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Integrating Multiple Intelligences in Teaching Materials to Enhance Students' Critical Thinking: A Literature Review

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Abstract

Critical thinking skills are essential competencies that students must possess to face 21st-century challenges. However, studies indicated that students' critical thinking skills in Indonesia remain unsatisfactory and, thus, need suitable approaches. One of the approaches believed to cope with this issue is the Multiple Intelligences. This article aims to examine the contribution of the Multiple Intelligences approach to developing teaching materials that foster students' critical thinking abilities. This study utilized a Systematic Literature Review (SLR) method, employing the PRISMA flow diagram for article selection. Articles were selected based on inclusion and exclusion criteria, including relevance, educational context, and international journal indexing. This article provides crucial insights for educators and researchers to optimize student-centered learning. The analysis revealed that 67% agreed that the Multiple Intelligences approach significantly improved critical thinking skills, 20% reported no influence, and 13% noted effects only on certain skill types. This research also highlights challenges, including limited teacher knowledge and skills, a lack of supporting infrastructure, and difficulties integrating with traditional methods. Future studies are recommended to develop teacher training, enhance infrastructure, integrate Multiple Intelligences-based and traditional approaches, and conduct longitudinal studies to evaluate effectiveness.

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INTRODUCTION

Mastering critical thinking skills is crucial for students to navigate the challenges of the 21st century. These skills empower students to evaluate information critically, solve problems creatively, and make evidence-based decisions (Ennis, 2011). However, studies show that Indonesian students' critical thinking abilities remain below expectations, often due to learning strategies that inadequately support higher-order thinking (Facione, 2015; Tiruneh et al., 2017). This finding is also consistent with recent research on critical thinking in Indonesian educational settings (Fernandes et al., 2024)

One promising approach to address this issue is the integration of the Multiple Intelligences (MI) theory in the development of teaching materials. The development of student potential can be approached through multiple intelligences (Wahyuni & Sulastri, 2025). By recognizing diverse cognitive strengths—such as linguistic, logical-mathematical, spatial, interpersonal, and others (Gardner, 1983) —MI-based materials can foster deeper student engagement and promote active learning. For example, studies have found a correlation between MI, self-efficacy, and emotion (Hernández-Barco et al., 2021). This alignment between learning activities and students' dominant intelligences has been shown to enhance critical thinking skills effectively (Nisa & Mawarsari, 2020; Aisyah & Wibowo, 2021; Rahmawati & Sulistyowati, 2022).

Empirical research in both primary and secondary education has demonstrated that MI-based teaching materials are not only accurate and efficient, but also adaptable across various learning contexts (Anwar, 2019; Rozhana & Anwar, 2022; Syahputra & Wahyuni, 2023). Despite its potential, the implementation of this approach still faces pedagogical and institutional challenges that require further exploration. The teaching and learning process can be enhanced through the application of multiple intelligence theory, which presents various challenges and opportunities (Walela, 2024).

The effects of multiple intelligences on students' critical thinking skills are generally difficult to measure quantitatively in a short period of time. This is because the development of critical thinking is a gradual process that often requires continuous practice, exposure to diverse learning activities, and opportunities for reflection. Conventional tests are usually limited to assessing surface-level understanding and may not capture the multidimensional aspects of reasoning, problem-solving, and decision-making fostered through multiple intelligences-based learning. Therefore, more comprehensive approaches—such as longitudinal studies, authentic assessments, and performance-based evaluations—are needed to provide a more accurate picture of how multiple intelligences contribute to the enhancement of students' critical thinking skills.

METHODS

This study employed a Systematic Literature Review (SLR) method with a structured and transparent procedure to ensure the credibility and comprehensiveness of the findings. The approach was designed to synthesize relevant empirical evidence on the integration of Multiple Intelligences in teaching materials to foster students' critical thinking. To achieve this, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was adopted as the guiding framework for the review process. The use of PRISMA provided a standardized structure in managing references, starting from the identification of potentially relevant studies, removal of duplicates, screening of titles and abstracts, to the assessment of full-text eligibility. This systematic process ensured that the articles included in the review were consistent with the predefined research objectives and questions.

Following the PRISMA stages, each article was evaluated based on specific inclusion and exclusion criteria established prior to the review. The inclusion criteria comprised publication years within the last five years, relevance to Multiple Intelligences, teaching materials, and critical thinking, and availability in internationally indexed journals written in English. Conversely, studies were excluded if

they focused solely on theoretical discussions without empirical implementation, were published before 2020, or fell outside the educational context. As emphasized by Mohd Nor & Mahmud (2024), employing PRISMA strengthens methodological rigor and transparency by making the selection process replicable and verifiable. Thus, the final pool of articles represents a reliable and valid basis for drawing conclusions in line with the research aims.

Search Strategy

The search for articles was conducted using relevant academic databases, including Google Scholar (scholar.google.com), Scypase, and ERIC. Articles were filtered using inclusion and exclusion criteria to extract relevant studies. The inclusion criteria were (1) articles published within the last five years; (2) studies discussing the relationship between Multiple Intelligences, teaching materials, and critical thinking; (3) research conducted in primary, secondary, or higher education contexts; English language; (4) published in internationally indexed journals; (5) keywords: "multiple intelligence," "multiple intelligences," "critical thinking skills," and empirical research. The exclusion criteria were (1) articles focused solely on MI theory without implementation in teaching materials and (2) articles from non-educational contexts.

Initial Search Results

The following tables present the initial search results and reference criteria used to identify and screen relevant articles for this study:

Table 1. Keywords-based Results

Keyword	Database	Number
Multiple intelligence/ Multiple intelligences	Scypase	190
Multiple intelligence/ Multiple intelligences	Google Scholar	36
Multiple intelligence/ Multiple intelligences	ERIC	2

Table 2. Reference Criteria

No	Criteria	Included	Excluded
1	Year	Published 2020–2024	Published before 2020
2	Language	English	Non-English
3	Type	Journal articles and reviews	Books, theses, proceedings
4	Duplication	No duplicate across search engines	Duplicates detected
5	Indexation	Internationally indexed journals	Non-internationally indexed journals

Study Selection

Study selection implemented the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) model to ensure that the filtering process was carried out in a systematic, rigorous, and transparent manner. This model provided a structured framework consisting of several stages, starting from the identification of potentially relevant studies, the screening of titles and abstracts, the assessment of full-text eligibility, and finally, the inclusion of articles that met the predefined criteria. By applying PRISMA, the review process became more objective and replicable, as each decision regarding article selection was documented clearly and supported by specific criteria. This systematic approach minimized the risk of bias and enhanced the credibility of the literature review findings, while also ensuring that only studies of sufficient quality and relevance were considered in answering the research questions.

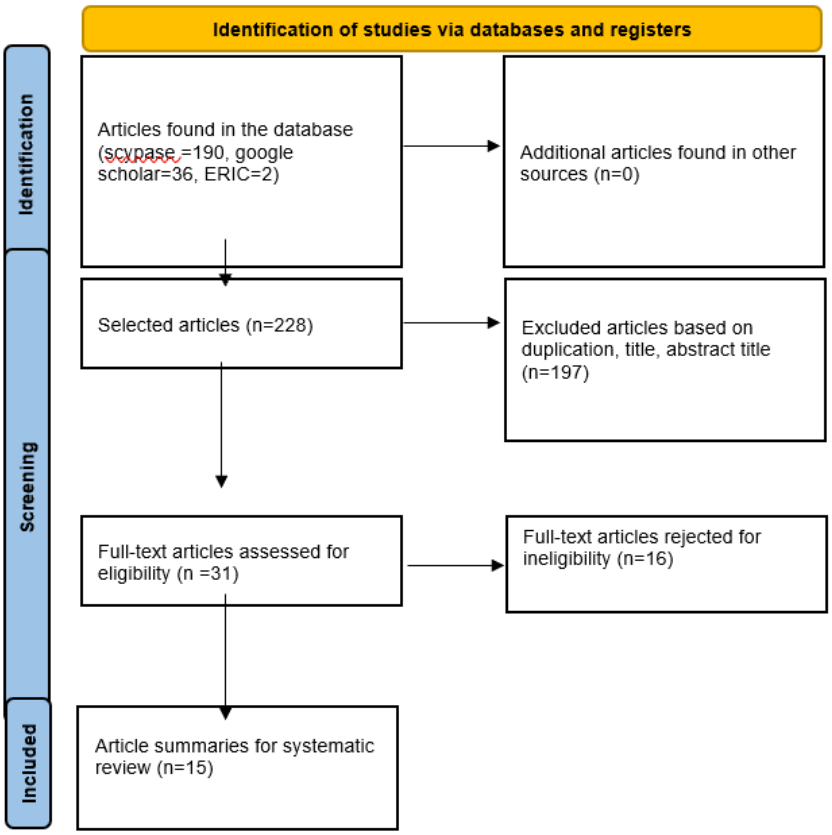

Figure 1. The PRISMA Protocol (Zakeri et al., 2022)

Quality Assessment Rubric

In evaluating the quality of the selected studies, a structured set of assessment criteria was applied to ensure that only relevant and credible articles were included in the review. The assessment emphasized five main aspects, namely relevance to the research topic, quality of research methodology, credibility and quality of the journal, contribution to research, and article presentation quality. Each criterion was rated on a scale of 1 to 5, where higher scores indicated stronger alignment with the standards of a rigorous systematic review. This rubric served as a transparent and consistent framework for determining the suitability of the articles, as summarized in Table 3.

Table 3. Quality Assessment Rubric

No	Criteria	Score 5	Score 4	Score 3	Score 2	Score 1
1	Relevance to Research Topic	Highly relevant to the SLR research topic, contributing directly to the research aims and questions.	Relevant to the main topic but does not fully answer all necessary aspects.	Some are relevant, with little information supporting the research objectives.	Minimal relevance to research focus.	Not relevant at all
2	Quality of Research Methodology	The research methodology is described in great detail and is valid (e.g., research design, data, analysis)	The methodology is clear but with some details missing.	The methodology exists, but it lacks depth or transparency.	The methodology is unclear or inadequate.	There is no explanation of the methodology

No	Criteria	Score 5	Score 4	Score 3	Score 2	Score 1
3	Credibility and Quality of the Journal	Journals indexed in highly reputable databases (e.g., Scopus Q1/Q2, WoS)	Journals indexed in moderately reputable databases (e.g., Scopus Q3/Q4, SINTA 1/2)	Journals are indexed but have low or unclear reputations.	The journal is not indexed but has a recognized publisher.	The journal is not indexed and has no credibility
4	Contribution to Research	Provides new insights, theories, or findings that are significant to the SLR.	These are important contributions but mostly complementary to previous research.	Contributions are limited and are a repetition of existing findings.	A very small contribution to research	No significant contribution
5	Article Presentation Quality	The article is very well written, uses proper academic language, and follows a standard structure.	The article is clear and structured, but there are some minor errors in the presentation.	The article is quite clear but with some shortcomings in presentation or language.	The article is difficult to understand due to poor presentation or structure.	The article is very difficult to understand and unstructured.

Total score:
The final score was calculated by adding the scores from all components, then interpreted as follows: 20-25: Very good for use in SLR, 15-20: Good with some caveats, 10-15: Needs further consideration before use, <10 Not suitable for use.

Data Analysis

This literature review employed thematic analysis to categorize and interpret findings from selected studies in alignment with two research questions:1. Is there a relationship between Multiple Intelligences (MI) and students' critical thinking skills? And 2. What are the challenges of implementing the MI approach in educational settings?

In response to the first question, most studies (67%) indicate a positive correlation between the application of MI-based teaching and the enhancement of students' critical thinking skills. This relationship is attributed to MI's ability to accommodate diverse learning preferences, thereby fostering greater engagement, deeper understanding, and improved reasoning skills. For instance, materials tailored to students' dominant intelligences such as visual-spatial tasks for visual learners or role-playing for interpersonal learners tended to activate analytical thinking and reflective inquiry (Aisyah & Wibowo, 2021; Syahputra & Wahyuni, 2023).

However, approximately 13% of the articles reported that only certain types of intelligence, namely logical-mathematical and linguistic, showed direct contributions to critical thinking. This suggests that some intelligences may naturally align more closely with analytical or logical reasoning processes. These findings highlight the importance of strategic alignment between the type of intelligence targeted and the cognitive skills intended to be developed (Shearer et al., 2021).

The remaining 20% of studies found no significant influence of MI on critical thinking outcomes. Possible explanations include methodological limitations, such as the absence of rigorous assessment tools to measure critical thinking development, or implementation flaws, where teachers failed to design activities effectively aligned with the MI framework. In the context of Indonesia, such inconsistencies may also stem from variations in teacher readiness, curriculum constraints, or limited access to instructional resources (Fauzi & Prabowo, 2023).

Regarding the second research question, several recurring challenges emerged across the literature: Limited teacher understanding of MI theory and its classroom application remains a significant obstacle. Many teachers report feeling unprepared to translate MI concepts into concrete

teaching strategies (Ozdemir et al., 2006; Nor et al., 2024), inadequate infrastructure and teaching resources, particularly in rural or underfunded schools, hinder the delivery of varied learning experiences aligned with different intelligences (Yusri et al., 2022), assessment difficulties persist, as most schools still rely on traditional tests that do not capture students' critical thinking or multidimensional learning progress and institutional resistance to pedagogical change, especially in contexts where conventional methods dominate, also limits the integration of MI-based learning in mainstream classrooms (Watson, 2023).

These findings underscore that while MI holds considerable promise for improving students' critical thinking, its effectiveness is highly contingent on the quality of its implementation. In Indonesia, addressing these challenges requires systemic efforts, including teacher training, resource provision, and reform in assessment practices to support a more holistic and differentiated approach to learning.

RESULTS AND DISCUSSION

The analysis highlights diverse relationship patterns as well as the challenges that emerge between the application of Multiple Intelligences (MI) and the development of students' critical thinking skills. To obtain a comprehensive understanding, the results from each reviewed article were systematically extracted and synthesized in alignment with the predefined research questions. This process enabled the identification of whether MI exerted a significant influence, a partial influence, or no influence at all on students' critical thinking abilities. Furthermore, the extracted data were organized into a table that not only illustrates the relationship patterns but also maps out the recurring challenges encountered in practice, such as limited teacher readiness, assessment difficulties, and resource constraints. Presenting the findings in this way provides a clearer and more structured overview of how MI theory has been implemented across different educational contexts and what obstacles may hinder its effectiveness.

To provide a clearer overview of how Multiple Intelligences (MI) relates to students' critical thinking skills across various studies, the reviewed articles were summarized based on their main findings and contextual challenges. Each article was analyzed to identify the relationship pattern—whether MI showed a significant influence, partial influence, or no effect at all—and to capture the key obstacles reported in its implementation. These obstacles ranged from limited resources and infrastructure, teacher readiness, and assessment difficulties, to institutional resistance and methodological complexity. The synthesis of these findings is presented in Table 4, which outlines the article titles, authors with publication years in APA format, relationship patterns, and challenges encountered in applying the MI approach.

Table 4. The Article Review Results

No	Article title	Authors / Year (APA)	Relationship pattern*	Challenge
1	Multiple intelligence and its implications in education	Haxhihyseni, E., & Andoni, B. (2023)	Influential	Imbalance of implementation
2	Multiple Intelligences in an Educational Context: Culturally Based Abilities and Aptitudes in the Body-Mind Binomial	Morgado, E. M. G., Licursi, M. B., & Leonido, L. (2024)	Some types of intelligence are influential; others are not.	Resources that are not yet supported
3	Exploring multiple intelligence-based education at private schools in Karachi	Fatima, I. (2023)	Influential	The need for systemic change in educational practices

No	Article title	Authors / Year (APA)	Relationship pattern*	Challenge
4	Senior High School Students' Multiple Intelligences and their Relationship with Academic Achievement in Science	Doblon, M. G. (2023)	The impact is only on student achievement, not on students' critical thinking skills.	It is not practical to adapt every lesson to all learning styles.
5	Multiple intelligence-based differential learning on critical thinking skills of Higher education Students	Alhamuddin, A., Inten, D. N., Mulyani, D., Suganda, A. D., Juhji, J., Prachagool, V., & Nuangchalerm, P. (2023)	Influential	Resistance from educators and institutions accustomed to traditional teaching methods
6	Multiple Intelligences: Educational and Cognitive Development with a Guiding Focus	Aguayo, B. B., Ruano, C. A., & Vallejo, A. P. (2021)	The influence is only on intellectual maturity, not on students' critical thinking skills.	Integration with Traditional Methods
7	Multiple Intelligences of Students in SMAN 1 V Koto Kampung Dalam Padang Pariaman	Putra, R. R., Fitri, R., Hartanto, I., & Selaras, G. H. (2020)	Some types of intelligence are influential; others are not.	Difficulty of Assessment
8	Predictor Of Multiple Intelligence In Educational Practice	Hasanuddin, H., Dewi, S. S., & Siregar, E. S. (2022)	Influential	Difficulty of Assessment
9	Evaluation Process of Multiple Intelligence in Collegiate	García Mejía, R. O., Argandoña Mendoza, M. F., Zambrano Zambrano, Y. A., Vallejo Loor, B. M., & Palma Delgado, G. M. (2020)	No effect	Teachers have limited knowledge of the Theory of Multiple Intelligences.
10	Theory of Multiple Intelligence among Middle School Students	Yavich, R., & Rotnitsky, I. (2020)	Influential	Resource Allocation
11	Multiple Intelligences and Success in School Studies	Yavich, R., & Rotnitsky, I. (2020)	Influential	The complexity of applying the multiple intelligences theory in education
12	Maximizing Multiple Intelligences for Unprecedented Academic Achievement	Maspul, K. A. (2023)	Influential	Infrastructure limitations that may hinder the implementation of learning strategies
13	Impact of Multiple Intelligence (MI) on Science Process Skills (SPS) among Senior High School Students	Amponsah, K. D., Bukari, Z., Asano, R., & Boateng, F. K. (2021)	Influential	Limitations of Teacher Knowledge and Skills
14	The effects of multiple intelligences theory on learning success: A meta-analysis in social science	Syafii, A. Z., Machali, I., Putro, N. H. P. S., Retnawati, H., & 'Aziz, H. (2022)	Influential	Implementation Complexity in Class
15	Effect of Multiple Intelligences Strategies on Pupils' Basic Science	Ekarika, C. B., & Imunaghemhe, L. O. (2022)	Influential	The effects of multiple intelligences on students' critical

No	Article title	Authors / Year (APA)	Relationship pattern*	Challenge
	Achievement in Calabar, Cross River State, Nigeria			thinking skills are generally difficult to measure quantitatively in a short period of time, as critical thinking development often requires longitudinal assessment and complex evaluation methods that go beyond conventional testing.

*Whether or not there is an influence between multiple intelligence and students' critical thinking skills

The findings of the systematic literature review revealed varying patterns of relationships between the application of Multiple Intelligences (MI) and the development of students' critical thinking skills. These patterns were categorized into three groups, namely influential, partially influential, and no effect, based on the consistency and strength of evidence reported in the reviewed studies. To provide a clearer overview, the summary of article analysis is presented in Table 5, which highlights the distribution of studies across the three categories and illustrates how MI contributes differently depending on the context, research design, and focus of implementation.

Table 5. Results of article analysis

Relationship patterns	No Article
Influential	1,3,5,8,10,11,12,13,14,15
Partially influential	2.7
No effect	4,6,9

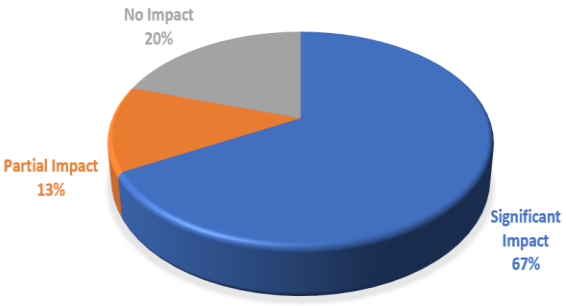

Figure 2. The Relationship Between Multiple Intelligences and Students' Critical Thinking Skills

The correlation between Multiple Intelligences (MI) and students' critical thinking skills is principally significant. A majority of reviewed articles (67%) revealed that the MI theory positively impacts students' critical thinking. This positive influence is largely attributed to the approach's ability to accommodate diverse learning styles, thereby making the learning experience more meaningful and personalized. When students engage in activities aligned with their dominant intelligences, their motivation and cognitive engagement tend to increase, which in turn supports the development of higher-order thinking skills (Ammar et al., 2023; Dwiastuti & Kusumawardani, 2023). In addition, MI-based strategies have been shown to be effective in improving both multiple intelligences and science process skills (Winarti et al., 2024)

However, a smaller proportion of studies (13%) observed that only certain types of intelligence—specifically logical-mathematical and linguistic intelligence—have a more direct influence on critical thinking, particularly in strengthening analytical skills and logical reasoning. This finding aligns with previous research suggesting that while MI creates inclusive learning environments, not all intelligence domains contribute equally to the enhancement of critical thinking (Shearer et al., 2021; Kumar & Ahmad, 2022).

The remaining studies (20%) found no significant direct impact of MI on critical

thinking. This may be attributed to suboptimal implementation or methodological constraints, such as the lack of specific tools to measure the interaction between MI and critical thinking outcomes (Bariyah & Sugiman, 2024). This can also be seen in studies comparing critical thinking levels across different educational programs, such as the International Baccalaureate (IB) and national education programs (Double et al., 2023). Poor alignment between teaching strategies and students' intelligence profiles, or the absence of structured MI-based interventions, may also reduce the effectiveness of this approach (Basri et al., 2021).

Several challenges arise in implementing the Multiple Intelligences approach. The primary issue lies in teachers' limited understanding and lack of adequate training to incorporate MI effectively into their instructional design. Studies show that without professional development, teachers tend to revert to conventional methods, failing to leverage the full potential of differentiated instruction (Fauzi & Prabowo, 2023; Nor et al., 2024).

Infrastructure also presents a significant barrier, especially in resource-constrained schools. MI-based instruction often requires diverse teaching aids, multimedia resources, and flexible classroom settings, which may be inaccessible due to funding limitations (Yusri et al., 2022).

Another major issue lies in assessment practices. Implementing multiple intelligences-based assessments in Indonesian schools presents several challenges (Iskandar & Haris, 2023). Evaluating critical thinking through the lens of MI necessitates complex, formative, and often time-consuming assessments. Unfortunately, many institutions continue to rely on traditional summative tests that inadequately capture the depth of critical thinking and the multidimensional nature of MI (Zakeri et al., 2022).

MI can be a powerful accelerator for critical-thinking development *when* the design intentionally marries intelligence-specific engagement with reasoning demands, is supported by teacher expertise, and is assessed authentically. The roadmap above converts that insight into sequenced, measurable actions—positioning Indonesian schools to leverage MI not as a conceptual trend, but as a systematic driver of higher-order learning.

Finally, cultural and institutional resistance to change remains a barrier. Teachers and school leaders accustomed to standardized, test-driven approaches may resist implementing MI-based methods due to perceived complexity or lack of immediate outcomes. Research shows that successful implementation requires not only training but also a shift in pedagogical mindset and support from leadership structures (Watson, 2023; Mohd Nor & Mahmud, 2024).

Recommendations for Research and Implementation

Future studies should delve deeper into the relationship between specific types of intelligence and critical thinking skills. To achieve more comprehensive findings, research efforts should employ a combination of both quantitative and qualitative methods. The successful implementation of the Multiple Intelligences approach requires collaboration among educators, school administrators, policymakers, and the wider community. This collective effort is essential to address the various challenges associated with its application. Educational institutions are encouraged to adopt the Multiple Intelligences approach gradually. This can begin with teacher training and the development of teaching materials, followed by more systemic changes in instructional methods.

When developing teaching materials, it is important to create adaptive resources that cater to diverse learning styles. Teaching materials should be designed to engage students through a mix of visual, auditory, kinesthetic, and collaborative activities, promoting the holistic development of critical thinking skills. Additionally, providing intensive training for teachers on the theory and practical application of Multiple Intelligences is crucial to ensure successful implementation.

The use of technology also plays a vital role; integrating online learning platforms and multimedia tools can help overcome resource constraints and expand access to Multiple

Intelligences-based learning. Finally, it is important to align the Multiple Intelligences approach with the national curriculum, ensuring that it remains relevant and supportive of established educational goals.

CONCLUSION

The review of several articles concluded that despite the challenges in its implementation, the application of Multiple Intelligences has promising potential in improving students' critical thinking skills. Systemic changes needed in educational practices and teacher training to support the effective implementation of Multiple Intelligences are essential factors in overcoming existing challenges. Improving educational infrastructure and teacher training is key to optimally applying Multiple Intelligences theory in schools. Overall, this study highlights the importance of implementing the Multiple Intelligences approaches in learning to support the development of students' critical thinking skills. For effective implementation, intensive teacher training is crucial to ameliorate their comprehension of the concept. The use of technology, like online learning platforms and multimedia tools, could be a solution to deal with resource constraints and expand the scope of Multiple Intelligences-based learning. In addition, Multiple Intelligences-based teaching materials should be aligned with the national curriculum to stay relevant to educational goals.

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