



Trends in Implementing the Make a Match Learning Model in Improving Science Learning Outcomes in Indonesian Elementary Schools: A Systematic Literature Review

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ABSTRACT

This study aims to analyze the implementation trends of the Make a Match learning model in improving science learning outcomes among Indonesian elementary school students and to identify challenges and opportunities for its implementation in the digital era. This study used a Systematic Literature Review (SLR) based on the PRISMA 2020 protocol to ensure a systematic, transparent, and replicable process. A literature search was conducted through Google Scholar and GARUDA databases for publications from 2021–2025 using the keywords “Make a Match,” “learning outcomes,” “science,” and “elementary school.” A total of 2,789 articles were initially identified, and after title screening, duplicate removal, abstract evaluation, and full-text assessment, 10 articles met the inclusion criteria and were further analyzed. Data extraction focused on the study design, sample characteristics, learning media, and students' cognitive, affective, and psychomotor learning outcomes. The quality of the studies was assessed using the Mixed Methods Appraisal Tool (MMAT), which showed that most of the selected studies were categorized as high quality. The findings indicate that the Make a Match learning model consistently improves elementary school students' science learning outcomes. The results indicate that the Make a Match model contributes to improving science students' learning outcomes, with consistent positive trends observed across the reviewed studies. However, 90% of the reviewed studies still relied on conventional learning media such as physical cards and manual flashcards. Only one study explicitly integrated interactive digital electronic modules into the learning process. These findings indicate the need for further innovation in technology-based Make a Match learning models to support digital-generation learners in contemporary elementary education.

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■ INTRODUCTION

Science education at the elementary school level, now called Natural and Social Sciences (IPAS) within the framework of the *Merdeka Curriculum*, plays a vital role in equipping students with scientific literacy from an early age (Hasnawati et al., 2025). The success of science learning stems not only from conceptual analysis but also from the development of scientific processes, such as observing, classifying, concluding, and solving real-world problems (Akuma & Callaghan, 2022). However, the reality indicates that elementary school students' science learning outcomes remain suboptimal. Various studies attribute these low outcomes to a lack of active student participation in the learning process, coupled with a pervasive teacher-centered approach that limits opportunities for student

exploration and interaction (Woods & Copur-Gencturk, 2024).

These problems are further compounded in the current digital era, where advances in information and communication technology have transformed students' characteristics, making them more receptive to interactive media and technology-based learning (Hsu et al., 2023). Students tend to be more engaged in learning that involves collaborative activities, educational games, and varied digital media (Prayoga et al., 2025; Sailer & Homner, 2020). As a result, an innovative learning model is needed that not only improves learning outcomes but also remains relevant to students' needs and characteristics in the digital era (Saleha et al., 2024).

The Make a Match learning model is closely related to constructivist learning theory,

which emphasizes that students actively construct knowledge through meaningful interactions and learning experiences (Prasetyo et al., 2025). In constructivist-oriented classrooms, students are encouraged to explore concepts collaboratively rather than passively receiving information from the teacher. Through card-matching activities and peer discussions, the Make a Match model enables students to develop conceptual understanding through active engagement and cooperative interaction (Budiarti & Wakhudin, 2026).

Furthermore, this model aligns with Vygotsky's sociocultural theory, particularly regarding the role of social interaction in cognitive development (Mengkido & Rahman, 2026). Collaborative learning activities in the Make a Match model create opportunities for peer support, communication, and collaborative problem-solving. Such interactions are crucial in elementary science learning because students can strengthen their scientific understanding through dialogue, cooperation, and contextual learning experiences (Adinda, 2026).

One learning model considered to have potential in addressing these challenges is the Make a Match cooperative learning model. This model emphasizes the interactive, collaborative activity of pairing question cards with answer cards. Through this mechanism, students are encouraged to actively think, communicate, and collaborate to understand the concepts being learned (Tadesse et al., 2024). Studies consistently demonstrate that the Make a Match model can enhance motivation to learn, student engagement, and learning outcomes across various subjects, including elementary school science (Zhafira & Zahra, 2025). Furthermore, this model is relatively flexible when combined with digital learning media, thus offering the potential for further development in modern learning contexts.

However, studies on the implementation of the Make a Match model still exhibit several limitations. Previous literature predominantly focuses on evaluating the model's effectiveness on a small scale and within specific local contexts, without providing a comprehensive or easily understandable illustration of broader trends. There is a significant research gap regarding how this classic cooperative model adapts to the characteristics of digital-native students, who are more responsive to multimedia stimuli (Widodo & Kurniawan, 2023). Research on integrating the Make a Match model with digital technologies, such as learning applications and online platforms, remains relatively limited, particularly regarding the challenges and opportunities of implementation in the post-pandemic era (Bond

et al., 2021). This situation highlights a significant research gap, particularly in mapping research trends, identifying implementation patterns, and analyzing the challenges and opportunities for implementing the Make a Match model in elementary school science learning in the digital era (Fauzi & Suryadi, 2022).

Previous literature reviews have generally discussed student achievement descriptively and have not comprehensively analyzed implementation trends, dominant learning media, research characteristics, and opportunities for digital integration in elementary school science learning. Furthermore, no recent *systematic literature review* has specifically examined how the Make a Match model has been adapted to the learning characteristics of digital-native students in the context of elementary school science education in Indonesia during 2021–2025. Consequently, there remains limited synthetic evidence on integrating digital technologies into the Make a Match model and its implications for improving elementary school science learning outcomes.

Recent studies emphasize that technology-enabled cooperative learning environments can significantly enhance students' motivation, engagement, collaborative interactions, and digital literacy in science learning contexts (Choi & Bae, 2023; Yang, 2023). Furthermore, the integration of interactive digital platforms and multimedia-based learning has been reported to support student-centered learning experiences that align with the characteristics of digital-native learners (Rismah & Efendi, 2023). Therefore, this study seeks to fill this gap by systematically analyzing the implementation trends of the Make a Match model, identifying the dominant learning media used in science learning in elementary schools, and exploring the challenges and opportunities of digital integration through a Systematic Literature Review approach (Bond et al., 2021).

The uniqueness of this study lies in its analytical focus, which goes beyond simply summarizing the effectiveness of the Make a Match model in improving learning outcomes. It regularly examines implementation trends, dominant learning media, research characteristics, and opportunities to integrate digital technologies such as gamification, Android-based applications, and interactive learning platforms in the context of elementary science education (Sulistiawan, 2025). Using the PRISMA 2020 protocol, this review synthesizes recent findings from Indonesian studies published between 2021 and 2025 to

identify emerging patterns and shifts in the use of learning media (Page et al., 2021). Furthermore, this study contributes to the literature by highlighting the limited adoption of digitally integrated Make a Match learning and proposing future directions for technology-based cooperative learning innovations in elementary schools (Choi & Bae, 2023). To the authors' knowledge, no previous systematic literature review has specifically synthesized the adaptation of the Make a Match learning model to digitally integrated elementary science learning environments in Indonesia.

Therefore, the main objective of the study is to analyze the implementation trends of the Make a Match learning model in improving elementary school students' science learning outcomes and to evaluate the challenges and opportunities of digital integration in contemporary learning environments. The findings of this study are expected to provide theoretical and practical contributions to the development of cooperative learning strategies that are adaptive to technological advances and the characteristics of digital generation learners.

Based on the identified research gaps, this study addresses the following research questions: (1) What is the trend of implementing the Make a Match learning model in elementary school science education in Indonesia during 2021–2025? (2) How effective is the Make a Match model in improving elementary school students' science learning outcomes? (3) What are the challenges and opportunities that arise in integrating digital technology into the Make a Match learning model?

■ METHOD

This study employed a Systematic Literature Review (SLR) approach to systematically identify, evaluate, and interpret all research relevant to the topic. This method aims to map recent developments, identify key theories, and reveal research gaps (Ananda & Rafida, 2022; Page et al., 2021), ensuring a transparent, replicable, and easily understandable research process. The SLR research stages are shown in Figure 1.

This review strictly followed the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol to ensure transparency and consistency throughout the literature review

process. The stages included identification, screening, eligibility assessment, and inclusion of relevant studies.

Search Strategy

The literature search was conducted in February 2026 using two main databases: Google Scholar and GARUDA (Digital Reference Garba). In addition to Google Scholar and GARUDA, this study also considered international databases such as Scopus, Web of Science (WoS), ERIC, and DOAJ to ensure broader academic coverage. However, the search results indicated that studies specifically addressing the implementation of the Make a Match model in elementary school science education, particularly in the Indonesian context, remain limited in internationally indexed databases. Therefore, this review prioritizes nationally indexed studies while also incorporating international findings to enhance its comprehensiveness. These databases were selected for their broad coverage and relevance to Indonesian academic publications. The search employed Boolean keywords such as “Make a Match” AND “Learning Outcomes” AND “Science” AND “Elementary School,” with a publication period limited to 2021–2025. This focus was chosen to capture the most recent trends.

Although international indexing databases such as Scopus and Web of Science are widely recognized for their rigorous peer-review standards and high-quality publication coverage, a preliminary search revealed that studies specifically addressing the implementation of the Make a Match model in elementary school science education in Indonesia remain relatively limited in these databases. Many relevant studies on classroom-based learning innovations in Indonesian elementary schools are more commonly published in nationally accredited journals indexed by GARUDA or accessible through Google Scholar. Therefore, the use of Google Scholar and GARUDA enabled the retrieval of broader, contextually relevant studies that align with the objectives and geographic scope of this systematic literature review. However, reliance on these databases may limit the inclusion of broader international perspectives, a consideration for future systematic literature reviews.



Figure 1. SLR research stages

Selection Process

The article selection process consists of four stages: identification, screening, eligibility, and inclusion, following the PRISMA 2020 framework. The PRISMA 2020 protocol guided the SLR approach to ensure a systematic, transparent, and replicable process. The literature search was conducted in February 2026 using two databases, Google Scholar and GARUDA, selected for their broad coverage and relevance to Indonesian academic publications.

The article selection process consists of four stages: identification, screening, eligibility, and inclusion, following the PRISMA 2020 framework (Figure 2). Inclusion and exclusion criteria were established to ensure that only relevant and high-quality studies were selected for analysis, as presented in Table 1. Initially,

2,789 articles were identified from Google Scholar (2,740) and GARUDA (49). After removing 15 duplicate records, 2,774 articles were screened based on title and abstract relevance. The screening process resulted in 100 potentially relevant studies for full-text assessment. Subsequently, 60 articles were excluded for failing to meet the methodological and topical relevance criteria established for this review. Ultimately, 10 articles met all inclusion criteria and were selected for further analysis. This study focuses on studies conducted in the context of primary education in Indonesia, with a geographic limitation intentionally applied to provide a more contextual understanding of the implementation of the Make a Match model in the Indonesian education system.

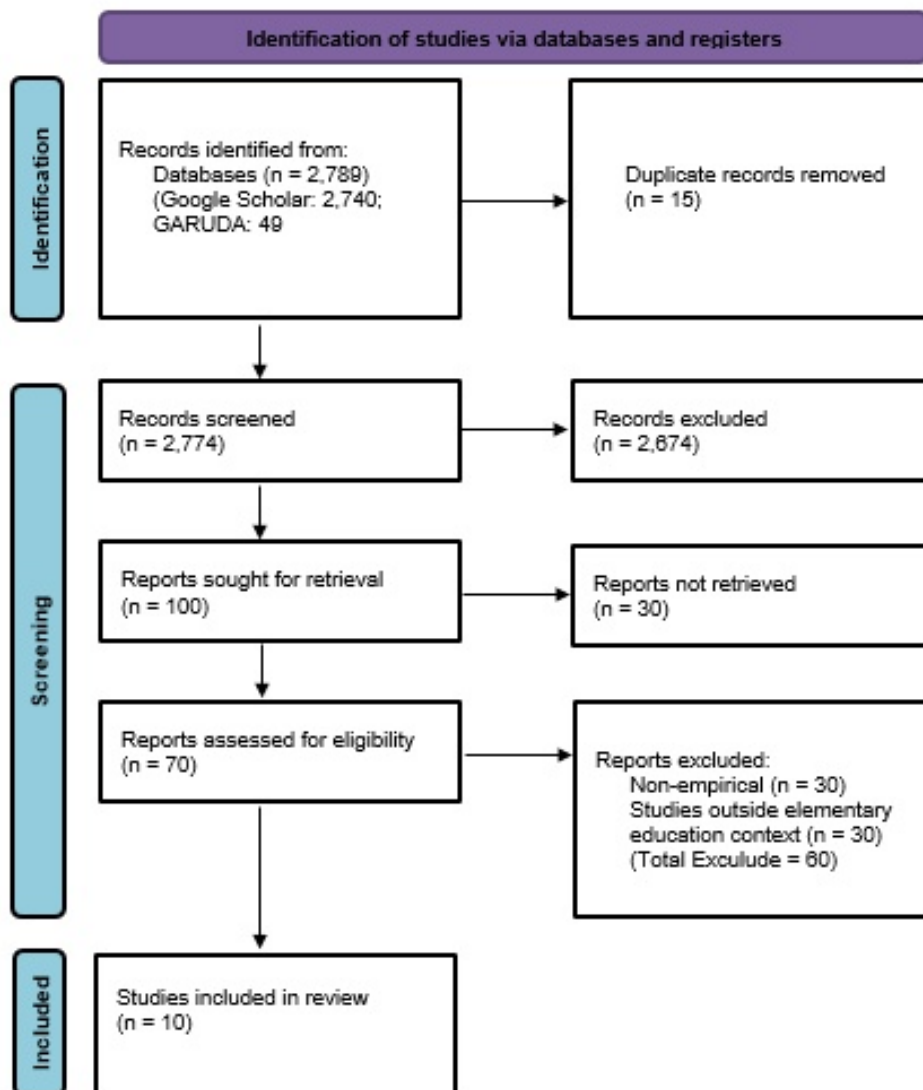


Figure 2. Prisma 2020 Flow Diagram

Table 1. Inclusion and exclusion criteria of selected studies

Criteria	Inclusion	Exception
Publication Year	Studies published between 2021 and 2025	Studies published before 2021
Level of education	Elementary school students	Middle school or higher education
Research Topics	The "Make a Match" model in science/science learning	Non-science learning topics
Research Design	Empirical research articles	Opinions, essays, and non-research articles
Geographic Coverage	The context of Indonesian education	Non-Indonesian context
Language	English and Indonesian	Other languages
Accessibility	Articles accessible in full text.	Articles containing only an abstract

Data Extraction and Synthesis

The data extraction process was conducted independently by two researchers using a predetermined synthesis matrix. The extracted data included the research design, sample characteristics, learning media, implementation context, and student learning outcomes in the cognitive, affective, and psychomotor domains. Any differences in data interpretation or classification were discussed collaboratively until consensus was reached, ensuring data reliability and consistency throughout the review process. After the extraction process was completed, the collected data were analyzed thematically to identify implementation trends, effectiveness across cognitive, affective, and psychomotor domains, as well as challenges and opportunities for digital integration in the Make a Match learning model in the context of elementary school science education.

Quality Assessment

To ensure methodological rigor and enhance the credibility of the review process, the quality of selected studies was assessed using the Mixed Methods Appraisal Tool (MMAT). The MMAT assessment was conducted systematically by evaluating methodological appropriateness, data collection procedures, consistency of study design, sample adequacy, and clarity of reported findings in each study. Each article was independently assessed by both authors using the MMAT criteria, and any discrepancies were resolved through discussion and consensus.

The assessment results indicate that the majority of the selected studies exhibited good methodological quality. Specifically, 80% of the studies were categorized as high quality, while the remaining were classified as moderate quality. To improve methodological

transparency and provide clearer information regarding study quality, an additional column labeled "MMAT Quality Score" was added to Table 2, presenting the final quality assessment score for each selected article. This systematic approach to quality assessment strengthens the transparency, reliability, and methodological rigor of this systematic literature review. Furthermore, data triangulation was applied by comparing findings from nationally indexed studies with insights from international literature to identify whether the observed patterns represent local characteristics or broader educational trends.

Table 2. MMAT quality score

MMAT Score	Quality Category
76–100%	High
51–75%	Moderate
≤50%	Low

■ RESULTS AND DISCUSSION

A systematic literature search was conducted using Google Scholar and GARUDA databases during the 2021–2025 publication period. A total of 2,789 articles were initially identified, comprising 2,740 from Google Scholar and 49 from GARUDA. After removing duplicates, screening titles and abstracts, and assessing full-text eligibility in accordance with the PRISMA 2020 protocol, 10 studies met all inclusion criteria and were selected for final analysis.

The selected studies show that the Make a Match learning model has been widely applied in elementary science education in Indonesia. Most studies employed Classroom Action Research (CAR) and quasi-experimental designs to improve science learning outcomes, student engagement, and class participation. Furthermore, the findings indicate that

Table 3. Data extraction of learning outcomes from selected studies

No	Author	Year	Media Used	Research Design	Pre-test	Post-test	Improve ment (%)
1.	Lestari & Wahyuni	2023	Flashcard	Classroom Action Research	68.4	84.7	23.8%
2.	Ningrum & Nugraheni	2025	Picture Card	Classroom Action Research	70.2	82.5	17.5%
3.	Pratama & Wulandari	2025	Visual Media	Classroom Action Research	65.0	80.0	23.1%

conventional learning media, such as flashcards, matching cards, and picture cards, remain dominant. At the same time, only a small number of studies integrate digital learning technologies, such as e-modules and interactive multimedia platforms.

To enhance the clarity of data presentation and avoid reliance solely on textual matrices, the findings were further visualized using a sunburst chart to illustrate the hierarchical distribution of learning media used in the selected studies. The visualization categorizes the data into two main groups: conventional media and digital media, followed by subcategories such as flashcards, printed cards, e-modules, and quiz-based applications. This approach provides a clearer representation of the proportion and dominance of each media type within the Make a Match learning model. The results indicate that conventional card-based media remains dominant, while digital-based media are emerging as complementary tools, reflecting a transitional trend toward

technology-integrated learning.

To further present quantitative evidence on learning outcomes, data from selected studies reporting pre-test and post-test scores are summarized in Table 3. Table 3 presents the extracted quantitative data from selected studies, highlighting the comparison between pre-test and post-test scores. The data show consistent improvements in students' learning outcomes following the implementation of the Make a Match learning model.

Two studies received an MMAT score of 80% because certain methodological aspects, particularly the clarity of data analysis procedures and consistency of reporting, were not fully described. Meanwhile, the remaining studies met all MMAT assessment indicators and therefore achieved a score of 100%. Based on the 10 selected articles, the implementation of the Make a Match learning model consistently improved elementary students' learning outcomes in IPAS subjects. The reviewed studies indicated increased classroom

Table 4. Results of the review of 10 selected articles

No	Title	Article Identification	Key Findings & Effectiveness	MMAT Score
1.	Implementation of the Make A Match Cooperative Learning Model Assisted by E-Modules on the Science Learning Outcomes of Fourth Grade Students of SD Negeri 1 Mayong in the 2024/2025 Academic Year (Sumayasa et al., 2025).	Torch Education: Journal of Educational Sciences (Volume 23, Number 1, Special Edition, Year 2025).	The use of electronic modules within the <i>Make a Match framework</i> has proven to be a crucial innovation capable of overcoming low learning outcomes in science subjects resulting from conventional teaching methods.	100%
2.	The Influence of the Make A Match Type Cooperative Model on the Learning Outcomes of Science in Grade IV of SDN 77 Palembang (Zaleha et al., 2025)	Perkhasa Basic Education Journal, Vol. 11, No. 2, October 2025.	This study shows that this cooperative learning pattern has a much more significant influence on the learning achievement of fourth-grade students than the lecture method.	100%
3.	Improving Science Learning Outcomes through the Make a Match Cooperative Learning Model Assisted by Card Media in Grade IV Students of Elementary Schools (Rahayu & Wardani, 2024)	Elementaria Journal. Volume 7, Number 1.	Using the Classroom Action Research approach, this model consistently improves students' cognitive competencies and psychomotor skills across science subjects.	100%

4.	Improving Learning Outcomes through the Demonstration-Assisted Make-A-Match Model in Elementary Schools (Farhana, 2025)	JIIP (Scientific Journal of Educational Sciences), Volume 8, Number 9, September 2025.	The synergy between card-matching and demonstration techniques successfully transformed complex scientific material into something more concrete and enjoyable for fifth-grade students.	100%
5.	Implementation of the Make A Match Type Cooperative Learning Model Assisted by Smart Snakes and Ladders Game Media to Improve Science Learning Outcomes of Fourth Grade Students at SDN IKIP Complex, Makassar City (Hasim, 2024)	CJPE: Cokroaminoto Journal of Primary Education, Volume 7, Number 2, October 2024.	Combining traditional games into a cooperative model effectively relieves boredom and improves academic achievement through play-while-learning activities.	80%
6.	Improving Student Learning Outcomes Using the Make A Match Learning Model in Science Subjects in Grade III of SD N 067240 Medan in the 2024/2025 Academic Year (Ginting et al., 2024)	Didactics: Scientific Journal of PGSD FKIP Universitas Independent, Volume 10, Number 03, September 2024.	Implementation in the lower class (Class III) has proven to foster dynamic teacher-student interaction and make basic science concepts easier to understand.	100%
7.	The Impact of the Make a Match Learning Model Using Picture Cards to Improve Science Learning Outcomes in Grade V Elementary Schools (Tamelab & Japa, 2021)	Journal of Educational Action Research, Volume 5, Number 4, Year 2021.	The use of visual illustrations on card media significantly helps elementary school students to concretize their understanding of abstract science concepts.	100%
8.	The Effect of the Make A Match Learning Model Assisted by Visual Media on Learning Outcomes and Student Activity in Grade IV of Pegadangan 2 Elementary School (Rahmawati, 2025)	Indonesian Journal of Educational Dynamics, Vol. 6, No. 3, August 2025.	This strategy has been proven highly effective at boosting two main variables simultaneously: the cognitive aspect (learning outcomes) and the affective aspect (student activity).	100%
9.	Implementation of the Make A Match Learning Model for Science Learning Outcomes for Grade IV (Situmeang, 2025)	CALAKAN: Journal of Literature, Language, and Culture, Volume 3, Number 2, July 2025.	Implementing this model is an effective solution to the problems of low student interest and a lack of passion for materials science lessons at the elementary level.	80%
10.	The Influence of the Make A Match Type Cooperative Learning Model Assisted by Flashcard Media on Science Learning Outcomes in Grade V Students of UPT SD Negeri 065011 Medan Selayang in the 2024/2025 Academic Year (Emilia et al., 2025)	Proceedings of the National Seminar on Education, Science, Social, and Law (PSSH), Volume 4, March 2025.	The integration of flashcards positively impacts mastery of science concepts, making the learning environment more active than the traditional approach.	100%

participation, more active interaction, and improved understanding of learning materials following the integration of matching-based cooperative activities.

The following discussion draws on secondary literature beyond the 10 selected SLR articles to strengthen the theoretical

interpretation (Nabilla, 2025). Explained that the Make a Match model improved students' social interaction and classroom engagement. In addition, cooperative learning environments encourage collaborative problem-solving and active participation among students (Gillies, 2021).

Interpretation of Make a Match Model Implementation Trends

Analysis of the literature shows that the Make a Match model remains a relevant and popular choice for improving science learning outcomes at the elementary school level. Its implementation trend is dominated by Classroom Action Research (CAR) studies oriented towards improving the quality of learning in specific classroom contexts (Ningrum & Nugraheni, 2025). This pattern indicates that teachers are actively seeking innovative solutions to address low science learning outcomes, often caused by the dominance of traditional lecture methods, as identified by Jessani (2015).

Although this model has high flexibility, the most prominent trend is the use of conventional or manual learning media (Sakinah, 2024). The majority of studies still integrate *Make a Match* with physical media such as visual aids, flashcards, picture cards, or even traditional games (Emilia et al., 2025). Only one study explicitly reports the use of digital media (e-modules) in the context of *Make a Match* (Sumayasa et al., 2025). This trend indicates a gap between the potential of educational technology and its implementation practices in the field. Although students in the digital era exhibit digital-native characteristics and respond positively to interactive media (Hsu et al., 2023), the adoption of technology in the *Make a Match* model has not yet become a dominant trend in recent publications.

The dominance of conventional media suggests that teachers still prioritize direct cooperative interactions, as physical matching activities are considered easier to implement and more effective at facilitating communication and collaboration among students. However, this trend also reflects a relatively limited transformation towards digitally integrated cooperative learning environments, despite the increasing demands of technology-oriented education and the learning characteristics of digital-generation students, who tend to respond positively to interactive and multimedia-based learning experiences (Hsu et al., 2023).

Effectiveness of the Make a Match Model in Improving Science Learning Outcomes

The synthesis results consistently confirm the effectiveness of the *Make a Match* learning model in improving elementary school students' science learning outcomes. Significant improvements were identified not only in cognitive achievement, as reflected in higher grade point averages and mastery of classical learning, but also in broader participation and

student engagement (Ningrum & Nugraheni, 2025; Sa'diyah et al., 2025). Quantitative findings from several studies further strengthen this conclusion (Lestari & Wahyuni, 2023). Quantitative findings from the selected studies consistently indicate that implementing the *Make a Match* model improves students' science learning outcomes. However, the magnitude of these improvements varies across studies depending on the learning context, learning media, and research design. Overall, the findings demonstrate a positive trend in improving students' academic achievement and participation in learning. These findings indicate that the *Make a Match* model not only contributes to increased classroom engagement but also to measurable improvements in academic achievement (Pratama & Wulandari, 2025).

To deepen the analysis, this study further examines the relationship between methodological quality and the magnitude of learning outcomes. Based on the MMAT assessment, most of the selected studies were categorized as having moderate to high quality. Studies with higher methodological rigor tend to report greater improvements in students' learning outcomes. For example, one study reported an increase in mean scores from 68.4 (pre-test) to 84.7 (post-test), indicating a substantial improvement. This improvement is consistent with the quantitative data presented in Table 2, which shows a similar pattern of increased learning outcomes across multiple studies. This difference reflects a large practical impact of the *Make a Match* learning model on students' cognitive achievement. Selected studies with sufficient statistical data were used to estimate effect sizes, which generally indicate moderate to large effects. This finding strengthens the conclusion that the effectiveness of the *Make a Match* model is not only descriptive but also supported by meaningful quantitative impact.

This analysis shows that methodological quality, as measured by MMAT, is positively associated with the magnitude of learning outcomes, meaning that more rigorously designed studies tend to produce stronger evidence of effectiveness. Therefore, future research is recommended to include more detailed statistical reporting to enable a more robust meta-analytic evaluation.

This model has also been shown to be effective in helping students understand abstract science concepts, facilitating the understanding of conceptually rich material, and reducing learning boredom caused by monotonous teaching methods (Pratama & Wulandari, 2025). Furthermore, the synthesis

of the selected articles indicates that the reported learning improvements are predominantly focused on the cognitive domain. Evidence regarding affective and psychomotor outcomes remains limited and is not consistently reported across the reviewed studies. However, studies outside the selected SLR dataset have reported that the Make a Match model can also enhance students' motivation, participation, communication skills, and social interaction (Nabilla, Zaleha et al 2025). These findings are presented as supporting literature rather than as primary evidence from this systematic review.

Challenges and Opportunities for Implementation in the Digital Era

The trend of implementing the "Matching" model, which is still dominated by conventional learning media, presents challenges and opportunities in the digital era. Most of the selected studies used physical learning media such as flashcards, picture cards, and traditional matching games. In contrast, only a small number of studies explicitly integrated digital technologies such as e-modules or interactive learning platforms (Sumayasa et al., 2025). These findings indicate that digital integration in the "Matching" model has not become a dominant practice in elementary school science learning, despite the increasing demand for technology-oriented education.

One of the key challenges identified in this review concerns teachers' digital pedagogical competencies for adapting cooperative learning activities to technology-enabled environments. Transitioning from traditional card-matching activities to interactive digital platforms requires more than simply converting printed materials into digital formats. Teachers must be able to design learning environments that maintain collaborative interactions, active communication, and cognitive engagement while effectively integrating digital features. However, several studies indicate that limited technological infrastructure, unequal access to digital devices, and a lack of teacher preparedness remain barriers to implementing digitally integrated cooperative learning models (Siddiq et al., 2024).

However, the digital era also presents significant opportunities to expand the pedagogical potential of the Make a Match model. Successful implementation of e-modules and interactive learning media demonstrates that digital integration can enhance learning flexibility, accessibility, motivation, and classroom engagement (Sumayasa et al., 2025). Features such as

gamification, immediate feedback, multimedia visualizations, and adaptive learning platforms can strengthen student participation and enhance the science learning experience more effectively than conventional approaches alone (Suparmi et al., 2025). These findings confirm that the transition to digitally integrated Make a Match learning is not only feasible but also potentially highly effective in supporting a student-centered learning environment.

Therefore, this review suggests that future research should focus on developing effective technology-integration frameworks for elementary school teachers, particularly on maintaining cooperative learning principles in digital learning environments. Such development is crucial to ensure that innovations in Make a Match learning go beyond conventional implementation and become more responsive to the educational needs and learning characteristics of digital-generation students in contemporary elementary school classrooms.

One specific example of digital constructivist implementation can be seen in the use of quiz applications such as Quizizz or Wordwall integrated with the Make a Match model. In this scenario, students worked collaboratively in small groups to match digital question cards to their corresponding answers displayed on an interactive quiz platform. The gamification features, including real-time scoring, leaderboards, and instant feedback, encourage active peer discussion and collaborative problem-solving. Unlike conventional card-based media, digital quiz applications enable students to negotiate answers dynamically, monitor group performance in real time, and engage more deeply during learning activities. This finding strengthens the constructivist perspective that knowledge is actively constructed through social interaction and collaborative digital experiences.

Limitations of the Review

This systematic literature review has several limitations that need to be acknowledged. First, the literature search was limited to Google Scholar and GARUDA databases, which may have limited the inclusion of a broader international perspective and studies indexed in international databases such as Scopus and Web of Science. Second, most of the selected studies used a Classroom Action Research (CAR) design conducted in the specific context of Indonesian elementary schools, which may limit the generalizability of the findings to broader educational settings. Third, only a small number of studies have

integrated digital learning technologies into the Make a Match model, indicating that empirical evidence on implementing technology-supported cooperative learning in elementary school science education remains relatively limited. Therefore, future systematic reviews are encouraged to include broader international databases and explore a wider range of technology-supported cooperative learning studies to strengthen the comprehensiveness of the findings.

■ CONCLUSION

An analysis of the literature published between 2021 and 2025 generally indicates that implementing the Make a Match learning model positively impacts the quality of science learning in elementary schools. This model not only enhances cognitive achievement and student learning mastery but also improves non-cognitive aspects such as motivation, classroom engagement, and social interaction, which are relevant to the vision of the Independent Curriculum. However, these findings should be interpreted with caution, as publication bias cannot be completely ruled out. Studies reporting significant positive results are generally more likely to be published than studies with limited or insignificant findings, which may influence the overall trends identified in this review. Furthermore, most implementations in the field still rely heavily on conventional media such as physical cards, indicating a substantial gap between the potential of modern educational technology and current classroom practices.

This technological gap presents both challenges and opportunities for digitizing the Make a Match model to better suit the characteristics of contemporary learners. The integration of digital media, such as e-modules and interactive learning platforms, shows potential to increase learning flexibility, interactivity, and student engagement. Therefore, future research should focus on developing a digitally integrated and gamified Make a Match model to ensure that cooperative learning strategies remain adaptive, effective, and responsive to the demands of digital education.

This review has several limitations that should be acknowledged. First, the number of selected studies was relatively limited: only 10 articles met all inclusion criteria, which may affect the generalizability of the findings. Second, this review focuses specifically on the Indonesian elementary school context and relies primarily on Google Scholar and GARUDA databases. As a result, potentially relevant studies indexed in international

databases may not have been fully captured. Therefore, future systematic literature reviews are encouraged to include a broader range of databases and larger datasets to strengthen the comprehensiveness and validity of future findings.

■ DECLARATION OF GENERATIVE AI USAGE IN THE WRITING PROCESS

During the preparation of this manuscript, the authors used ChatGPT, developed by OpenAI, solely for language editing, grammar refinement, and improving academic sentence structure. All conceptual development, data analysis, interpretation of findings, and final manuscript revisions were conducted independently by the authors. The authors take full responsibility for the content and integrity of the final manuscript.

■ REFERENCE

- Adinda, AS (2026). Systematic literature review: Application of understanding by design in improving learning outcomes and student engagement. *Multidisciplinary Journal of Academic Sciences*, 3 (1), 398–410.
- Akuma, F. V., & Callaghan, R. (2022). Teaching practices and challenges regarding the use of inquiry-based science education in primary schools. *Teaching and Teacher Education*, 10 (2), 85–98. <https://doi.org/10.1016/j.tate.2022.103761>
- Ananda, R., & Rafida, T. (2022). Systematic literature review in educational research: Concepts, procedures, and implementation. *Journal of Education and Culture*, 7(2), 120–130.
- Bond, M., Bedenlier, S., Marin, VI, & Händel, M. (2021). Facilitating student engagement through educational technology: A systematic review. *Computers & Education*, 164, 104120. <https://doi.org/10.1016/j.compedu.2020.104120>
- Budiarti, MR, & Wakhudin. (2026). Improving elementary school students' digital literacy through culture-responsive Canva-based science learning. *Journal of Innovation and Research in Primary Education*, 5(1). <https://doi.org/10.56916/jirpe.v5i1.2842>
- Choi, J.-M., & Bae, J.-H. (2023). The effect of digital writing-based science classes on elementary school students' science learning motivation and scientific attitudes. *Journal of Elementary Education Research*, 38(1), 37–64. <https://doi.org/10.23279/>

- eer.38.1.202302.37
- Emilia, R., Dedi, P., & Firdaus, A. (2025). The effect of the make a match cooperative learning model assisted by flashcard media on science learning outcomes in fifth grade students. *Education, Science, Social and Law (PSSH)*, 4, 1–11.
- Farhana, H. (2025). Improving learning outcomes through the make-a-match model assisted by demonstrations in elementary schools. *JIIIP - Scientific Journal of Educational Sciences* (2025) 8(9), 8, 10457–10462. <https://doi.org/10.54371/jiip.v8i9.9191>
- Fauzi, A., & Suryadi, D. (2022). Challenges and opportunities for 21st-century learning in elementary schools in the digital era. *Journal of Elementary Education*, 13 (1), 1–10.
- George, M. L., & Siranchuk, V. (2025). From teacher-centered to learner-driven: A review of the progression towards student-centric education models and practices. *International Journal of Educational Research Reviews*, 10 (1), 45–60. <https://doi.org/10.1234/ijerr.2025.001>
- Gillies, RM (2021). Cooperative learning: Theory, research, and practice in enhancing social interaction and student learning outcomes. *International Journal of Education*, 15 (2), 101–115.
- Ginting, EL, Wahyuni, S., & Khoiriah, H. (2024). Improving student learning outcomes using the make-a-match learning model in science subjects in grade 3 of SDN 067240 Medan. *Didactics: Scientific Journal of Elementary School Teacher Training and Education*, 10, 304. <https://doi.org/10.36989/didactics.v10i03.3802>
- Hasim, AR (2024). Application of the make-a-match cooperative learning model assisted by the smart snakes and ladders game media to improve science learning outcomes of fourth-grade students at SDN Kompleks IKIP Makassar City. *Cokroaminoto Journal of Primary Education*, 7(2), 327–338. <https://doi.org/10.30605/cjpe.7.2.2024.4614>
- Hasnawati, Astria, FP, Syazali, M., Putra, GP, Septiani, M., & Anggreni, M. (2025). Identification of elementary school students' scientific literacy skills after the implementation of the Independent Curriculum. *BIOCHEPHY: Journal of Science Education*, 5 (1), 761–766. <https://doi.org/10.52562/biochephy.v5i1.1697>
- Hsu, T. C., Chang, S. C., & Hung, Y. T. (2023). The effects of digital learning environments on student engagement and learning outcomes: A systematic review. *Educational Technology & Society*, 26(2), 45–60.
- Jessani, S.I. (2015). Science education: Issues, approaches and challenges. *Journal of Education and Educational Development*, 2(1), 79. <https://doi.org/10.22555/joeed.v2i1.51>
- Lestari, S., & Wahyuni, D. (2023). The influence of cooperative learning models on elementary school students' motivation and learning activeness. *Indonesian Journal of Elementary Education*, 8(2), 120–130.
- Mengkido, K., & Rahman, A. (2026). Enhancing science and social studies learning outcomes through the picture and picture cooperative learning model: A classroom action research in Indonesian elementary education. *Journal of Innovation and Research in Primary Education (JIRPE)*, 5 (1), 1629–1641. <https://doi.org/10.56916/jirpe.v5i1.3136>
- Nabilla. (2025). Application of the make-a-match cooperative learning model to improve social skills and science learning outcomes in fifth-grade elementary school students. *Scientific Journal of Education*, 13(1). <https://doi.org/10.20961/jkc.v13i1.88475>
- Ningrum, DA, & Nugraheni, R. (2025). The effectiveness of the digital media-based make-a-match learning model on elementary school students' learning outcomes. *Scientific Journal of Elementary Education*, 10 (1), 25–34.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Prasetyo, S., Nurdin, I.F., Noviar, D., & Abroto. (2025). The influence of collaborative constructivist approaches on improving science learning outcomes in slow learners in elementary school. *Indonesian Journal of Educational Development (IJED)*, 6(2), 676–690. <https://doi.org/10.59672/ijed.v6i2.4800>
- Pratama, RA, & Wulandari, D. (2025). The effectiveness of the make-a-match learning model in overcoming student boredom in science learning. *Perkhasa Elementary Education Journal*, 11 (1), 60–70.
- Prayoga, A., Setiawan, D., & Rahmawati, I. (2025). Digital-based collaborative

- learning to enhance student engagement in elementary education. *Indonesian Journal of Elementary Education*, 10 (1), 15–27.
- Rahayu, S., & Wardani, K. (2024). Improving science learning outcomes through the make-a-match cooperative learning model assisted by cards in fourth-grade elementary school students. *Journal of Elementary Education and Social Humanities*.
- Rahmawati. (2025). The influence of the make a match learning model assisted by visual media on learning outcomes and student activity in grade IV of Pegadingan 2 Elementary School. *Jurnal Dinamika Pendidikan Nusantara*, 6 (1), 46.
- Rismah, E. R., & Efendi, N. (2023). The effect of cooperative learning on science learning outcomes: A study of fourth-grade elementary school students. *Academia Open*, 8(1). <https://doi.org/10.21070/acopen.8.2023.4380>
- Sa'diyah, N., Hidayat, T., & Prasetyo, A. (2025). Implementation of the make a match model in classroom action research to improve elementary school students' learning outcomes. *Basicedu Journal*, 9(1), 120–130.
- Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, 32 (1), 77–112. <https://doi.org/10.1007/s10648-019-09498-w>
- Sakinah, L. (2024). The effect of the make-a-match cooperative learning model assisted by digital flashcard media on the cognitive learning outcomes of elementary school students in science. *Scientific Journal of Elementary Education*, vol. 9. <https://doi.org/10.23969/jp.v9i3.14842>
- Saleha, S., Nurhayati, N., & Amalia, R. (2024). Innovation in digital learning models to meet the needs of 21st century students. *International Journal of Instruction*, 17 (3), 233–248.
- Siddiq, F., Hatlevik, O.E., Olsen, R.V., Throndsen, I., & Scherer, R. (2024). Readiness and challenges of technology integration in learning in the post-pandemic era. *Journal of Educational Research*, 24 (1), 12–25.
- Situmeang, SN (2025). Application of the make a match learning model to improve science learning outcomes in fourth grade. *Elementary School Scientific Journal*, 2 (2), 243–252. <https://doi.org/10.61492/calakan.v3i2.367>
- Sulistiawan, B. (2025). Development of the Smart Apps Creator application in Android-based science learning to improve students' cognitive learning outcomes in elementary schools. *Indonesian Action Research Journal (ARJI)*, 7(3). <https://doi.org/10.61227/arji.v7i3.386>
- Sumayasa, K., Sudarsana, I.K., Putu, N., & Prastya, C. (2025). Implementation of the Make a Match cooperative learning model assisted by e-modules on the science learning outcomes of fourth-grade students at SD Negeri 1 Mayong in the 2024/2025 academic year. *Suluh Pendidikan: Jurnal Ilmu-Ilmu Pendidikan*, 23 (1), 1105–1114. <https://doi.org/10.23887/pspj.v23i1>
- Suparmi, S., Sukmawati, F., Santosa, E.B., Cahyono, B.T., & Prihatin, R. (2025). Digitally integrated cooperative learning models to enhance student creativity: Comparative analysis across creativity dimensions. *Journal of Educational Science and Technology (EST)*, 11 (2), 92. <https://doi.org/10.26858/est.v11i2.78265>
- Tadesse, T., Ware, H., Asmare, A., & Gillies, R.M. (2024). Enhancing engagement and learning outcomes through cooperative learning in the classroom. *Education Sciences*, 14 (9), 975.
- Tamelab, H., & Japa, IGN (2021). The impact of the make-a-match learning model using picture cards to improve fifth-grade science learning outcomes in elementary school. *Journal of Education Action Research*, 5(4), 478–482. <https://doi.org/10.23887/jear.v5i4.12340>
- Widodo, A., & Kurniawan, R. (2023). Classroom action research as an effort to improve the quality of learning in elementary schools. *Journal of Elementary Education and Learning*, 10 (2), 145–156.
- Woods, D., & Copur-Gencturk, Y. (2024). Student-centered versus teacher-centered instruction: Implications for learning and pedagogical knowledge. *Teaching and Teacher Education*, 132, 104251. <https://doi.org/10.1016/j.tate.2023.104251>
- Yang, S. (2023). Development of an instructional model for improving digital literacy in elementary school science classes and the application effect. *Korean Open Access Journal (KOAJ)*, 51 (3), 322–341. <https://doi.org/10.15717/bioedu.2023.51.3.322>
- Zaleha, S., Rahman, A., & Lestari, H. (2025). The influence of the make a match type cooperative model on the science learning outcomes of class IV SDN 77

- Palembang. *Perkhasa Basic Education Journal*, 11(2), 1329–1339. <https://doi.org/10.31932/jpdp.v11i2.4936>
- Zhafira, T., & Zahra, F. A. (2025). The effect of the make a match type cooperative learning model on student learning outcomes in the human respiratory system. *Universe Journal of Science Education*, 6 (2).