accordance with the principles of the Independent Curriculum, with a focus on projects relevant to local issues. Observations at State Senior High School 1 Sampit, for example, revealed a project to create an eco-brick prototype as a solution for plastic waste management.

In Brazil, teachers rely more heavily on WhatsApp as a learning medium, primarily to address limited access to a formal LMS. The flipped classroom model is consistently implemented, allowing students to learn material through videos before face-to-face meetings, allowing class time to be used for focused discussion and practice. Peer teaching approaches are also prominent, as observed in a high school in São Paulo, where senior students guide a group of new students in understanding science concepts through collaborative discussions.

3.2 Evidence-Based Learning Strategies

Data shows that teachers in both countries employ active learning and formative assessment as core strategies. However, there are significant differences in the use of adaptive technology. In Brazil, teachers are increasingly utilizing social media (e.g., WhatsApp and Instagram) to provide quick and ongoing feedback, especially in areas with unstable internet connectivity. A science teacher in Minas Gerais stated:

> *"WhatsApp allows me to provide feedback in minutes, even though the students are in semi-rural areas with limited internet access."*

In Indonesia, the use of social media in learning is relatively limited. Teachers are more focused on official school platforms like Google Classroom, which are seen as helpful in archiving materials and monitoring student progress. A mathematics teacher in East Kotawaringin said:

> *"Google Classroom helps archive all assignments and monitor progress, although it takes time for students to adapt."*

3.3 Supporting and Inhibiting Factors

The cross-case analysis shows that the effectiveness of learning innovation implementation is influenced by a number of supporting and inhibiting factors unique to each country. In Indonesia, local government support through regular Subject Teacher Conference (Subject Teachers' Consultation) training programs is a key factor in strengthening teacher capacity. A majority of teachers stated that this training improved their skills in operating a Learning Management System (LMS) and developing project-based learning (PBL) strategies. Meanwhile, in Brazil, teacher community involvement and collaboration with educational NGOs played a key role in providing free training and digital learning resources, with 75% of teachers reporting significant benefits from these programs.

On the other hand, inhibiting factors limit the optimization of learning innovations. In Indonesia, the digital literacy gap remains a challenge, particularly in rural areas, where observations indicate that 2 out of 6 teachers require technical assistance to operate an LMS. Meanwhile, in Brazil, the main obstacle lies in limited devices and internet connectivity in remote areas. This results in limited access to learning materials, which in many cases can only be downloaded via mobile phones with limited internet quotas, making synchronous learning difficult.

3.4 Comparison of Key Findings

To gain a more structured overview of the similarities and differences in the implementation of learning innovations in Indonesia and Brazil, the findings of this study are presented in the form of a cross-case comparison. Table 1 summarizes key aspects, including the forms of learning innovations, evidence-based strategies, and supporting and inhibiting factors in both countries. This table is intended to facilitate readers in identifying contextual patterns and differences that emerge from the qualitative analysis.

Table 1. Comparison of learning innovations, evidence-based strategies, and supporting and inhibiting factors in Indonesia and Brazil.

Aspect	Indonesia	Brazil
Form of Innovation	Google Classroom, Kahoot, Project-Based Learning (PBL)	WhatsApp, Flipped Classroom, Peer Teaching
Evidence-Based Strategy	Active Learning, Formative Assessment, official school LMS	Active Learning, Formative Assessment, adaptive use of social media
Supporting Factors	MGMP training from local government (83% of teachers feel supported)	Support from teacher communities & educational NGOs (75% of teachers feel supported)
Inhibiting Factors	Low digital literacy in rural areas (2 out of 6 teachers require technical assistance)	Limited devices & connectivity in remote areas (majority access via mobile phones)

Based on the comparison in Table 1, it is clear that both countries adopt the principles of active learning and formative assessment, but differ in the media and ecosystem support used. Indonesia tends to integrate formal LMSs aligned with national policies, while Brazil utilizes popular communication platforms to reach students across various infrastructure conditions. This difference underscores the importance of adapting evidence-based learning strategies to suit the social, technological, and educational policy characteristics of each country.

3.5 Cross-Case Analysis

The cross-case analysis reveals three key findings that reflect the strong influence of local context on the implementation of evidence-based learning innovations in Indonesia and Brazil. First, local context determines the choice of learning media. Teachers in Indonesia tend to adopt formal Learning Management Systems (LMS) integrated with national education policies, such as Google Classroom, because these platforms support structured and documented learning administration. Conversely, teachers in Brazil utilize popular, familiar platforms, such as WhatsApp, to overcome the limitations of formal LMS infrastructure and increase communication with students.

Second, the forms of external support differ in the two countries. In Indonesia, support comes more from local government policies, particularly through regularly scheduled MGMP training programs. This program provides formal coaching, pedagogical capacity building, and curriculum implementation guidance. In Brazil, external support comes primarily from teacher community networks and partnerships with educational NGOs. These collaborations tend to be flexible, based on local needs, and often provide freely accessible resources and training.

Third, technological barriers are context-specific. In Indonesia, the main challenge lies in the digital skills of teachers and students, particularly in rural areas that are not yet fully familiar with the use of online learning platforms. Meanwhile, in Brazil, the biggest obstacle is limited technological infrastructure and devices, including unstable internet connections in remote areas, which limit synchronous learning interactions.

4. Discussion

The results of this study reveal that in both Indonesia and Brazil, teachers implement active learning strategies and formative assessment as the core of evidence-based learning innovations (Howell et al., 2013). These strategies enable students to actively participate in the learning process through discussion, problem-solving, and collaborative work, while providing ongoing feedback to improve learning performance. This similarity indicates that, despite differences in geographic and social contexts, evidence-based pedagogical principles have universal relevance in increasing student engagement and learning outcomes.

While the learning principles used are similar, the implementation methods differ significantly (Lamar et al., 2018; Snoeck et al., 2018). In Indonesia, the use of formal LMSs such as Google Classroom aligns with the national education policy (Kurikulum Merdeka), which emphasizes a structured learning administration system. Meanwhile, in Brazil, teachers prefer popular platforms like WhatsApp and Instagram, which are more accessible in areas with limited LMS infrastructure. This difference reflects not only the state of technological infrastructure but is also influenced by learning cultures: Indonesia emphasizes compliance with learning procedures and documentation in accordance with government standards, while Brazil emphasizes flexibility and an informal approach that prioritizes accessibility to communication.

Differences in the implementation of evidence-based learning strategies in Indonesia and Brazil can be analyzed through two main theoretical frameworks: TPACK (Technological Pedagogical Content Knowledge) and SAMR (Substitution, Augmentation, Modification, Redefinition). Based on the TPACK framework, technology integration in Indonesia demonstrates a fairly strong combination of pedagogical knowledge and content knowledge, but remains limited to structured technological knowledge on official platforms. Teachers in Indonesia operate formal Learning Management Systems (LMS) such as Google Classroom in accordance with the national curriculum, resulting in directed and consistent technology adaptation, but lacking flexibility in adapting to dynamic learning needs. In contrast, in Brazil, technology integration is more adaptive and contextual, combining

technological knowledge utilizing popular platforms like WhatsApp and Instagram with creative pedagogical approaches. Although the technology used is relatively simple, teachers are able to connect it relevantly to the learning content, encouraging active student participation.

From the SAMR framework, the use of formal LMS in Indonesia generally falls at the Augmentation level, enhancing traditional learning functions with technological support, such as distributing digital materials, submitting online assignments, and using interactive quizzes. In the implementation of project-based learning, the use of technology is beginning to move toward the Modification level, where technology enables the design of collaborative assignments that would be difficult to implement conventionally. Meanwhile, in Brazil, the use of WhatsApp for collaborative learning and the implementation of flipped classrooms has reached the Modification and even Redefinition levels, fundamentally changing the interaction patterns of teachers and students beyond the boundaries of traditional classroom space and time (Warner, 2016). This model allows students to study material independently before face-to-face sessions, then utilize class time for in-depth discussions and collaborative problem-solving, creating a more flexible, open, and personalized learning experience.

These findings have important implications for global education practice, particularly in the context of adopting evidence-based strategies in developing countries. First, the success of strategies such as active learning and formative assessment depends not only on the effectiveness of the method itself, but also on local adaptability to social, economic, and technological conditions. Second, countries with limited infrastructure can utilize technologies already familiar to their communities, provided they are combined with appropriate pedagogical approaches. Third, national education policies need to consider implementation flexibility, so that learning innovations can be adapted contextually without sacrificing quality or fundamental principles.

Thus, this study confirms that evidence-based learning strategies can be implemented across countries with positive results, provided they are tailored to each country's educational ecosystem, technological infrastructure, and learning culture. Local adaptation is key to ensuring the sustainability and inclusiveness of learning innovations globally.

5. Conclusion

This study shows that although Indonesia and Brazil adopt similar pedagogical principles, namely active learning and formative assessment, the implementation of evidence-based learning innovations in the two countries differs significantly. These differences are primarily influenced by the local context and existing educational ecosystem. In Indonesia, innovation implementation tends to follow formal channels through LMS platforms such as Google Classroom, in line with the Independent Curriculum policy. Meanwhile, in Brazil, teachers demonstrate adaptive flexibility by utilizing familiar informal platforms, such as WhatsApp, to overcome infrastructure limitations. These findings confirm that the success of learning innovations is determined not only by the quality of the strategy, but also by the teachers' ability to adapt to the local educational ecosystem. To improve the quality of learning and ensure the innovations can be widely adopted, it is recommended to establish cross-border teacher training programs and best practices exchange forums between Indonesia and Brazil. Furthermore, further research focusing on the long-term impact of these innovations on student learning outcomes is also needed.

Article Information Form

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Authors' Contribution

PatriciaVargas: Contributed to the research idea's conceptualization, the design of the methodology, data collection in Brazil, cross-case analysis, and the writing and revision of the manuscript.

Endang Sri Estimurti: Responsible for the initial conceptualization, data collection in Indonesia, thematic data analysis, and provided a significant contribution to the writing and final revision of the manuscript

Declaration of Conflict of Interest

The authors declare no financial or non-financial conflicts of interest that could have influenced the outcomes or interpretation of this research.

Artificial Intelligence Statement

In preparing this manuscript, artificial intelligence (AI) tools were exclusively used for grammar checks, spelling correction, and sentence refinement. The use of AI was limited to these basic writing functions and was not employed for critical processes such as data collection, data analysis, or the interpretation of research findings.

Ethical Approval

This study involved human subjects (teachers). All research procedures were granted ethical approval by the Institutional Review Board (IRB) of both Universitas Muhammadiyah palangkaraya and Universidade Federal do Estado do Rio de Janeiro. The specific ethical approval numbers are on file with each respective university.

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