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Effects of index card match and card sort on reading comprehension and collaboration

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Abstract
This study investigated the effects of Index Card Match (ICM) and Card Sort (CS) learning models on fourth-grade students' reading comprehension and collaboration skills. Using a quasi-experimental pretest–posttest non-equivalent group design, the study involved 54 students from SDN 1 Depok, assigned to ICM (n = 27) and CS (n = 27) groups. Data were collected through reading comprehension tests, collaboration questionnaires, observations, and interviews, and validated using expert judgment, Pearson product–moment correlation, and Cronbach's Alpha. Data analysis employed descriptive statistics, paired t-tests, independent t-tests, and MANOVA. Results showed that both models significantly improved students' reading comprehension and collaboration. ICM produced greater gains in comprehension, while CS more effectively enhanced collaboration. These findings highlight the value of cooperative learning in supporting literacy and social skills within the Merdeka Curriculum, and position ICM and CS as effective instructional strategies for strengthening primary students' academic and collaborative competencies.
Keywords: Index Card Match; Card Sort; Reading Comprehension; Collaboration Skills; Cooperative Learning

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INTRODUCTION

One of the essential language skills that students must master is reading, particularly reading comprehension. Reading comprehension is a core literacy skill that determines learning success across different subjects (Song et al., 2025). Developing reading habits from an early age is crucial to establish a sustainable culture of learning (Ariawan & Winoto, 2021). In addition, reading broadens perspectives, enhances knowledge, and deepens understanding (Aisyah et al., 2020) .As a complex process, reading comprehension requires readers to concentrate on key information within a text (Meng et al., 2025). However, the literacy level of Indonesian students remains relatively low. Evidence from international assessments, such as PIRLS (Progress in International Reading Literacy Study) and PISA (Programme for International Student Assessment), indicates that Indonesia ranked 69th out of 80 countries in 2022, 72nd out of 77 in PISA 2018, and 45th out of 48 in PIRLS 2016 (Sari et al., 2022). These findings demonstrate that elementary schools must prioritize strengthening students' reading comprehension skills as a foundation for successful learning and higher-order literacy development (Rothville & Skalicky, 2025).

Previous preliminary observations support this broader problem. Interviews and

observations conducted in 4th grade students at Cluster 8, Depok District, Sleman Regency, Yogyakarta, revealed several challenges in Indonesian language learning, particularly in reading comprehension. Students demonstrated limited ability to explain textual content and faced difficulties in identifying main ideas, characters, plot, and moral values. Furthermore, some students read hesitantly, which reduced their comprehension. The learning process was also constrained by the teacher's reliance on a teacher-centered direct instructionteacher-centered direct instruction model, with minimal application of innovative strategies. This situation suggests that more engaging, student-centered, and collaborative instructional models are needed to improve comprehension outcomes.

Another challenge in learning is the lack of students' collaboration skills, where only a few actively participate while others remain passive. In fact, collaboration is a key 21st-century competence and is also assessed in international evaluations by the OECD (Marmoah et al., 2022). Previous studies highlight its importance: Bai et al. (2025) show that cooperation in learning fosters engagement, critical thinking, and deeper understanding through dialogue. Latorre-Cosculluela et al. (2025) emphasize that interactive strategies enhance cooperative learning and create positive group dynamics. Mostafa et al. (2025) find that team-based learning environments improve communication and collaborative practices and Schürmann et al. (2025) demonstrate that group reflection not only strengthens collaboration but also boosts academic outcomes. Therefore, developing students' collaboration is not only complementary but also integral to achieving comprehensive literacy skills.

The Index Card Match (ICM) and Card Sort (CS) models are relevant because they integrate reading activities, information processing, and cooperative work. Research shows that interventions combining vocabulary, comprehension strategies, and active engagement are more effective than single approaches (Denton et al., 2022). Likewise, integrating direct instruction with collaborative activities helps students clarify understanding through discussion (Rogde et al., 2019). Cooperative learning also fosters positive engagement and teamwork (Veldman et al., 2020), while structured interventions strengthen inferential comprehension (Barnes et al., 2024).

Both models have been widely recognized as active learning strategies that foster student engagement and interaction in the classroom. Studies confirm that they improve learning outcomes and conceptual understanding (Amir et al., 2021; Raipartiwi, 2022). ICM, for instance, requires students to actively match question and answer cards, which increases participation while also promoting cooperation and responsibility (Fatmawati, 2021; Tias et al., 2020). Similarly, CS emphasizes sorting and categorizing information, helping students process concepts while engaging in collaborative activities (Rasmuin, 2020). Despite these benefits, most research has primarily examined cognitive outcomes such as mastery and performance, with limited attention to collaboration skills, a critical 21st-century competence (Bai et al., 2025). Moreover, the application of ICM and CS in Indonesian language instruction particularly in improving reading comprehension at the elementary level remains underexplored. This study therefore seeks to examine the effectiveness of ICM and CS in enhancing both reading comprehension and collaboration among fourth-grade students.

Several previous studies have confirmed the positive effects of the Index Card Match (ICM) model on student outcomes and collaboration. Raipartiwi, (2022) found that ICM increased student engagement and improved mastery learning in elementary classrooms, while Amir et al. (2021) reported that the model enhanced conceptual understanding and active participation. Similarly, the Card Sort (CS) model has also been shown to strengthen learning interest and responsiveness. Novitasari and Rezania (2022) demonstrated that CS promoted higher levels of student motivation and more effective participation in social studies. From these relevant studies, it can be concluded that both ICM and CS contribute positively to enhancing conceptual understanding and student engagement. However, limited research has specifically examined how ICM and CS impact students' collaborative skills within the context of Indonesian language

learning, particularly reading comprehension. Therefore, the present study seeks to investigate the effects of ICM and CS on these aspects.

In this study, the researcher aims to investigate (1) the effect of the ICM learning model on fourth-grade elementary school students' reading comprehension and collaborative skills in Indonesian language subjects, (2) the effect of the CS learning model on fourth-grade elementary school students' reading comprehension and collaborative skills in Indonesian language subjects, (3) the differences in reading comprehension between students taught using the ICM model and those taught using the CS model, and (4) the differences in collaborative skills between students taught using the ICM model and those taught using the CS model.

This research is expected to contribute to the existing body of knowledge by providing insights into the effectiveness of the ICM and CS models in simultaneously improving reading comprehension and collaborative skills among fourth-grade elementary school students. The findings may serve as a reference for educators in selecting and applying instructional strategies for Indonesian language learning that not only enhance cognitive outcomes but also promote students' social and collaborative competencies, in line with the principles of the Kurikulum Merdeka.

METHODS

This study employed a quantitative approach using a quasi-experimental method. Experimental research is designed to examine the causal effect of a treatment on specific outcomes under controlled conditions (Creswell & Creswell, 2018). The design applied was the pretest–posttest non-equivalent comparison group design, which compares the changes in students' outcomes before and after treatment between two non-randomized groups. This design was selected because random assignment was not possible in the school setting, yet it allowed for meaningful comparison between groups.

The population of this study consisted of fourth-grade students from Gugus 8 elementary schools in Depok Subdistrict, Sleman Regency, Special Region of Yogyakarta, including SD N Depok 1, SD N Depok 2, SD N Mustokorejo, and SD N Timbulharjo. The sampling technique employed was non-probability sampling, meaning that participants were not selected randomly but based on specific considerations such as accessibility, particular characteristics, or the researcher's judgment. Specifically, purposive sampling was applied because within the cluster, only one school, SD N Depok 1, had parallel classes with similar student characteristics. Class IV A was assigned as Experimental Class 1, which received the ICM model, while Class IV B was designated as Experimental Class 2, which received the CS model.

Table 1. The total of fourth grade students

No.	Schools	Total of Students
1.	SD N Depok 1	54
2.	SD N Depok 2	26
3.	SD N Mustokorejo	28
4.	SD N Timbulharjo	28
Total		136

Table 2. Fourth grade students in the sample

No.	Group	Class	Total of Student
1.	Experimental Class 1	IV A	27
2.	Experimental Class 2	IV B	27
Total			54

The research instruments were validated through expert judgment to ensure content validity. Two language education experts from Universitas Negeri Yogyakarta reviewed the reading comprehension test and the collaboration questionnaire. The reading comprehension test consisted of 10 multiple-choice items and 5 extended-response questions, while the

collaboration questionnaire comprised 15 Likert-scale statements. The experts assessed the instruments for relevance, clarity, and alignment with the learning objectives. Based on their feedback, several revisions were made to improve item formulation and content accuracy before the instruments were administered to students. This process ensured that the instruments met the requirements for content validity and reliability.

Two dependent variables were examined: reading comprehension and collaboration skills. Data were collected using the validated instruments, and their reliability was confirmed (Cronbach's Alpha > 0.70). Data analysis involved descriptive statistics, assumption testing (Shapiro–Wilk for normality and Levene's test for homogeneity of variances), and hypothesis testing using paired t-tests, independent t-tests, and MANOVA with a significance level of 0.05. These procedures ensured a rigorous evaluation of the effects of the ICM and CS models on students' cognitive and collaborative outcomes. The study was conducted ethically, with permission from the school and informed consent obtained from teachers and students.

RESULTS AND DISCUSSION

Results

This section presents the results of statistical analyses examining the effects of the Index Card Match (ICM) and Card Sort (CS) learning models on students' reading comprehension and collaboration skills. The analyses include descriptive statistics, assumption testing, and inferential comparisons through t-tests and MANOVA.

Descriptive Statistics

Table 3 presents the descriptive statistics of the pretest and posttest scores for reading comprehension and collaboration skills. Both groups showed relatively similar mean scores before the treatment, indicating comparable initial conditions. After the treatment, both groups experienced improvement, with the ICM group showing greater gains in reading comprehension, while the CS group performed better in collaboration skills.

Table 3. Descriptive statistics of pretest and posttest scores

No.	Variable	Group	Pretest Mean	Posttest Mean	Sig.(2-tailed)
1.	Reading Comprehension	ICM	61	76.15	0.000
		CS	53.33	67	0.000
2.	Collaboration Skills	ICM	67.7	79.07	0.000
		CS	63.52	70.3	0.000

These results indicate that both ICM and CS models are effective in enhancing students' outcomes, though each model emphasizes different learning aspects.

Assumption Tests

The assumption tests were conducted prior to hypothesis testing and included both normality and homogeneity checks. The Shapiro–Wilk test showed that the pretest and posttest data in both groups had significance values greater than 0.05, indicating that the data were normally distributed and met the requirements for parametric analysis. In addition, Levene's Test demonstrated significance values above 0.05, confirming that the variances across groups were homogeneous. Therefore, the dataset fulfilled the assumptions necessary for subsequent t-tests and MANOVA.

Results Within-Group Comparisons (Paired T-Test)

The paired *t*-test results showed that both the ICM and CS groups experienced a statistically significant improvement in reading comprehension and collaboration skills ($p < 0.05$). This indicates that each model was effective in improving students' learning outcomes from pretest to posttest.

Between-Group Comparisons

The independent t-test on posttest scores revealed significant differences between the two groups. Students in the ICM class scored higher in reading comprehension compared to those in the CS class ($p = 0.033, < 0.05$). Conversely, while both groups improved in collaboration skills, the CS group achieved higher posttest scores in collaboration and the difference was statistically significant ($p = 0.000, < 0.05$).

Table 4. Independent t-test results

No.	Variable	Group	Mean Difference	T	df	Sig.(2-tailed)
1.	Reading Comprehension	ICM	9.148	2.185	52	0.033
		CS				
2.	Collaboration Skills	ICM	8.518	3.916	52	0.000
		CS				

Based on these results, ICM proved more effective in enhancing reading comprehension, while CS demonstrated stronger effects on collaboration performance, supported by statistically significant differences between the two groups ($p < 0.05$). Therefore, the findings indicate that learning models influence different skill domains ICM supports deeper text processing, whereas CS optimally facilitates interactive and cooperative learning.

Multivariate analysis

The MANOVA results confirmed that the type of learning model had a significant multivariate effect on students' reading comprehension and collaboration skills simultaneously (Wilks' Lambda, $p < 0.05$). This suggests that the learning models not only influenced each outcome individually but also contributed collectively to students' academic and social competencies.

Table 5. Multivariate tests

Multivariate Tests						
Grade Effect		Value	F	Hypothesis df	Error df	Sig.
	Pillai's Trace	.261	9.023[b]	2.000	51.000	0.000
	Wilks' Lambda	.739	9.023[b]	2.000	51.000	0.000
	Hotelling's Trace	.354	9.023[b]	2.000	51.000	0.000
	Roy's Largest Root	.354	9.023[b]	2.000	51.000	0.000

The multivariate test results (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) indicated a significance value of $0.000 < 0.05$. These findings suggest that the ICM and CS learning models have a significant simultaneous effect on students' reading comprehension and collaboration skills. These results indicate that the learning models simultaneously influenced both academic (reading comprehension) and social (collaboration) competencies. Rogde et al., (2019) and Veldman et al. (2020) found that combining structured instruction with interactive strategies produces both cognitive and interpersonal benefits.

Comparisons of key findings and interpretations

The findings revealed that both the Index Card Match (ICM) and Card Sort (CS) models significantly improved students' reading comprehension and collaboration skills. This result indicates that active and cooperative learning strategies are effective in fostering both cognitive and social outcomes in elementary language learning. Specifically, the ICM model was found to be more effective in enhancing students' reading comprehension. The structured matching process in ICM encouraged students to recall, connect, and analyze textual information, thereby promoting deeper processing and understanding of the text.

Meanwhile, the CS model was more effective in developing students' collaboration skills, as it required students to work together to categorize information and negotiate meanings. Although the statistical difference in collaboration scores between the two groups was not significant, the qualitative observations showed that students in the CS class demonstrated more interactive and cooperative behaviors.

The results of the multivariate analysis (MANOVA) further confirmed that both models had significant simultaneous effects on reading comprehension and collaboration. This finding reinforces the pedagogical importance of integrating cooperative learning approaches in Indonesian language instruction. It also aligns with the Merdeka Curriculum's emphasis on literacy, collaboration, and 21st-century competencies. Overall, this study contributes empirical evidence that student-centered learning models such as ICM and CS can effectively support both literacy development and social learning in the elementary school context.

Discussion

Results the ICM model on students' reading comprehension and collaboration skills

The implementation of the Index Card Match (ICM) model in the experimental class (Grade IVA, SD Negeri Depok 1) demonstrated a notable improvement in both reading comprehension and collaboration skills. The pretest results indicated that students' average reading comprehension score was 61, while their collaboration skill score was 67.70. These results highlight that many students still struggled with understanding longer texts and analyzing intrinsic elements within the reading material. Such difficulties align with the view that comprehension is a foundational component of advanced literacy and a determinant of academic success (Rothville & Skalicky, 2025). In other words, students' inability to engage with more complex texts suggests that they had not yet fully integrated the various basic reading skills into a coherent literacy competence.

The use of the ICM model proved effective in addressing these challenges. By encouraging students to match and categorize key information from texts while engaging in peer discussion, the model fostered not only comprehension of textual content but also collaboration, exchange of perspectives, and collective meaning-making. This finding supports Veldman et al. (2020), who argued that cooperative learning enhances positive engagement among elementary students. It also resonates with Barnes et al. (2024), who emphasized that structured interventions could strengthen reading comprehension skills. Thus, seemingly simple activities such as card-matching in groups may serve as an effective pedagogical strategy to simultaneously improve students' reading comprehension and collaboration.

After six sessions of ICM implementation, posttest results showed a significant increase in both competencies. Students' reading comprehension scores rose from 61 to 76.15, while collaboration scores increased from 67.70 to 79.07. The paired-samples t-test confirmed that these gains were statistically significant ($p < 0.05$). These results indicate that the ICM model had a positive and significant effect on both reading comprehension and collaboration. Beyond the statistical evidence, this improvement demonstrates the potential of interactive and student-centered instructional models to overcome learning barriers in elementary education.

Results comparisons the impact of the CS model on students' reading

The implementation of the Card Sort (CS) model in the experimental class (Grade IVB, SD Negeri Depok 1) showed significant improvement in students' reading comprehension and collaboration skills. The pretest results revealed an average score of 53.33 for reading comprehension and 63.52 for collaboration, both of which were below the minimum competency standard. This suggests that conventional teaching methods, which relied mainly on textbooks, were not sufficiently engaging to stimulate students' interest or comprehension. In this context, the CS model offered an effective alternative strategy to address these challenges. As noted by Meng et al. (2025) reading comprehension is a complex process that requires readers to filter out irrelevant information and concentrate on the most important ideas.

The CS model facilitated this process by engaging students in sorting, selecting, and categorizing information from texts, enabling them to focus more effectively on key concepts.

After six sessions of CS implementation, posttest results demonstrated substantial gains, with reading comprehension scores increasing from 53.33 to 67 and collaboration scores rising from 63.52 to 70.3. The paired-samples t-test confirmed that these improvements were statistically significant ($p < 0.05$). These findings indicate that the success of the CS model lies in its capacity to integrate individual cognitive processing with collaborative group activities. By actively sorting information and engaging in peer interaction, students not only deepened their understanding of the text but also strengthened their ability to negotiate meaning and share perspectives. This is consistent with the findings of Rogde et al. (2019), who argued that language comprehension is more effective when direct instruction is combined with collaborative activities, as peer discussion helps clarify meaning.

The Card Sort (CS) model is an active learning strategy that utilizes paper slips containing information or instructional material. This approach is designed to help students understand various concepts, recognize specific characteristics of the subject matter, and review material previously delivered by the teacher. The CS model emphasizes physical activity and student engagement, thereby fostering a more dynamic and interactive classroom atmosphere, particularly when students feel bored or lack motivation (Rasmuin, 2020). In addition, the CS model provides opportunities for students to collaborate, exchange ideas, and strengthen comprehension, making it highly relevant for improving both reading comprehension and collaborative skills.

The results of this study contribute to the growing body of research on literacy instruction by highlighting the effectiveness of the Card Sort model as an integrative strategy. Beyond improving reading comprehension, CS promotes essential 21st-century skills such as collaboration and communication, which are increasingly recognized as central to student success. However, it should be noted that the study was limited to a relatively small sample in a single school and within a short period of implementation. Future research should therefore test the model across broader contexts and longer durations to explore its long-term impact on literacy and collaboration development.

Comparisons Difference in The Effect of ICM and CS on Reading Comprehension

This study employed an independent t-test to examine the differences in the effects of the Index Card Match (ICM) and Card Sort (CS) models on students' reading comprehension. The results showed a significant difference between the two models (Sig. = 0.033 < 0.05), indicating that ICM was more effective than CS in improving students' comprehension skills. The higher mean score achieved by students in the ICM class confirms its stronger influence compared to CS.

These findings are consistent with Denton et al. (2022), who argued that reading interventions combining vocabulary, comprehension strategies, and active student engagement are more successful than single-component approaches. Both ICM and CS may be considered multi-component strategies, as they require students to recognize vocabulary, process information, and collaborate. However, ICM appears to provide a more engaging and cognitively stimulating environment. The card-matching activity in ICM requires students to search for, identify, and connect information actively, which not only supports comprehension but also maintains student focus. This is supported by Raihan et al., (2023), who found that ICM significantly enhanced students' concentration by creating a more enjoyable learning atmosphere.

The advantages of ICM also align with Latorre-Cosculluela et al. (2025), who emphasized that interactive learning strategies promote cooperative learning and generate more positive group dynamics. Thus, ICM can be understood not merely as a tool for improving reading comprehension but also as a means of fostering effective collaboration in the classroom. These

results highlight the potential of ICM as a comprehensive instructional strategy that integrates cognitive, affective, and social dimensions of learning, thereby offering stronger outcomes compared to CS

Comparisons of differences in the effect of ICM and CS collaboration skills

The independent t-test results indicated a significant difference in collaboration skills between students taught with Index Card Match (ICM) and those taught with Card Sort (CS), with Sig. = 0.000 < 0.05. The higher mean score in the ICM group demonstrates that this model was more effective in fostering collaborative abilities. This finding is consistent with Bai et al. (2025), who highlighted that cooperative learning models enhance student engagement, critical thinking, and deep understanding through collective dialogue and meaning making. Similarly, Mostafa et al. (2025) emphasized that group work strengthens communication and collaborative practices, which are integral to 21st-century learning.

The superiority of ICM in promoting collaboration can be explained by its interactive activities, which require students to actively search for and match information with peers, thereby encouraging teamwork and mutual dependence. This is in line with Schürmann et al. (2025), who found that group discussions and reflections significantly improve student performance and learning outcomes. Hence, ICM can be considered not only an instructional strategy for comprehension but also a more effective model than CS in developing essential collaboration skills in elementary classrooms.

Comparisons of multivariate difference of ICM and CS models on reading

A MANOVA test was employed to analyze simultaneous multivariate differences in the combination of reading comprehension and collaboration skills between students taught using the Index Card Match (ICM) model and those taught with the Card Sort (CS) model. The results revealed a significance value of 0.000 < 0.05, indicating that the learning model had a significant effect on both variables simultaneously. This finding confirms that the implementation of cooperative learning models, whether ICM or CS, can effectively facilitate the integrated development of literacy and collaboration skills. This aligns with constructivist theory, which emphasizes the role of social interaction and collaborative activities in building knowledge (Vygotsky, 1978).

Feng and Wei (2025) argue that collaborative learning becomes more effective when students are given clear roles and appropriate feedback, thereby fostering behavioral, cognitive, and emotional engagement. This resonates with the findings of this study, as demonstrated through MANOVA, that both ICM and CS not only influence reading comprehension but also enhance collaboration. These models provide opportunities for students to exchange information, work together based on assigned roles, and co-construct understanding through classroom interaction.

The results are further supported by Fatmawati (2021), further support the results by demonstrating that ICM fosters both cognitive growth and socio-emotional development. This suggests that ICM not only improves comprehension but also cultivates cooperation, independence, and responsibility. Similarly, Amir et al. (2021) noted that ICM strengthens conceptual understanding through active and enjoyable pair activities, enabling students to construct meaning from shared learning experiences rather than relying on rote memorization. Meanwhile, CS has also been shown to positively impact teamwork and learning motivation. Rasmuin (2020) demonstrated that CS encourages students to actively participate in discussions and work more effectively in groups. Taken together, the evidence suggests that while ICM is more prominent in enhancing reading comprehension and CS is more effective in fostering collaboration, both models complement each other and serve as valuable alternatives for teaching Bahasa Indonesia in elementary schools.

Overall, the results reveal that both Index Card Match (ICM) and Card Sort (CS) models effectively enhance literacy and collaboration in elementary classrooms, though each exhibits distinctive strengths. ICM facilitates deeper cognitive engagement through interactive matching activities, while CS encourages structured teamwork. The findings thus reinforce the pedagogical relevance of cooperative models in Indonesian language instruction, aligning with the Merdeka Curriculum's goal of cultivating literacy, collaboration, and independent learning among students.

Research Limitation

This study has several limitations that need to be considered. The study limited its analysis to reading comprehension and collaboration skills, neglecting other crucial aspects like motivation, learning interest, and critical thinking. In addition, external factors, including students' physical and psychological conditions, could not be fully controlled, which may have affected the results. The scope of the study was also limited, as it was conducted only in two classes (IVA and IVB) at SD Negeri Depok 1, thus reducing the generalizability of the findings. Furthermore, variations in students' academic abilities, particularly among slow learners who required more time to understand the material, presented additional challenges in the implementation of the learning models.

CONCLUSION

The findings of this study indicate that both the Index Card Match (ICM) and Card Sort (CS) models significantly enhanced fourth-grade students' reading comprehension and collaboration skills in Indonesian language learning. The ICM model generated higher gains in reading comprehension, suggesting that the process of matching information encourages deeper cognitive engagement with texts, whereas the CS model facilitated greater collaborative interaction, although the difference between the two models remained statistically non-significant. These findings highlight that ICM is more cognitively oriented while CS offers stronger social engagement potential, making the two models complementary rather than competing approaches. Theoretically, this study reinforces the relevance of cooperative and active learning frameworks in supporting literacy development within the Merdeka Curriculum context. Practically, teachers are encouraged to implement both models flexibly and adaptively based on classroom needs to optimize comprehension and collaborative learning outcomes. Future research may expand this work by examining long-term implementation, integrating additional variables such as motivation or critical thinking, and applying the models to different text genres or grade levels to deepen understanding of cooperative learning effectiveness in elementary literacy instruction.

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REFERENCES

Aisyah, S., Yarmi, G., Sumantri, M. S., & Iasha, V. (2020). Kemampuan Membaca Permulaan Melalui Pendekatan Whole Language di Sekolah Dasar. *Jurnal Basicedu*, *4*(3), 637–643. https://doi.org/10.31004/basicedu.v4i3.393

Amir, A., Azmin, N., Rubianti, I., & Olahairullah. (2021). Meningkatkan Motivasi Dan Hasil Belajar

Siswa Melalui Model Pembelaran Index Card Match Pada Pelajaran IPA Terpadu Jurnal PIPA: Pendidikan Ilmu Pengetahuan Alam. *Jurnal PIPA: Pendidikan Ilmu Pengetahuan Alam*, *02*(01), 1–6. https://doi.org/10.31004/10.56842/jp-ipa.v2i01.48

Ariawan, V. A. N., & Winoto, S. (2021). Total reading skills for elementary school students through the reading questioning answering model. *Jurnal Prima Edukasia*, *9*(1), 44–54. https://doi.org/10.21831/jpe.v9i1.34534

Bai, B., Zang, X., & Guo, W. (2025). Hong Kong students' motivational beliefs and emotions in collaborative learning in ESL classrooms: influences of actual and self-perceived English proficiency. *Social Psychology of Education*, *28*(1). https://doi.org/10.1007/s11218-024-10011-7

Barnes, M. A., Clemens, N. H., Simmons, D., Hall, C., Fogarty, M., Martinez-Lincoln, A., Vaughn, S., Simmons, L., Fall, A. M., & Roberts, G. (2024). A Randomized Controlled Trial of Tutor- and Computer-Delivered Inferential Comprehension Interventions for Middle School Students with Reading Difficulties. *Scientific Studies of Reading*, *28*(4), 411–440. https://doi.org/10.1080/10888438.2024.2331517

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage.

Denton, C. A., Hall, C., Cho, E., Cannon, G., Scammacca, N., & Wanzek, J. (2022). A meta-analysis of the effects of foundational skills and multicomponent reading interventions on reading comprehension for primary-grade students. *Learning and Individual Differences*, *93*, 1–33. https://doi.org/10.1016/j.lindif.2021.102062

Fatmawati, F. (2021). Efektivitas Model Permainan Kartu Indeks (Index Card Match) Terhadap Hasil Pembelajaran Perkembangan Kognitif Dan Sosial Emosional Anak Usia 5-6 Tahun Di TK Al-Harits. *Kiddo: Jurnal Pendidikan Islam Anak Usia Dini*, *2*(1), 27–39. https://doi.org/10.19105/kiddo.v2i1.3616

Feng, S., & Wei, Z. (2025). The CoMPAS Framework for Modeling Individual Participation in Collaborative Learning Processes: a Systematic Review. In *International Journal of Computer-Supported Collaborative Learning* (Vol. 20, Issue 4). Springer US. https://doi.org/10.1007/s11412-025-09450-x

Latorre-Cosculluela, C., Sierra-Sánchez, V., & Vázquez-Toledo, S. (2025). Gamification, collaborative learning and transversal competences: analysis of academic performance and students' perceptions. *Smart Learning Environments*, *12*(1). https://doi.org/10.1186/s40561-024-00361-2

Marmoah, S., Gestiardi, R., Sarwanto, S., Chumdari, C., & Maryani, I. (2022). A bibliometric analysis of collaboration skills in education (2019-2021). *Journal of Education and Learning (EduLearn)*, *16*(4), 542–551. https://doi.org/10.11591/edulearn.v16i4.20337

Meng, Z., Zhao, M., Yu, J., Xu, T., Li, X., Jin, D., Yu, R., & Yu, M. (2025). Read, Eliminate, and Focus: A reading comprehension paradigm for distant supervised relation extraction. *Neural Networks*, *185*(December 2024), 107138. https://doi.org/10.1016/j.neunet.2025.107138

Mostafa, S. K., Abdel-Rahman, R. H., Mansour, A. K., & El-Sherbeny, M. A. (2025). Fostering collaborative practice: a pilot study on interprofessional education through simulation-based team-oriented learning sessions among pharmacy and medical students. *Discover Education*, *4*(1). https://doi.org/10.1007/s44217-025-00407-8

Novitasari, A. E., & Rezania, V. (2022). The Influence of Card Sort Type Active Learning Strategy on Interests and Responses of Elementary School Students. *AL-ISHLAH: Jurnal Pendidikan*, *14*(3), 4291–4302. https://doi.org/10.35445/alishlah.v14i3.1855

Raihan, P., Tabroni, I., Wang, Y., & Zou, G. (2023). Index Card Match Learning Method to Improve Learning Concentration. *Journal of Computer Science Advancements*, *1*(2), 127–136. https://doi.org/10.55849/jsca.v1i2.480

Raipartiwi, N. K. (2022). Penerapan Metode Index Card Match Untuk Meningkatkan Keaktifan Dan Hasil Belajar Siswa. *Indonesian Journal of Educational Development*, *2*(4), 589–598.

https://doi.org/10.5281/zenodo.6203533

Rasmuin, R. (2020). Implementation of Sort Card Method to Improve Motivation and Learning Outcomes of MAN Batu Students. *FITRAH: Jurnal Kajian Ilmu-Ilmu Keislaman*, *6*(2), 161–172. https://doi.org/10.24952/fitrah.v6i2.2637

Rogde, K., Hagen, Å. M., Melby-Lervåg, M., & Lervåg, A. (2019). The effect of linguistic comprehension instruction on generalized language and reading comprehension skills: A systematic review. *Campbell Systematic Reviews*, *15*(4). https://doi.org/10.1002/cl2.1059

Rothville, K., & Skalicky, S. (2025). An examination of the utility of the Aozora Repository to support reading comprehension development, reading fluency, and extensive reading for L2 learners of Japanese. *System*, *129*(December 2024), 103564. https://doi.org/10.1016/j.system.2024.103564

Sari, N. T. A., Nurmahanani, I., Adjie, N., & Rajasa, G. (2022). Persepsi Siswa Sekolah Dasar Kelas Rendah Terhadap Aktivitas Membaca Nyaring (Reading Aloud) : Sebuah Studi Kasus. *Metodik Didaktik*, *17*(2), 92–103. https://doi.org/10.17509/md.v17i2.30845

Schürmann, V., Bodemer, D., & Marquardt, N. (2025). Applying debriefings in the context of higher education: How joint reflection fosters students' collaborative problem solving. In *Social Psychology of Education* (Vol. 28, Issue 1). Springer Netherlands. https://doi.org/10.1007/s11218-024-09991-3

Song, X., Razali, A. B., Sulaiman, T., & Jeyaraj, J. J. (2025). Effectiveness of online project-based learning on Chinese EFL learners' critical thinking skills and reading comprehension ability. *Thinking Skills and Creativity*, *56*(July 2024), 101778. https://doi.org/10.1016/j.tsc.2025.101778

Tias, I. W. U., Putri, B. D., & Pratiwi, D. (2020). Pengaruh Strategi Pembelajaran Aktif Tipe Index Card Match Terhadap Hasil Belajar Peserta Didik di Sekolah Dasar. *Jurnal Basicedu*, *4*(4), 1315–1325. https://doi.org/10.31004/basicedu.v4i4.553

Veldman, M. A., Doolaard, S., Bosker, R. J., & Snijders, T. A. B. (2020). Young children working together. Cooperative learning effects on group work of children in Grade 1 of primary education. *Learning and Instruction*, *67*, 101308. https://doi.org/10.1016/j.learninstruc.2020.101308

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.

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