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The Effect of Implementing Teams Game Tournament Learning Model Assisted by Wordwall in Improving Students' Social Skills

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ABSTRACT

Social skills are important for students to build positive interactions with others. However, these skills are still low because learning tends to focus on cognitive development. The solution offered is the implementation of a cooperative learning model of the Teams Game Tournament (TGT) type, assisted by Wordwall. Describing and analysing the differences in social skills between students who use the TGT model assisted by Wordwall and students who use the Number Head Together (NHT) model is the purpose of this study. Using a quantitative approach with a nonequivalent control group quasi-experimental design. Data were collected through tests and observations involving 43 fourth-grade students from SDN 177 Cipedes, using the total sampling technique. The data analysis showed that the control group obtained a gain score of 5.06, while the experimental group obtained a gain score of 9.80. The hypothesis test yielded a significance value < 0.005 , and the effect size using Cohen's d formula was 1.08, which falls into the large category. Based on those statements, it can be concluded that there is a significant difference in students' social skills (basic aspects of interaction, communication, team building, problem solving) between students who use the TGT model assisted by Wordwall and the NHT model, and the team games tournament learning model has a strong effect on improving students' social skills.

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1. INTRODUCTION

Education is the process of knowledge transfer through training, learning, or research to achieve specific goals. Helping educators develop students' social skills so they can face and solve various problems is one of the goals of education (Gunawan & Indriyani, 2021). However, in practice, there are still learning activities that focus on developing students' knowledge potential but do not optimize development in other aspects, such as the affective domain, which relates to social skills. Social skills are the extent to which a student can create and maintain appropriate social relationships, be accepted by others, build and maintain friendships, and end negative relationships.

The development of social skills is necessary because they do not emerge instantly but through a process of habituation shaped by the student's environment (Rahayu et al., 2016). Students with good social skills tend to adapt more easily to their surroundings and develop their potential. This statement is supported by Iswaningtyas (2017), who emphasizes that students with good social skills more readily develop qualities such as self-confidence, cooperation skills, and academic achievement. Students with poor social skills usually have difficulty controlling themselves, showing empathy, and interacting with others (Surya, 2018). (Murtafiah & Sahara, 2019) also argue that students need social skills to meet their social interaction needs and adapt to their surroundings.

The IPAS subject, which covers material on social sciences, is closely related to social skills. This is in line with the learning objectives of IPS, which aim to shape students into good citizens by developing knowledge, social skills, and social awareness that benefit themselves, society, and the country (Puspitaningdyah, 2018). The IPS learning material at the elementary school level not only covers knowledge about social sciences, but also includes various things that are beneficial for students' personal development and relevant to their current and future lives, especially in the context of the diversity of aspects of their living environment (Aulia et al., 2023).

Based on the results of a preliminary study conducted at SDN 177 Cipedes through interviews with fourth-grade homeroom teachers, several problems were identified in the learning process, particularly those that could impede the development of students' social skills. These problems include students who are selective in choosing friends, students who bully and tease their friends, students who interrupt their friends' conversations, students who hesitate to ask teacher questions when they do not understand the learning material, students who are unable to take responsibility for completing tasks when studying in groups, and students who are unable to respect differences of opinion.

Based on these conditions, efforts are needed to improve social skills by implementing a learning model supported by learning media that can stimulate students' social skill development. Research by Eldiana (2022) shows that the use of the TGT learning model has a significant effect on the social skills of fourth-grade students at SDN 1 Tambahrejo. Another study by Lustari (2021) revealed that implementing the Teams Game Tournament Learning Model improved students' social skills, as evidenced by an increase in observation results from 50% in cycle I to 80% in cycle II. To maximize the success of implementing the cooperative learning model of the teams-game tournament type in developing students' social skills, learning media that can support this learning model, namely Wordwall, are needed. Research by Qalbi et al. (2025) shows that social studies learning in fifth grade, using Wordwall media, significantly improves students' cooperation skills.

One of the many learning models and media that can address the problems stated earlier is the implementation of the Teams Game Tournament (TGT) cooperative learning model, assisted by Wordwall. The team game tournament learning model put students together in small groups of 4-6 people with diverse backgrounds, starting with a class presentation, teams, a game, a tournament, and teams' recognition. The TGT learning model, which incorporates games into the process, encourages students to learn in a more relaxed manner while still emphasizing responsibility, honesty, cooperation, healthy competition, and engagement in learning (Fathurrohman, 2015). It is expected that implementing the TGT cooperative learning model, assisted by Wordwall, in the IPAS subject will improve students' social skills.

2. METHODS

The approach used in this research is quantitative, employing a quasi-experimental design with a nonequivalent control group, comprising two groups: a control group and an experimental group.

Table 1. Quasi-experimental method with a non-equivalent control group research

Group	Pre-test	Treatment	Post-test
Experimental	O ₁	X	O ₂
Control	O ₃		O ₄

This research was conducted through three meetings, with 3 JPs (lesson hours) per meeting (35 minutes @ 1 JP). Both groups will be given a pretest to determine their equivalence. Then treatment is given to the experimental group. The next step is to administer a posttest to both groups and compare the posttest scores with the pretest scores. This research involved 43 fourth-grade students at SDN 177 Cipedes as the population. The sample for this research was selected using the total sampling technique. There are two groups in this research: class IV A as the experimental group and class IV B as the control group.

Table 2. The experimental class and the control class

No	Class	Number of Students	Description
1.	IV A	22	Experimental Class
2.	IV B	21	Control Class
Total		43	

The instruments used are tests (pretest and posttest) of social skills consisting of 32 multiple-choice questions and observation sheets. Normality tests, homogeneity tests, n-gain tests, and hypothesis tests (independent-samples tests) are the data analyses conducted in this research.

This study conducted construct and empirical validity tests—the construct validity test involved two expert judgements, resulting in the instrument being usable with revision. An empirical validity test was conducted through a trial of the instrument with students outside the research sample, namely all 55 fourth-grade students at SDN 212 Harapan.

The data obtained were then processed using Microsoft Excel and SPSS (Statistical Package for the Social Sciences), and the analysis used the Pearson Product-Moment Correlation. The

number of respondents in the trial test was 55 students, yielding an R-squared value of 0.265. Based on the validity test results from SPSS analysis of the 40 test items, 32 items were valid, and 8 were invalid. Based on these results, the research instrument used 32 valid items because they represented each aspect of the social skills being studied and had a sufficiently strong relationship with the measured variable.

The reliability test in this study used the Cronbach's Alpha technique. The results of the reliability test using Cronbach's Alpha or the Alpha coefficient with the assistance of SPSS version 28 are as follows:

Table 3. Reliability Statistics

<i>Cronbach's Alpha</i>	<i>N of Items</i>
.863	40

Based on Table 3.5, the reliability test results indicate an alpha coefficient of 0.863, which is higher than the r-table value (0.265), i.e., $0.863 > 0.265$. It can be concluded that, overall, the items in the developed instrument are reliable and consistent for repeated use with the same subject under the same conditions, with a very high reliability level.

3. RESULTS AND DISCUSSION

The research was conducted during three meetings in each class (with 3JP (lesson hours) of each meeting (35 minutes @ 1JP)) by implementing the Teams Game Tournament (TGT) cooperative learning model assisted by Wordwall. The pretest was given to 21 students in the control group and 22 students in the experimental group on the same day. The results are:

Table 4. Pretest results for the control and experimental groups.

Group	Total Score	Average	Lowest Score	Highest Score
Control	1656,25	78,86	43,75	96,87
Experimental	1803,12	81,96	65,62	96,87

The control group's pretest results obtained a total score of 1656,25 with an average score of 78,86. The minimum score in the control group was 43,75 and the maximum score was 96,87. In the experimental group, the total score obtained was 1803,12 with an average score of 81,96. The minimum score in the experimental group was 65,62 and the maximum score was 96,87. The posttest was given to 21 students in the control group and 22 students in the experimental group on the same day. The results are:

Table 5. The post-test results in the control group and the experimental group

Group	Total Score	Average	Lowest Score	Highest Score
Control	1762,5	83,92	62,5	96,87
Experimental	2018,75	91,76	78,12	100

The control group's posttest results obtained a total score of 1762,5 with an average score of 83,92. The minimum score in the control group was 62,5 and the maximum score was 96,87. The experimental group obtained a total score of 2018,75 with an average score of 91,76. The minimum score in the experimental group was 78,12 and the maximum score was 100. The experimental and control group gain score results are:

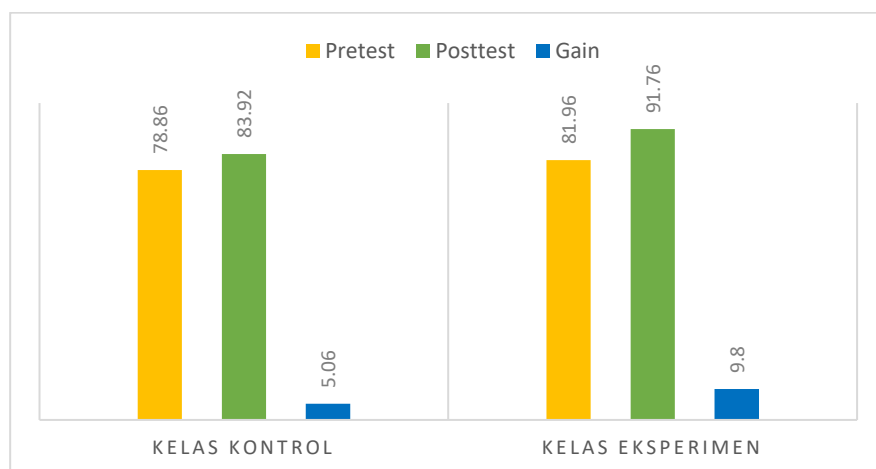


Figure 1. The experimental and control group gain score results are

The control group obtained a gain score of 5,06 and the experimental group obtained a gain score of 9.80. Based on these gain scores, both the control class and the experimental class experienced an increase. However, the increase in the experimental class exceeded that of the control class. The experimental and control group n-gain score results are:

Table 6. The experimental and control group n-gain score results

Group	Total N-Gain	N-Gain Average	N-Gain Percentage (%)
Experimental	12,56	0,57	57,13%
Control	2,75	0,13	13,11%

The experimental class obtained a total n-gain of 12,56, an average n-gain of 0,57, and an n-gain percentage of 57,13%, and was classified as quite effective. Meanwhile, the control class obtained a total n-gain of 2,75, an average n-gain of 0,13, and an n-gain percentage of 13,11%, and was classified as ineffective. This shows that the treatment, implemented through the TGT cooperative learning model assisted by Wordwall in the experimental class, was effective in improving students' social skills. The following shows the differences in the pretest, posttest, and gain scores of the experimental and control groups in graphical form for basic interaction skills:

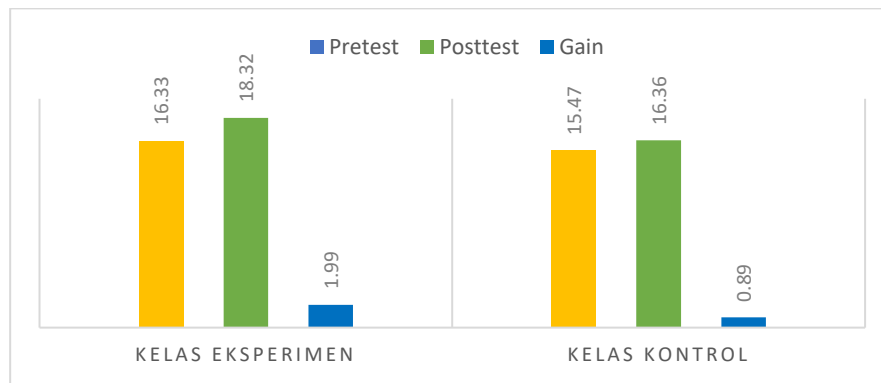


Figure 2. The differences in the pretest, posttest, and gain scores of the experimental and control groups for basic interaction skills

Comparison of pretest and posttest results for basic interaction skills between the control and experimental groups. The gain obtained by the experimental group was 1,99 with a pretest average of 16,33 and a posttest average of 18,32. Meanwhile, the gain for the control group was 0,89, with a pretest average of 15,47 and a posttest average of 16,36. The following shows the differences in the pretest, posttest, and gain scores of the experimental and control groups in graphical form for communication skills:

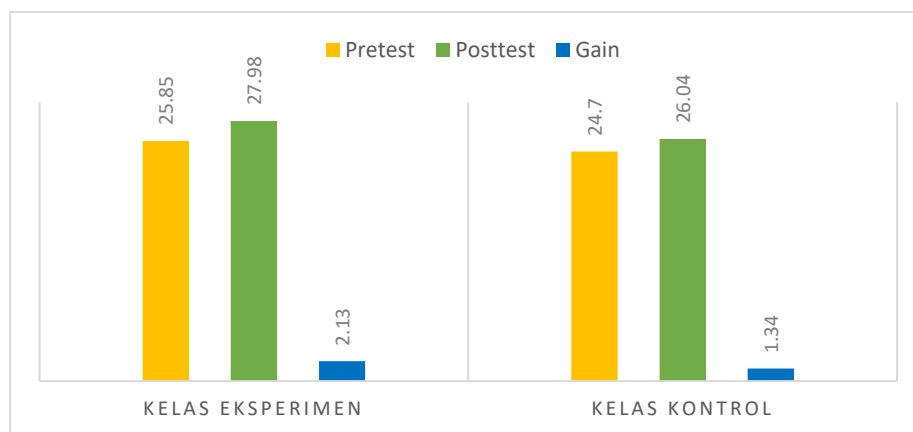


Figure 3. The differences in the pretest, posttest, and gain scores of the experimental and control groups are shown in graphical form for communication

Comparison of pretest and posttest results for communication skills between the control and experimental groups. The gain obtained by the experimental group was 2,13 with a pretest average of 25,85 and a posttest average of 27,98. Meanwhile, the gain for the control group was 1,34, with a pretest average of 24,70 and a posttest average of 26,04. The following shows the differences in the pretest, posttest, and gain scores of the experimental and control groups in graphical form for team-building skills:

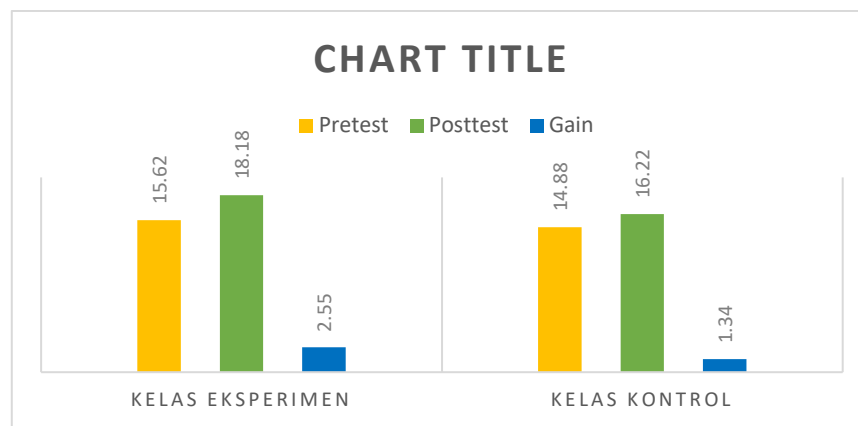


Figure 4. The differences in the pretest, posttest, and gain scores of the experimental and control groups are shown in graphical form for team-building skills

Comparison of pretest and posttest results for team-building skills between the control and experimental groups. The gain obtained by the experimental group was 2,55 with a pretest average of 15,62 and a posttest average of 18,18; meanwhile, the gain obtained by the control group was 1,34 with a pretest average of 14,88 and a posttest average of 16,22.

The following shows the differences in the pretest, posttest, and gain scores of the experimental and control groups in graphical form for problem-solving skills:

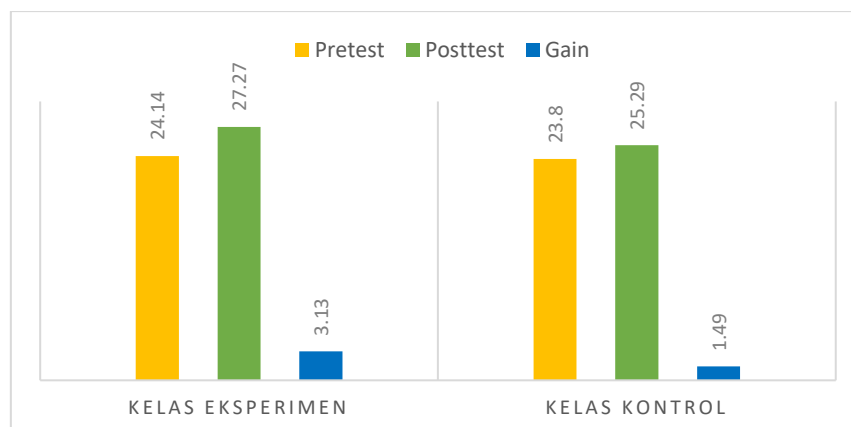


Figure 5. The differences in the pretest, posttest, and gain scores of the experimental and control groups are shown in graphical form for problem-solving skills

Comparison of pretest and posttest results for problem-solving skills between the control and experimental groups. The gain obtained by the experimental group was 3,13 with a pretest average of 24,14 and a posttest average of 27,27; meanwhile, the gain obtained by the control group was 1,49 with a pretest average of 23,80 and a posttest average of 25,29.

The research results based on observation are:

Table 7. The research results based on observation

Experimental			Control		
First Meeting	Second Meeting	Third Meeting	First Meeting	Second Meeting	Third Meeting
g					

Score	854	936	996	795	832	879
Average	38,81	42,54	45,27	37,85	39,61	41,53
Percentage	80%	88%	94%	72%	82%	87%

In the first meeting, the control class obtained an average score of 37,85, which increased by 1,76 in the second meeting to 39,61, and by 1,92 in the third meeting to 41,53. In the first meeting, the experimental class obtained an average score of 38,81, which increased by 3,73 in the second meeting to 42,54, and by 2,73 in the third meeting to 42,57.

The normality test results show that the pretest and posttest data of both groups are normally distributed, with the control group obtaining significance values (sig.) of 0,345 and 0,366. Meanwhile, the pretest and posttest data of the experimental group obtained significance values (sig.) of 0,352 and 0,197.

Table 8. Tests of Normality

		<i>Kolmogorov-Smirnov^a</i>			<i>Shapiro-Wilk</i>		
Kelas		Statistic	df	Sig.	Statistic	df	Sig.
Hasil	Pretest Kelas Kontrol	.131	21	.200*	.950	21	.345
	Posttest Kelas Kontrol	.151	21	.200*	.952	21	.366
	Pretest Kelas Eksperimen	.136	22	.200*	.952	22	.352
	Posttest Kelas Eksperimen	.158	22	.163	.940	22	.197

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The homogeneity test results showed that the data were homogeneous, with the homogeneity test results obtained by the experimental group and the control group being $0,052 > 0,05$.

Table 9. Test of Homogeneity of Variance

		<i>Levene Statistic</i>	df1	df2	Sig.
Hasil	Based on Mean	2.691	3	82	.052
	Based on Median	2.587	3	82	.059
	Based on Median and with adjusted df	2.587	3	65.848	.060
	Based on the trimmed mean	2.698	3	82	.051

The hypothesis test results obtained tcount of -3.589 with a degree of freedom of 41 and ttable of 2.019. Because tcount was negative, the ttable used was also negative, namely -2.019. In this general hypothesis test, it is known that $t_{calculated} > t_{table} = -3.589 > -2.019$, so H_0 is rejected, and H_1 is accepted. The hypothesis test also yielded a p-value of $0.001 < 0.05$, so H_0 is rejected, and H_1 is accepted. The data analysis shows a difference in social skills in the IPAS subject in grade IV between students who use the Teams Game Tournament (TGT)

cooperative learning model, assisted by Wordwall, and those who use the Number Head Together learning model.

Table 10. Independent Samples Test

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Nilai	Equal variances assumed	4.258	.045	-3.589	41	.001	-7.907	2.203	-12.356	-3.458
	Equal variances not assumed			-3.562	33.361	.001	-7.907	2.226	-12.434	-3.380

The effect of the Teams Game Tournament (TGT) model, assisted by Wordwall, on improving social skills aligns with the objectives of cooperative learning, which form the foundation of the TGT model. These objectives include encouraging students to improve their learning outcomes, helping them better accept individual differences, and fostering the development of social skills (Fathurrohman, 2015). This learning model provides students with lessons in cooperation and collaboration to prepare them to navigate their social environment.

The cooperative learning model of the Teams Game Tournament (TGT) type is one of the various cooperative learning models introduced by David DeVries and Keith Edwards, emphasizing learning in small groups. According to Slavin (2011), the TGT cooperative learning model emphasizes academic tournaments, using quizzes for both individual and group assessments. Group assessment is based on the team leader's role in guiding their members to compete with other groups studying the same material. During the research process, the implementation of the TGT cooperative learning model was supported by Wordwall media, particularly during the games and tournament phase.

The TGT cooperative learning model is easy to implement and engages all students equally, without differentiating based on status. It encourages student involvement as peer tutors, incorporates game elements to enhance enthusiasm, and includes reinforcement. When combined with Wordwall, the TGT model makes the learning process more engaging and enjoyable. Throughout the learning activities, students not only understand the material but also develop their social skills. Learning activities using the TGT model, assisted by Wordwall, place students into small groups where they must interact, collaborate, help one another, and show mutual respect. This is consistent with Fathurrohman (2015), who states that learning activities incorporating game elements designed within the TGT model provide opportunities for students to learn in a more relaxed environment while fostering responsibility, honesty, cooperation, healthy competition, and increased active participation.

In this model, students take on the role of peer tutors. At the same time, the game and tournament components provide opportunities for them to interact and exchange ideas as they solve problems. Consistent with Veloo and Chairhany (2013), implementing the Team Games Tournament model can enhance students' social skills. During the learning process, students are required to explain the material to group members who have not yet understood it; in other words, they act as peer tutors, which in turn contributes to the improvement of their social skills. The research conducted by Toifur and Kurniawan (2022) states that the

implementation of the TGT learning model has the potential to be effective in providing a significant positive influence on improving students' communication skills.

The influence of the TGT cooperative learning model, assisted by Wordwall, on improving students' social skills is evident in the combination of the model and media, which not only creates an enjoyable learning environment but also more efficiently supports the development of social skills. Throughout the learning process, students can participate in competitive and collaborative games. In addition, the group-based learning structure encourages students to actively collaborate and discuss while completing worksheets and answering questions during the games and tournament stages. Wordwall is simple, visually appealing, interactive, and straightforward, making students feel more enthusiastic during learning (Putra et al., 2021).

The effectiveness of the TGT cooperative learning model, assisted by Wordwall, in improving students' social skills is evident in behaviors such as more intensive peer interactions within small groups, respect for one another, collaboration to complete tasks, and mutual appreciation. These findings are based on the data obtained through pretests, posttests, and observations. The development of social skills is essential because they do not develop instantly; rather, they emerge through habitual practices shaped by the student's environment (Rahayu et al., 2016; Wulandari et al., 2025). Students who possess strong social skills are more likely to be accepted by their social environment and are better able to refine their competencies.

4. CONCLUSION

Based on the results of the research data analysis, it can be concluded that the implementation of the Teams Game Tournament (TGT) cooperative learning model, assisted by Wordwall, in the IPAS subject in grade IV has a significant effect on improving students' social skills. The data analysis also shows differences in students' social skills, including basic interaction skills, communication skills, team/group building skills, and problem-solving skills, between students who learn using the TGT cooperative learning model assisted by Wordwall and students who use the Number Head Together learning model. However, some relevant stakeholders may consider some recommendations:

- a. Teachers are encouraged to incorporate the Teams Game Tournament (TGT) cooperative learning model in combination with interactive learning media such as Wordwall into the learning process. The integration of TGT and Wordwall has been shown to enhance students' social skills across multiple dimensions while fostering an active, engaging learning environment. The syntax of the TGT model, together with the game-based features provided by Wordwall, supports students in developing interaction, communication, collaboration, and mutual assistance. Consequently, this approach contributes not only to improving students' cognitive skills but also to developing their social skills.
- b. Furthermore, to broaden the scope of inquiry, future studies are advised to apply this learning model to different educational levels, such as junior or senior high school. Such research would allow examination of the consistency and generalizability of the TGT model's effects, as assisted by Wordwall, across varied contexts and student populations.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

- Aulia, L. R., Pebriani, Y. N., Arifin, M. H., & Wahyuningsih, Y. (2023). Mengembangkan Keterampilan Sosial dalam Kehidupan Melalui Model Pembelajaran IPS di Sekolah Dasar. *Jurnal Penelitian dan Pendidikan IPS (JPPI)*, 17(1), 66–74.
- Eldiana, Y. E. (2022). *Pengaruh Model Pembelajaran Kooperatif Tipe Team Games Tournament Terhadap Keterampilan Sosial Siswa Pada Pembelajaran Tematik Kelas IV SDN 1 Tambahrejo Pasca Pandemi Covid-19*. Universitas Lampung.
- Fathurrohman, M. (2015). *Model-Model Pembelajaran Inovatif: Alternatif Desain Pembelajaran yang Menyenangkan*. Ar-Ruzz Media.
- Gunawan, P. A., & Indriyani, L. (2021). Menerapkan keterampilan sosial siswa dengan menerapkan model pembelajaran berbasis masalah. *Jurnal Pendidikan Ekonomi*, 13(1), 44-49.
- Iswaningtyas, V. (2017). Penerapan Metode Bermain Peran untuk Meningkatkan Keterampilan Sosial Anak. *Jurnal Efektor*, 4(1), 41-43.
- Lustari, D. (2021). *Peningkatan Keterampilan Sosial Siswa Dengan Menggunakan Model Pembelajaran Kooperatif Teams Games Tournament (TGT) Dalam Pembelajaran Tematik di Sekolah Dasar (Penelitian Tindakan Kelas Pada Siswa Kelas 4 SDN 023 Pasir Sialang)*. Universitas Pahlawan Tuanku Tambusai.
- Murtafiah, A., & Sahara, O. A. (2019). Pelaksanaan Bimbingan Pribadi Sosial Dalam Mengembangkan Keterampilan Sosial Siswa Terisolir Di SMP Negeri 5 Banguntapan. *Konseling Edukasi: Journal of Guidance and Counseling*, 3(2), 1-29.
- Puspitaningdyah. (2018). Pengaruh Keterampilan Mengelola Kelas dan Keaktifan Belajar terhadap Hasil Belajar IPS SD. *Joyful Learning Journal*, 7(1), 39–47.
- Qalbi, M. D., Agusta, A. R., Jannah, F., & Rafianti, W. R. (2025). Meningkatkan Aktivitas, Keterampilan Kerja Sama, Berpikir Kritis dan Hasil Belajar Peserta Didik Menggunakan Model Pembelajaran Cangkal dan Media Wordwall pada Muatan IPS Kelas V SDN Basirih 1 Banjarmasin. *Jurnal Pendidikan Sosial Dan Konseling*, 2(4), 1277–1285.
- Rahayu, D., Hamid, S. I., & Sutini, A. (2016). Peningkatan Keterampilan Sosial Anak Usia Dini Melalui Permainan Tradisional. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, 7(2), 67-77.
- Surya, Y. F. (2018). Penerapan Model Number Head Together untuk Meningkatkan Hasil Belajar IPS Kelas IV SD. *Jurnal Basicedu*, 2(1), 135–139.

- Toifur, A., & Kurniawan, W. D. (2022). Efektivitas Metode Pembelajaran Teams Games Tournament (TGT) Terhadap Kemampuan Komunikasi Siswa. *Jurnal Pendidikan Teknik Mesin (JPTM)*, 11(02), 147–153.
- Veloo, A., & Chairhany, S. (2013). Fostering Students' Attitudes and Achievement in Probability Using Teams Games Tournaments. *Procedia - Social and Behavioral Sciences*, 93, 59–64.



Improving Interpersonal Intelligence Regarding Social Sensitivity Through the CTL Method in Social Studies Learning

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ABSTRACT

With the development of the times, marked by changes in social life, students' social sensitivity has decreased, including at the basic education level. On the other hand, the importance of developing 21st-century competencies encourages changes in the learning process (Partnership for 21st Century Skills, 2009). Achieving 21st-century competency goals requires development within the learning process, particularly by enhancing soft skills. Developing students' soft skills, combined with the Contextual Teaching and Learning (CTL) method, is a solution to the problem of social sensitivity among students at SD Islam Cendekia. In this context, it is necessary to conduct research to measure students' social sensitivity using the CTL learning method. The research uses a quantitative, experimental approach, with data collected via Likert-scale instruments to measure students' social sensitivity. The instrument data obtained is then analyzed using descriptive statistics. Based on the data obtained and analyzed, there is a significant 19% increase in their social sensitivity attitude after CTL implementation.

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1. INTRODUCTION

Learning is a process of change that concerns attitudes and behaviors. (Hammond and Wellington, 2019). The process includes a range of activities to achieve the set goals and competencies. (Rao, 2020). Teachers are the primary actors in this process, which directly affects their students. In the learning process, the teacher's role cannot be overlooked. Therefore, to achieve the best results in the learning process, coaching is needed to plan and direct activities. (Lau, 2001). Teachers are expected to plan, implement, and reflect on their work, thereby developing a strong sense of social sensitivity and respecting others.

Learning itself is "Learning is fundamentally about change—change in attitudes, behavior, beliefs, capabilities, mental models, skills, or a combination of these", meaning that learning is the basis for changes in attitudes, behaviors, and beliefs, mental abilities, skills, and others (Lederman and Abell, 2014). Learning is also: "... Learning is defined as a persistent change in human performance or performance potential; learning comes about as a consequence of the learner's experience and interaction with the world". Another opinion states that "learning is a relatively permanent change in behavioral potentiality that occurs as a result of reinforced practice".

According to Law no. 20 of 2003 concerning the National Education System, article 37, paragraph 1, states that "the curriculum of primary and secondary education must contain social studies subjects". Through social studies learning, students will be equipped with the knowledge and skills to understand the dynamics of people's lives and to develop the knowledge, attitudes, and skills needed in their own lives (Lau, 2001). Social studies learning in the classroom focuses not only on the cognitive realm but also on the affective and psychomotor realms. This is intended so that, through social studies learning, students are expected to solve various problems not only from a cognitive perspective but also to behave, actively participate in the life of the community around them, and show great social concern as part of their lives. The implementation of effective and efficient social studies learning in schools, especially at the basic education level, should be carried out by teachers with appropriate qualifications and competencies (Ciolan & Manasia, 2024). This is intended to create a fun learning process that motivates students and encourages active participation. In the process, social studies learning is also expected to develop students' social sensitivity so that, in practice, they can adapt to and socialize within community life. The growth and development of this social sensitivity is also accompanied by students' interpersonal intelligence, one of the multiple intelligences proposed by Gardner.

Young people need this interpersonal intelligence to understand how they feel in their surroundings. This is because interpersonal intelligence is the ability to understand and relate to others. Interpersonal intelligence is the ability to understand differences in a person's mood, intentions, motivations, and feelings. Other aspects of interpersonal intelligence include sensitivity to sounds, facial expressions, and body movements; the ability to distinguish different types of cues; and the ability to respond pragmatically to them.

Social sensitivity is the extent to which a person is responsive to the expectations and social conditions in his environment, enabling him to act in accordance with the community's expectations. Social sensitivity in a person begins with maturity, allowing him to direct his personality in accordance with his heart and the ethical and aesthetic values of his society. The growth and development of social sensitivity in students is inseparable from their interpersonal intelligence. Social sensitivity is a person's ability to respond quickly and

appropriately to specific objects or social situations. Religiosity and social sensitivity are very important to be instilled in children, in this case, students, from an early age. These social sensitivities include sharing with others and being willing to help people in need. Another form of social sensitivity is the courage to apologize when you make a mistake, and an attitude of respect for others with different circumstances. Social sensitivity is also defined as the ability to understand individual behaviors, feelings, and motives, which are central to the psychological understanding of fundamental phenomena such as self-efficacy and its role in interactions within and between groups. Social sensitivity is also considered a stimulus that has the potential to cause anxiety and worry about a phenomenon or symptom that occurs both internally and externally.

Student sensitivity affects their daily attitudes and behaviors because, in social situations, they experience human feelings and instincts. Social sensitivity is an individual's ability to identify and understand social cues and to respect others. Having high social sensitivity can make a person liked and respected in their social relationships. Social sensitivity is the ability of individuals to understand and respond appropriately to others' feelings, needs, and social situations. Social sensitivity is a social aspect consisting of: a) Empathy is an understanding of others based on their perspectives, needs, and experiences. b) Prosocial behavior is a moral action that must be performed within a cultural context, such as sharing, helping people in need, cooperating with others, and expressing sympathy.

Social sensitivity plays an important role in various aspects of life, including personal relationships, the work environment, and participation in society. High social sensitivity can help individuals get along, avoid conflict, and create a conducive environment. Fostering a high level of social sensitivity can be achieved in social studies learning through appropriate methods tailored to students' characteristics, subject content, and goals, such as Contextual Teaching and Learning (CTL), which connects learning to real-world contexts. (Ciolan and Manasia, 2024). Among the various learning methods that can be applied in social studies to facilitate students' interpersonal intelligence and foster attitudes of high social sensitivity is the CTL method. This is because the CTL learning method is grounded in current realities, with principles such as constructivism and reflection that support the development of student competencies (Alamer and Almaghlouth, 2024).

There are three things from the concept of the contextual learning method/CTL, namely (1) the contextual learning method/CTL emphasizes the process of student involvement to find the material and in this process does not expect students only to receive the lesson but also the process of finding and finding the subject material themselves, (2) the contextual learning method/CTL encourages students to be able to find the relationship between the material learned and the real-life situation, (3) the contextual learning method/CTL encourages students to be able to apply it in life, meaning that the contextual learning method/CTL not only expects students to understand the material learned but how the material can color their daily behavior.

In this regard, the Ministry of National Education (Pendidikan, 2011) stated that there are five important characteristics of the contextual learning method (CTL), namely activating existing knowledge and reflecting on it to develop strategies (Rao, 2020). John Dewey originally developed the concept of contextual learning from his traditional learning experiences. According to him, students will learn well if what they learn is related to the knowledge and activities they already know and encounter. In relation to the above, the Ministry of National Education (Pendidikan, 2011) asks every teacher if applying the

contextual learning method/CTL must (1) students be seen as developing individuals, (2) every child tends to learn new things, (3) learning for students is the process of connecting new things with known things, (4) learning for children is the process of perfecting the scheme.

The contextual learning method (CTL) is a learning approach with seven principles that underlie its implementation: constructivism, inquiry, questioning, community learning, modeling, reflection, and assessment, according to the Ministry of National Education (Pendidikan, 2011). To achieve the same competence by using the contextual/CTL learning method, teachers carry out learning steps such as (1) introduction, (2) core consisting of activities in the field and in the classroom, and (3) conclusion. In addition, as a method for supporting social studies learning, the CTL method has seven principles that underlie its implementation: constructivism, inquiry, questioning, learning community, modeling, reflection, and assessment, which have been proven effective in increasing student performance through strategic learning interventions (Alamer & Almaghlouth, 2024).

2. METHODS

The approach used in this study is quantitative and experimental, employing the CTL method as the learning treatment (Creswell and Creswell, 2017). The data collection process using non-test instruments, in the form of Likert-scale questionnaires, assesses students' social sensitivity, with responses on a 1-4 continuum (Cohen et al., 2002). To support the data, participant observation was conducted by directly observing the research object during classroom instruction and breaks in the school environment. In addition, documentation/photos of the implementation of learning activities in the classroom were collected. Before starting and conducting the research, initial observations and interviews were conducted with the Scholar Islamic Elementary School Class Teacher to obtain a description of the research object.

The data obtained after treatment will then be analyzed using descriptive statistics, which begin with tests of the validity and reliability of the social sensitivity instruments (Field, 2024). After testing the instruments' validity and reliability and learning the treatment using the CTL method, the students were given instruments to measure social sensitivity and were also observed by the researchers. The instrument data were analyzed descriptively to determine the level of social sensitivity among elementary school students. The study subjects were 5th-grade students at SD Islam Cendekia in the Purwakarta district. Sample determination is carried out using purposive sampling, namely, sampling based on specific criteria (Etikan et al., 2016). The selection of the sample was based on the following considerations:

- 1) Not in the preparation period to take the final school exam.
- 2) There are social studies learning materials related to social sensitivity.
- 3) Grade 5 is a class with a middle level among a row of grade levels in elementary schools.
- 4) Classroom students already have a social sensitivity to friends and the surrounding environment.

3. RESULTS AND DISCUSSION

This research was conducted in elementary schools, where Purwakarta Scholars administered the questionnaire instruments. It begins with making initial observations to gain an overall picture of the research subject. Questionnaires were used as an initial data collection method to assess students' social sensitivity before the treatment and presentation

were administered (Creswell & Creswell, 2017). The material was provided, and the questionnaire was completed the next day. The facilities and infrastructure used during the research activities were laptops, internet quotas, whiteboards, markers, and projector screens. Before conducting the research, the team surveyed the elementary school where it would take place. The survey was conducted by issuing research permits to the principal, homeroom teachers of grade 5, and home teachers of grade 6. During this planning phase, the researcher communicates with the homeroom teacher regarding the activity schedule and prepares all necessary facilities and infrastructure.

The initial research began on July 23, 2024, in grade 5, by administering questionnaire instruments to assess students' initial understanding of social sensitivity. The questionnaire instrument contains statements about social sensitivity. Students fill in the instrument by giving a mark (v) in the column of the available answer sheet, namely by choosing one of the answers that best suit the situation in the SS column for Strongly Agree, S for Agree, TS for Disagree, and STS for Strongly Disagree. With the attitude category that refers to the range of score percentages, namely:

- 1) 76% - 100% = Have Very High Social Sensitivity;
- 2) 51%-75% = Have High Social Sensitivity;
- 3) 26% - 50% = Have Low Social Sensitivity;
- 4) 0% - 25% = Have Very Low Social Sensitivity (Cohen et al., 2002).

In the second study, grade 5 students were given material on social sensitivity before completing the instrument. This is done so that researchers can compare those who studied social sensitivity beforehand with those who have received social sensitivity material using the Contextual Teaching and Learning (CTL) method.

Based on the results of data processing in the form of score percentages, where the score percentage shows the level of social sensitivity that students have before and after being given Contextual Teaching Learning about social sensitivity (Field, 2024). The discussion of the results of the research is focused on two things, namely (1) the level of social sensitivity in students before conducting Contextual Teaching Learning, and (2) the level of social sensitivity and student response after learning with the Contextual Teaching Learning method.

1. The level of social sensitivity in students before doing Contextual Teaching Learning

In the initial research activity in grade 5, students were given questionnaire instruments without Contextual Teaching and Learning. There are about 28 students in grade 5; each student answers the questionnaire statements individually. The diagram below shows the initial level of social sensitivity of students in grade 5. The following diagram is attached:



Figure 1. Social Sensitivity Pre Test

Of the 16 students in grade 5, 6 have a very high level of social sensitivity, and the other 10 are at a quite high level. In the diagram above, 82% of students have a very high level of social sensitivity, while the remaining 17% have a fairly high level. (Cohen et al., 2002). This shows that 5th-grade students at SD Islam Cendekia Purwakarta already have strong social sensitivity, as evidenced by their ability to cooperate, help, and empathize. This initial data has not been incorporated into the learning background using the Contextual Teaching and Learning method, so researchers have not been able to see how far they have developed social sensitivity in daily life. (Creswell and Creswell, 2017).

2. The level of social sensitivity and students' response after learning with the Contextual Teaching Learning method

In the second research activity in grade 5, students were given the same questionnaire, and Contextual Teaching and Learning was applied during learning activities, including during the distribution of materials (Johnson, 2002). Students develop an understanding of social sensitivity, including concepts, goals, factors that affect it, and the importance of awareness in recognizing and observing others' reactions and changes, both verbal and nonverbal, in daily life. There are about 16 students in grade 5, with data obtained on the results of the level of social sensitivity contained in the following diagram:



Figure 2. Social Sensitivity Post Test

Of the 16 students in grade 5, 14 have a very high level of social sensitivity, and 2 have a quite high level. According to the diagram above, 87% of 5th-grade students have a very high level of social sensitivity and can apply it in daily life (Gardner, 2011). Meanwhile, the other 12% of students have a high enough level of social sensitivity to apply it effectively. The data show that the Contextual Teaching and Learning method significantly influences learning outcomes (Johnson, 2002). If the same number of respondents is taken from each class, without reducing the number of students in the “high” social sensitivity category, the increase will be 19%. The increase is expected to continue, as awareness of social sensitivity is very important for everyone, especially elementary school students. This is based on the fact that social sensitivity is a dimension of interpersonal intelligence (Goleman, 2005). Interpersonal intelligence is a person’s ability to interact with others, communicate, and build and maintain social relationships.

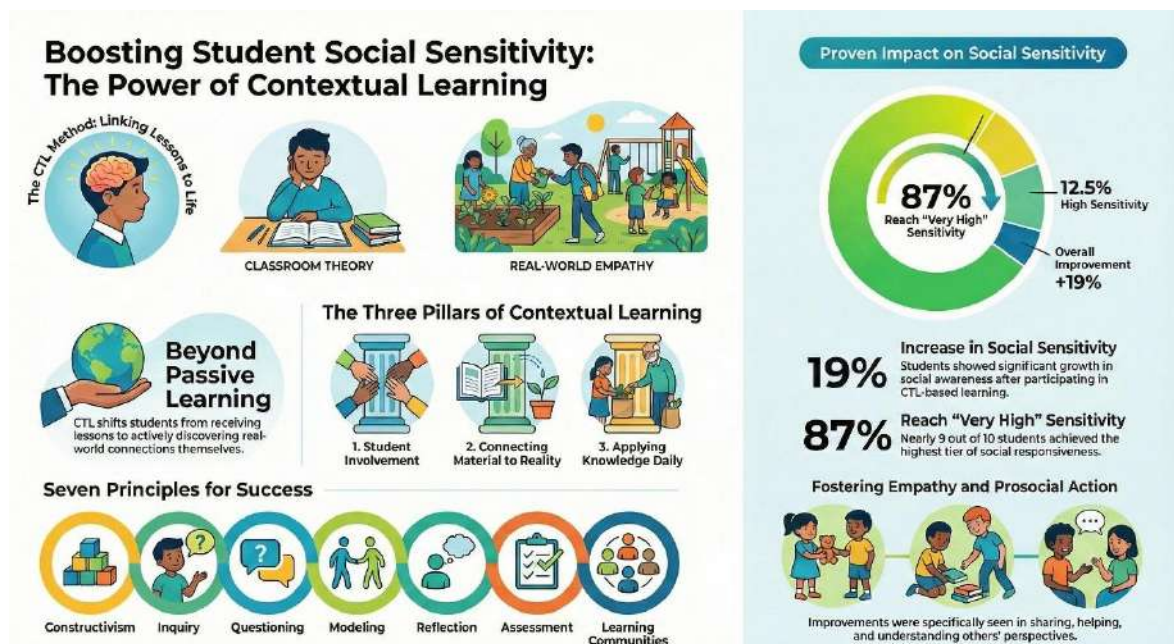


Figure 3. Research Results Infographic

This research article investigates how the CTL method can enhance social sensitivity and interpersonal intelligence in elementary school students. The authors argue that modern societal changes have led to a decline in students’ empathy, necessitating more effective Social Studies teaching strategies. Using a quantitative experimental approach, the study compares students’ awareness before and after exposure to lessons that link academic material to real-world situations. Results demonstrate a significant 19% increase in social sensitivity among fifth-grade participants at SD Islam Cendekia. Ultimately, the source concludes that the CTL method is a vital tool for developing the soft skills and moral behaviors required for successful community life.

4. CONCLUSION

Based on the research results, this study found that learning using the Contextual Teaching and Learning method increased students’ social sensitivity awareness by 19%. Student sensitivity is very important because it shapes their daily attitudes and behaviors, as social sensitivity involves feelings and instincts (Goleman, 2005). The Contextual Teaching and

Learning method can be appealing to students, helping them understand that social sensitivity is essential in daily life (Johnson, 2002). In addition, social sensitivity is closely related to interpersonal intelligence, as it involves interaction with friends and the surrounding environment (Gardner, 2011). The interaction is not limited to discussion and sharing feelings; it also involves understanding thoughts and feelings and responding appropriately.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

- Alamer, A., & Almaghlouth, S. (2024). Autonomous single-language interest predicts vocabulary achievement: A latent growth curve model approach—International Review of Applied Linguistics in Language Teaching, 0.
- Ciolan, L., & Manasia, L. (2024). Picturing innovation in higher education: A photovoice study of innovative pedagogies. *Active Learning in Higher Education*, 14697874241245350.
- Cohen, L., Manion, L., and Morrison, K. (2002). *Research methods in education*. Routledge.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.
- Etikan, I., Musa, S. A., and Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4.
- Field, A. (2024). *Discovering statistics using IBM SPSS statistics*. Sage Publications Limited.
- Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences*. Basic books.
- Goleman, D. (2005). *Emotional intelligence: Why it can matter more than IQ*. Bantam.
- Hammond, M., and Wellington, J. (2019). *Education research: The basics*. Routledge.
- Johnson, E. B. (2002). *Contextual teaching and learning: What it is and why it's here to stay*. Corwin Press.
- Lau, D. C.-M. (2001). Analysing the curriculum development process: Three models. *Pedagogy, Culture and Society*, 9(1), 29–44.
- Lederman, N. G., & Abell, S. K. (2014). *Handbook of research on science education* (Vol. 2). Routledge, New York.
- Pendidikan, D. (2011). *Undang-Undang Sistem Pendidikan Nasional*. Jakarta: Pustaka Belajar.
- Rao, N. (2020). Outcome-based education: An outline. *Higher Education for the Future*, 7(1), 5–21.



Systematic Literature Review: Effectiveness of Discovery Learning on the Learning Outcomes of Students in Elementary Schools in Science

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ABSTRACT

A teacher-centred approach still dominates science learning in schools. This condition contradicts the nature of science as a discovery process and the demands of the Independent Curriculum, which emphasises student-centred learning. This study aims to analyse the effectiveness of the Discovery Learning model in improving elementary school students' science learning outcomes, based on a review of the relevant literature. The research method was a Systematic Literature Review (SLR) conducted in accordance with the PRISMA protocol. Data were obtained via Google Scholar using Publish or Perish and Covidence. Of the 404 identified articles, 18 articles indexed in SINTA 1–4 between 2021 and 2025 met the inclusion criteria. The results indicate that Discovery Learning is effective in improving science learning outcomes in cognitive, affective, and psychomotor aspects. Cognitive improvements are demonstrated through increases in average scores, learning completion, and N-Gain; affective improvements include increased motivation, scientific attitudes, and student activeness; and psychomotor improvements include the development of science process skills. The effectiveness of this model is further optimised with the support of contextual and visual media. Thus, Discovery Learning has been proven effective, relevant, and adaptive for science learning in elementary schools and aligns with the principles of the Independent Curriculum.

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1. INTRODUCTION

Education is a manifestation of human culture that functions in the development of life. Therefore, educational development must occur in line with cultural change. This change is understood as continuous educational renewal at every level to anticipate future needs. Good educational activities will connect people, by people, and for people, and will influence abilities and personalities within society. The world of education is not only about the transfer of knowledge but also about the transfer of values that protect social unity and help maintain civilisation.

Education that supports future development is education that fosters student achievement, potential, and abilities, preparing them to thrive in the coming era of globalisation. At every stage of the learning process, cognitive skills must be developed. Learning design plays a crucial role because each stage is closely related to life. Essentially, the outcomes of each learning process serve as a foundation for students to face challenges around them and prepare for their future lives (Yanti et al., 2022).

Learning is a process aimed at changing a person's behaviour to be more positive as expected. Learning is also the process of internalising knowledge within an individual. This process involves the activities of students as learners and teachers as educators. Learning is carried out in several stages, starting with planning, implementation, and evaluation by the teacher, and then implemented through face-to-face meetings supported by appropriate media, tools, and teaching materials. The teacher's role as an educator is to control or direct the skills and knowledge that students are to master. Meanwhile, students, as pupils, play an active role in carrying out the teacher's instructions to achieve learning objectives, as reflected in competency achievement indicators (Haizatul Faizah, 2024).

The Independent Curriculum is a new policy developed by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) as an effort to realise more flexible, competency-oriented learning and to emphasise the strengthening of the character and profile of Pancasila Students. One of the updates presented in the Independent Curriculum at the elementary school level is the introduction of Natural and Social Sciences (IPAS) subjects. According to the official IPAS Learning Outcomes document published by Direktorat Sekolah Dasar, Kemendikdasmen (2022), IPAS is an integration of Natural Sciences (IPA) and Social Sciences (IPS) subjects that aims to develop scientific thinking skills, process skills, and an integrated understanding of concepts between natural and social aspects.

Through science learning, students are guided to understand the relationships between natural phenomena and the social life around them in a holistic, contextual manner. This approach is expected to foster curiosity, critical thinking skills, and environmental awareness. However, in practice, subjects related to scientific concepts, such as science, are still often considered difficult by most elementary school students, necessitating learning strategies that can make science learning more meaningful and enjoyable (Hartina et al., 2025).

Science has been an integral part of human life since humans began to master themselves and their surroundings. Humans and nature are the inseparable source, object, and subject of science. However, in practice, science instruction by teachers tends to be conventional. Teachers have not yet fully implemented active and creative learning to engage students, and the method is still dominated by lectures and assignments (Pratiwi, 2025).

Science learning in schools tends to be teacher-centred, with the teacher as the sole source of information and students playing a passive role as recipients of knowledge. This condition

contradicts the nature of science as a process of discovery that requires active student involvement in exploration and investigation activities. Monotonous and less varied learning causes students to feel bored and less motivated to learn science. The one-way lecture method prevents students from developing critical thinking, creativity, and problem-solving abilities, which are 21st-century competencies (Tanjung et al., 2022). This is caused by several factors, including: (1) a learning approach that is still teacher-centred, (2) a lack of active student involvement in the learning process, (3) minimal use of innovative learning models, and (4) limited teaching materials that can stimulate student interest in learning (Mediawadi & Bayu, 2022).

Learning outcomes in Natural Sciences (IPA) subjects integrated into the Social Sciences (IPAS) are indicators of students' success in understanding and mastering the competencies established in the learning process. In the context of the IPA subject in elementary schools, learning outcomes encompass not only cognitive aspects of knowledge, but also affective, attitudes, and psychomotor (skills). IPA learning aims to foster scientific thinking skills, curiosity, and concern for nature and the environment in students' daily lives (Kusumawati & Riyanto, 2022).

However, in practice, science learning outcomes at the elementary school level often fall short of optimal results. This is due to several factors, including the use of teacher-centred learning models, low levels of active student involvement in the learning process, and limited opportunities for students to explore and discover independently. As a result, science learning tends to be rote and unable to foster deep conceptual understanding or critical and creative thinking skills (Agung et al., 2025). Low science learning outcomes reflect the need for innovation in learning strategies, including models that encourage students to discover concepts through direct, active learning experiences. Therefore, the Discovery Learning Model is essential because it allows students to be directly involved in understanding nature and to practice the material they have learned.

Although various studies indicate that Discovery Learning has the potential to improve science learning outcomes, the available empirical evidence remains scattered across contexts, research designs, and diverse learning media. This situation has resulted in a lack of systematic mapping of conclusions about the effectiveness of Discovery Learning, particularly regarding its impact on cognitive, affective, and psychomotor aspects as a whole. Therefore, this study aims to systematically review the literature to answer the following research questions: RQ1: How effective is Discovery Learning in improving cognitive, affective, and psychomotor learning outcomes in science learning at the elementary school level? RQ2: What factors optimise the effectiveness of Discovery Learning in the context of science learning in elementary schools? Therefore, a more structured study using a Systematic Literature Review (SLR) approach is needed to provide a comprehensive overview of the effectiveness of Discovery Learning and the supporting factors that maximise its application in science learning in elementary schools.

The application of an appropriate learning model can be a strategy to improve the quality of the learning process. One such model is discovery learning. This study aims to review the literature related to the application of the discovery learning model to improve student learning outcomes at the elementary school level. This study used the Systematic Literature Review (SLR) method. The data collection process was carried out in a structured manner by documenting all articles relevant to the research topic. Learning in elementary schools still

tends to be teacher-centred, with a dominant lecture method, resulting in students being less active in the knowledge-construction process (Yulizar et al., 2024).

The Discovery Learning model is a student-centred learning approach that emphasises the independent discovery of concepts. This model aligns with the characteristics of science and science learning, which require a scientific approach and conceptual exploration. Various empirical studies have shown that the application of Discovery Learning can improve student learning outcomes (Candra et al., 2021).

Discovery learning is a learning model that emphasises students discovering concepts through exploration and investigation. Bruner (1961), the originator of discovery learning theory, emphasised that learning is more meaningful when students actively discover knowledge through inquiry (Muhammad et al., 2023). This model aligns with the constructivist theory, which views students as active constructors of their own knowledge. Discovery learning is effective in improving the cognitive, affective, and psychomotor learning outcomes of elementary school students. This model facilitates students' development of science process skills such as observing, classifying, measuring, predicting, and concluding, which are important foundations for advanced science learning (Puspitasari & Budiyanto, 2025).

Given the importance of evaluating the effectiveness of the Discovery Learning model in elementary science education, a systematic review of research findings is necessary. A Systematic Literature Review (SLR) is an appropriate method for identifying, evaluating, and synthesising empirical evidence on the effectiveness of Discovery Learning on science and learning outcomes.

Several findings indicate that low student learning outcomes, particularly in science subjects, are caused by suboptimal, still-conventional learning processes (Hamid et al., 2023). Teachers tend to rely on lectures and assignments without actively and creatively involving students. This results in student learning outcomes failing to meet the Minimum Completion Criteria (KKM), compounded by minimal individual attention from teachers. This study aims to examine the effectiveness of student learning styles and teachers' use of the Discovery Learning model as factors influencing student learning outcomes, through a review of relevant literature.

2. METHODS

This study employed a Systematic Literature Review (SLR) method following the PRISMA protocol. This study used the Systematic Literature Review (SLR) method, an approach to research conducted systematically. To collect secondary data, evaluate it critically, and synthesise all relevant scientific evidence, the study addresses specific research questions. SLR is the process of identifying, assessing, and interpreting available research to produce comprehensive, objective, reliable, and replicable answers. The analytical review in the SLR is designed to establish clear inclusion and exclusion criteria, ensuring transparent and credible study results (Latifah, 2023). This study used the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, as it involved a systematic literature review. PRISMA is a systematic review reporting guideline that helps researchers explain the background, objectives, and review procedures in a structured, evidence-based manner.

The SLR stages in this study include planning, conducting, and reporting. The planning stage begins with establishing a research question (RQ) as the basis for the literature search and selection. All data used are secondary, obtained from literature studies and scientific

documents, without involving field research. The collected data is systematically analysed and synthesised to develop a current understanding of the research topic (Suprpti et al., 2022). The implementation stage includes searching for and selecting articles and scientific journals relevant to the research focus. Literature selection is conducted strictly, prioritising reputable national and international journals. Articles that meet the criteria are then sorted, analysed, and processed as study material in the literature review (Mulia, 2022). The reporting stage is the final stage, namely, the preparation of the SLR results into a scientific manuscript. At this stage, PRISMA is used as a guide to ensure the quality, transparency, and completeness of the systematic review report. The PRISMA protocol provides a checklist of key items that must be explained carefully, from the study's basis to the methods used (Habibah & Nuraini, 2025).

The article selection procedure follows the PRISMA Flow Diagram which includes four stages, namely: (1) identification of articles from various data sources, (2) screening through the elimination of duplication and selection of titles and abstracts, (3) assessment of eligibility through a comprehensive review of the article content, and (4) inclusion of final articles for the data extraction and synthesis process (Yinuo, 2025). Data collection was conducted using the Publish or Perish application and the Google Scholar database, with a combination of relevant keywords, such as Discovery Learning, learning outcomes, and elementary school science and education. The articles analysed were limited to publications from 2021–2025 to ensure the data's up-to-dateness (Rizkiyah, 2025). Articles that met the inclusion criteria were then analysed through data extraction to identify learning models, media innovations, research methods, and key findings. Data were analysed descriptively and qualitatively to produce a comprehensive thematic synthesis, so that the SLR not only summarises the literature but also maps knowledge and directions for the development of research in science and education in elementary schools (Dini et al., 2024).

3. RESULTS AND DISCUSSION

Results section. This is organised based on the Systematic Literature Review (SLR) of 18 articles that discuss the effectiveness of discovery learning on the learning outcomes of elementary school students in science. The analysis was conducted descriptively by tracing Publications, Citations, and Researchers; Place of Publication; Sinta Indexed; Research Methods in the Reviewed Literature; and Research Issues and Themes in the Reviewed Literature used in the articles.

The article selection process involved several stages: identifying relevant articles, screening them based on titles and abstracts, and thoroughly reviewing their content. This resulted in 18 articles deemed suitable for further analysis.

Based on an analysis of 18 research articles using various research methods, the discovery learning model has the potential to improve students' science learning outcomes at the elementary school level. Qualitative research articles indicate that the discovery learning model is effective in improving student learning outcomes (Rikmasari & Rosesa, 2022; Yulianti & Andrijati, 2024).

On the other hand, quantitative research articles show that the use of the discovery learning model has a significant impact on student learning outcomes (Tapa et al., 2023; Kasmini, 2021; Sudirama et al., 2021; Sasingan & Wote, 2022; Gede et al., 2020; Naibaho & Hoesein, 2021; Mayuni et al., 2021; Kusumayuni et al., 2023; Sabrina et al., 2025; Parla et al., 2025).

In addition, research articles on Mixed Methods/PTK Dominant Qualitative affective in improving students' science learning outcomes (Olivia & Sanoto, 2023), (Khotimah, 2021), (Mila Deviana, Ervina Eka Subekti, 2021), (Aryantini et al., 2021; Husni & Suryawan, 2022). Development research also indicates that the use of discovery learning strategies positively impacts elementary school students' learning outcomes.

Discovery Learning is a learning model that places students at the centre of learning activities, actively involved in exploration, observation, and problem-solving to discover new concepts or principles without being given final answers by the teacher. In this model, students are allowed to investigate information through experiments, observations, or data processing to construct their own knowledge based on their learning experiences. The teacher's role shifts to that of a facilitator who guides the discovery process rather than simply transmitting material, making the learning process more interactive and meaningful for students (Ilmiati, 2024).

In discovery learning, students engage in mental activities such as discussions, exchanging opinions, reading information from various sources, and conducting their own observations and experiments. The discovery learning model guides students to discover concepts through various information or data obtained from observations or experiments. In addition, the application of the discovery learning model at the elementary level has the following advantages: 1) Enriching students' learning experiences, 2) Providing opportunities for students to interact with sources of knowledge other than books, 3) Encouraging student creativity, 4) Increasing students' self-confidence, and 5) Strengthening cooperation between students (Bakhtiar & Nasir, 2025).

In the discovery learning model, various media are used to achieve goals and outcomes. Learning media plays a role in conveying messages and making abstract material more concrete because, at the elementary school level, students are still in the concrete operational stage (Aini & Alim, 2025). In 18 articles that have been mentioned, there is a variety of media used in learning Discovery learning, such as: 1) PowerPoint media, 2) video and audiovisual media, 3) interactive media, and 4) mind mapping media. The use of various media has improved student learning outcomes. In this model, each student gains similar knowledge, making learning more effective and efficient.

Using the discovery learning model can expand students' learning experiences. In addition to relying on textbooks and teachers, students can also utilise a variety of other learning resources, such as videos, interactions with classmates, group work, and everyday experiences. With this variety of learning resources, students have a greater opportunity to master the learning material. The advantages students gain from this learning model include stimulating curiosity and developing independent problem-solving skills. However, the discovery learning model also has disadvantages, including the lengthy learning time required, inefficiency when teaching a large number of students, the need for mental preparation, and insufficient attention to developing attitudes and skills (Khasinah, 2021).

This research shows that applying the discovery learning model can improve student learning outcomes for the following reasons. First, the discovery learning model aligns with the constructivist approach, which views students as actively constructing their own knowledge. Second, the discovery learning model provides opportunities for students to participate in class activities and actively use various learning resources. Third, the stages in the discovery learning model encourage students to systematically, critically, and logically

search for and investigate problems, enabling them to independently acquire knowledge, attitudes, and skills through their learning (Adi, 2022).

Effectiveness of Discovery Learning towards Learning Outcomes Cognitive

The study results literature shows that applying the Discovery Learning model in ways that yield consistent and significant gains supports the cognitive education of school participants in the fundamentals of science learning. This improvement is reflected in the ability to understand concepts, analyse problems, and apply knowledge in everyday contexts. Various studies in the synthesis table report increases in average grades, learning completeness, N-Gain, and high effect sizes, both through experimental designs, CAR, and meta-analyses. Furthermore, the use of supporting media such as mind mapping, concrete media, and visual presentations has been shown to strengthen the knowledge-construction process and help students organise concepts more systematically and meaningfully (Setiawati & Mursidik, 2024).

Findings are in line with Bruner's study (1961), which emphasises the importance of the discovery process in building deep conceptual understanding. When students are engaged in active exploration, observation, and problem-solving, learning shifts from memorisation to a more conceptual understanding. This is also in line with the constructivist theories of Piaget (1970) and Vygotsky (1978), which state that knowledge is actively constructed through interactions with the environment and social processes. Thus, Discovery Learning can be seen as an effective learning model for improving elementary school students' cognitive learning outcomes in science. However, the generalisation of findings still needs to be done carefully, considering variations in research designs and contexts (Dewi & Elisa, 2025).

Effectiveness of Discovery Learning towards Learning Outcomes Affective

Synthesis results show that the Discovery Learning model not only effectively increases cognitive results, but also provides a significant and positive impact on affective participant education, such as interest, motivation for learning, curiosity know, scientific attitude, and caring towards the science learning process. Through active involvement in observing, asking, discussing, and finding out, participants draft independently; they become more enthusiastic, more responsible in their responses, and more positive in their attitude toward learning.

Findings. This is in line with the view of Hosnan (2014), who emphasised that Discovery Learning can foster a positive attitude among scientific participants, and is reinforced by the results of the study in the table synthesis, which show improvements in motivation, activity, and independence. The study of students in schools is based on a learning centred on the discovery process. Thus, Discovery Learning is relevant to educational goals that are not only oriented towards mastering knowledge but also towards the holistic formation of students' values, attitudes, and character (Husniah, 2025).

Effectiveness of Discovery Learning towards Learning Outcomes: Psychomotor

Synthesis results in the literature show that the Discovery Learning model not only effectively improves cognitive outcomes but also makes a meaningful contribution to the development of psychomotor outcomes for students, especially in basic science learning at school. Aspects that develop psychomotor skills, covering science process skills such as observing, classifying, measuring, conducting experiments, predicting, and drawing interesting conclusions based on the data obtained in a direct way (Ningsih & Winarni, 2025). Meaningful science learning must involve participants being actively educated in the scientific

process. Discovery Learning positions students as the main Learning. Through stages of stimulation, data collection, data processing, verification, and conclusion drawing, students are directly trained to engage in integrated physical and mental activities. These activities encourage students' motor skills in experiments, observations, discussions, and the use of learning tools and media.

The empirical findings in the synthesis table support this argument. Research (Kusumayuni et al., 2023) shows that implementing STEAM-based Discovery Learning significantly improves students' science process skills, particularly in observing, experimenting, and drawing conclusions from experimental results. Similar results were also found by Rikmasari & Rosesa (2022), who concluded that Discovery Learning consistently has a positive impact on psychomotor aspects when supported by thorough learning planning and the use of media appropriate to the characteristics of elementary school students.

Furthermore, research integrating concrete and visual media, such as mind mapping (Sattvika et al., 2024) and real objects (Husni et al., 2022), shows that students' physical activity in manipulating learning objects can strengthen motor skills and motor coordination. This confirms that discovery-based learning oriented towards direct experience is highly relevant to the concrete operational stage of development in elementary school students. Therefore, based on the results of the literature review and the research synthesis table, Discovery Learning is effective in improving students' psychomotor learning outcomes through active, contextual, and direct, experience-based learning. This model provides space for students to learn through action (learning by doing), so that science process skills and motor abilities develop optimally and meaningfully.

The application of Discovery Learning in science learning has been proven to be effective in improving the learning outcomes of elementary school students, because students do not only receive knowledge passively, but actively build concepts through exploration, observation, and their own investigations; for example, experimental research shows that fifth-grade students taught with this model have a significant increase in posttest and N-Gain scores compared to conventional learning, which indicates an increase in understanding of science concepts. Discovery Learning is effective in improving science learning outcomes in elementary school (Sari et al., 2022) In addition, another study found that implementation Discovery Learning in a way significant repair results Study students in various science and natural sciences materials, including influence style to objects and materials other materials, namely score posttest student increase in a way real after learning based findings of the discovery learning model have an influence positive to results learning science (Permatasari et al., 2024).

Discussion

How effective is the Discovery Learning model in improving the science learning outcomes of elementary school students according to the results of relevant literature reviews?

Effectiveness of Discovery Learning on the Outcomes of Science Learning

Based on the synthesised literature, Discovery Learning can be understood as an effective learning model for improving the quality of science learning in elementary schools, primarily because it encourages active student involvement in the learning process. Learning is no longer centred on the teacher as the primary source of information, but rather positions students as subjects who construct knowledge through direct experience. In the context of

science learning, this approach is highly relevant because science fundamentally emphasises the process of discovery, investigation, and proof of concepts through real-world experiences in the learning environment.

Theoretically, the effectiveness of Discovery Learning can be explained through a constructivist approach, which emphasises that knowledge is not acquired through memorisation but is actively constructed through interactions between students and the learning environment. Through the stages of stimulation, problem identification, data collection, data processing, proof, and conclusion, students are encouraged to think systematically, critically, and logically. This process makes learning more meaningful because students do not simply receive concepts as ready-made information but instead experience the process of discovering them. This strengthens students' conceptual understanding and scientific skills, as explained by Discovery Learning, which provides significant opportunities for students to construct knowledge, attitudes, and skills independently through active investigation. (Tarigan et al., 2025). Furthermore, this approach is crucial because students are at a developmental stage that requires concrete experiences to understand abstract concepts. Therefore, Discovery Learning not only improves academic learning outcomes but also fosters a scientific mindset through the practice of observing, testing, and drawing conclusions.

Relevance Discovery Learning with Merdeka Curriculum and IPAS

Discovery Learning is also relevant to the implementation of the Independent Curriculum, particularly because it emphasises student-centred, experiential learning and encourages exploration and competency development. In the context of science and science, which integrates science and social studies concepts, Discovery Learning provides students with the opportunity to connect natural and social phenomena through observational activities, simple experiments, and contextual analysis. Thus, learning not only emphasizes cognitive outcomes but also develops the affective aspects and skills needed for 21st-century learning. This strengthens the argument that Discovery Learning aligns with the goals of the Independent Curriculum to foster meaningful, in-depth learning. (Ramadhanty et al., 2024).

Pedagogically, Discovery Learning supports the demands of science and science learning, which emphasise the scientific process, inquiry, and the development of thinking skills. This model provides students with the opportunity to experience the stages of scientific thinking, from formulating problems to concluding. This not only increases students' cognitive engagement but also fosters enthusiasm and curiosity, which are the foundation of science learning. Therefore, Discovery Learning can be viewed as a learning strategy that is not only empirically effective but also philosophically aligned with the direction of science learning in the Independent Curriculum. (Hidayatulloh & Anshori, 2024).

The effectiveness of Discovery Learning will be optimal when supported by learning media suited to the characteristics of elementary school students who are still in the concrete operational stage. Visual and contextual media, such as mind maps, concrete objects, and digital media, help students organise concepts more systematically. Media support also strengthens the concept discovery process, enabling students to understand the material more deeply and retain it. Integrating this model with a contextual or STEAM approach also enriches the learning experience by connecting science concepts to real-life issues relevant to students' lives. (Hidayati et al., 2025). Furthermore, integrating Discovery Learning with

contextual and STEAM approaches enriches the learning process by linking scientific concepts to real-life problems and cross-disciplinary activities.

Overall, the SLR results indicate that the Discovery Learning model is effective in improving elementary school students' science learning outcomes across cognitive, affective, and psychomotor domains. This finding strengthens Bruner's theory and constructivism and supports various previous research results that emphasise the importance of active and meaningful learning. Thus, this finding indicates that Discovery Learning is effective in addressing problems in science learning, which have been dominated by lecture methods, minimal active student involvement, and low conceptual understanding, the main background of this research. The results of the literature review indicate that the cognitive aspect is the dominant component of learning outcomes and improves through the application of the discovery learning model. Students who learn using this model demonstrate stronger abilities in understanding scientific concepts, linking natural and social phenomena, and applying concepts in everyday contexts.

The practical implications of these findings for elementary school teachers are that Discovery Learning needs to be systematically designed by providing contextual stimuli, exploratory worksheets (LKPD), visual and concrete media, and discussion facilitation strategies that encourage students to actively observe, ask questions, and independently draw conclusions about concepts. Teachers act as facilitators who guide students' thinking processes so that learning does not merely follow syntax, but truly builds conceptual understanding and scientific skills. The application of this model can also strengthen 21st-century skills such as critical thinking, collaboration, communication, and independent learning, making it relevant to science learning in the Independent Curriculum. However, the results of the reviewed studies still have general limitations, mainly because most of the studies are dominated by Classroom Action Research (CAR) designs that do not involve control groups, resulting in weak causal inferences, unequal representation of research locations, requiring caution in national generalisations, and the lack of research evaluating long-term retention of learning outcomes. Therefore, further research is recommended to employ a more robust experimental design, expand the study's scope, and conduct longitudinal evaluations to better understand the effectiveness of Discovery Learning.

4. CONCLUSION

Based on a Systematic Literature Review of 18 research articles published between 2021 and 2025, the Discovery Learning model has proven effective in improving elementary school students' science learning outcomes. This effectiveness is consistently demonstrated across various research designs, including quantitative, qualitative, mixed methods, and Classroom Action Research. Improved learning outcomes occur not only in the cognitive domain but also in the affective and psychomotor domains. In the cognitive domain, Discovery Learning can improve conceptual understanding, critical and analytical thinking skills, and the application of science concepts in everyday life. In the affective domain, this model encourages the development of motivation to learn, curiosity, scientific attitudes, independence, and active participation among students. Meanwhile, in the psychomotor domain, Discovery Learning contributes to the development of science process skills, such as observing, classifying, measuring, conducting experiments, predicting, and drawing conclusions based on empirical data. The effectiveness of this model is further optimised when supported by contextual and visual learning media appropriate to the concrete operational thinking characteristics of elementary school students.

Scientifically, the results of this study provide an important contribution to the development of science learning theory and practice in elementary schools. The research findings strengthen the empirical basis for the claim that Discovery Learning aligns with the constructivist theories of Bruner, Piaget, and Vygotsky and is relevant to the Independent Curriculum's direction, which emphasises active, exploratory, and learner-centred learning. This study also emphasises the role of Discovery Learning in the holistic development of 21st-century skills. As a recommendation, further research is suggested to examine the implementation of Discovery Learning through large-scale, cross-regional experimental designs and to integrate it with digital technology, the STEAM approach, and authentic assessment. Furthermore, longitudinal research is needed to examine the long-term impact of Discovery Learning on students' scientific literacy, character, and higher-order thinking skills.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

- Adi, D. P. (2022). Penerapan Model Discovery Learning untuk Meningkatkan Hasil Belajar. *Jurnal Ekonomi Dan Pendidikan*, 19(2), 151–157.
- Aini, I. Q., Alim, R. F. (2025). Implementation of Jean Piaget's Cognitive Development Theory in Science Learning in Elementary Schools and Its Relevance to SDGs 4. *Journal on Smart Learning Technologies*, 1(2), 77–97.
- Aryantini, N. K., Sujana, I. W. (2021). Model Discovery Learning Berbantuan Media Power Point Meningkatkan Hasil Belajar IPA Siswa SD. *Jurnal Pedagogi*, 4(2), 243–250.
- Bakhtiar, Y. H., & Nasir, T. M. (2025). Implementation of the Discovery Learning Model in Islamic Religious Education Subjects. *Al Hikmah: Journal Of Education*, 6(1), 37–50.
- Deviana, M. Subekti, E. E. K. (2021). Peningkatan Hasil Belajar IPA pada Pembelajaran Tema 9 Melalui Model Discovery Learning Berbantuan Media Powerpoint bagi Siswa Kelas V SDN 2 Tanggung. *Jurnal Paedagogy: Jurnal Penelitian Dan Pengembangan Pendidikan*, 8(3), 345–350.
- Dewi, D. A., & Elisa, E. I. (2025). Implications of Constructivism Theory in Elementary School Science Learning: Systematic Literature Review. *EDUHUMANIORA : Jurnal Pendidikan Dasar*, 17(2), 199–210.
- Dini, M., Nabilla, S. M., & Fitriani, K. (2024). Systematic Literature Review (SLR): Implementation of Character Education Through Scout Extracurricular Activities in Elementary. *Action Research Journal Indonesia (ARJI)*, 6(4), 486–510.
- Direktorat Sekolah Dasar, Kemendikdasmen. (2022). *Hal-hal Esensial Kurikulum Merdeka di Jenjang SD*. <https://ditsd.kemendikdasmen.go.id/artikel/detail/hal-hal-esensial-kurikulum-merdeka-di-jenjang-sd>.
- Gede, P., Artawan, O., Kusmariyatni, N., & Sudana, D. N. (2020). Pengaruh Model Pembelajaran Discovery Learning Terhadap Hasil Belajar IPA. *Jurnal Ilmiah Pendidikan*

Profesi Guru, 3(November), 454–460.

- Habibah, R. I., Nuraini, A., Y. W. (2025). Systematic Literature Review Dengan Metode Prisma: Peran Pembelajaran IPS Dalam Mengembangkan Karakter Siswa. *Didaktik: Jurnal Ilmiah PGSD FKIP Universitas Mandiri*, 11(4), 264–275.
- Husni, R., Suryawan, A., P. R. (2022). Pengaruh Model Pembelajaran Discovery Learning Berbantuan Media Benda Konkret Terhadap Hasil Belajar IPA. *Borobudur Educational Review*, 2(1), 10–22.
- Husniah, E. H. (2025). Implementation of the Discovery Learning Model to Increase Student Learning Motivation at Alue Bata Public Elementary School. *Journal of Indonesian Primary School*, 2(3), 1–10.
- Ilmiati, A. (2024). Penerapan Model Discovery Learning Terhadap Literasi Sains Pada Pembelajaran Fisika. *Jurnal Citra Pendidikan*, 4, 1768–1776.
- Kasmini, L. I. M. (2021). Peningkatan Hasil Belajar IPA Melalui Implementasi Model Pembelajaran Discovery Learning di Sekolah Dasar Kota Banda Aceh. *Jurnal Bidang Pendidikan Dasar*, 5(1), 62–71.
- Khasinah, S. (2021). Discovery Learning: Definisi, Sintaksis, Keunggulan dan Kelemahan. *Jurnal MUDARRISUNA: Media Kajian Pendidikan Agama Islam*, 11(3), 402–413.
- Khotimah, H. (2021). Upaya Meningkatkan Hasil Belajar Peserta Didik Terhadap Materi Sifat Benda Pelajaran IPA Melalui Metode Discovery Learning. *Jurnal Pendidikan Sekolah*, 8(1), 1–8.
- Kusumayuni, P. N., Suarni, N. K. (2023). Model Discovery Learning Berbasis STEAM: Dampaknya Terhadap Hasil Belajar IPA dan Keterampilan Proses Sains Siswa. *Jurnal Ilmiah*, 6(1), 186–195.
- Latifah, N. et al. (2023). Systematic Literature Review: Media Pembelajaran Sudut Pasar Online untuk Siswa Kelas V Sekolah Dasar. *Jurnal Elementaria Edukasia*, 6(4), 1971–1983.
- Mayuni, K. R., Japa, I. N. N., (2021). Meningkatnya Hasil Belajar IPA Siswa Kelas V SD Melalui Pembelajaran Discovery Learning. *Jurnal Ilmiah Pendidikan*, 4(2), 219–229.
- Mulia, R. A. (2022). Systematic Literature Review: Analisis Tren dan Tantangan Dalam Perkembangan Desentralisasi di Indonesia. *Jurnal Ilmiah Ekotrans & Erudisi*, 2(2), 49–61.
- Naibaho, M. R. U., & Hoesein, E. R. (2021). Meta Analisis Model Discovery Learning Untuk Meningkatkan Hasil Belajar IPA Siswa SD. *JPDJ (Jurnal Pendidikan Dasar Indonesia)*, 6(1), 19.
- Ningsih, N.S., Winarni, E. W. O. J. (2025). Pengembangan LKPD IPA Berbasis Discovery Learning Materi Pernapasan Manusia untuk Meningkatkan Keterampilan Proses Sains Siswa Kelas V Sekolah Dasar. *Jurnal Kapdesas:Kajian Pendidikan Dasar*, 4(2), 276–286.
- Olivia, M., & Sanoto, H. (2023). Penerapan model pembelajaran Discovery Learning untuk meningkatkan motivasi dan hasil belajar IPA siswa kelas IV. *JlIP-Jurnal Ilmiah Ilmu Pendidikan*, 6(8), 6156–6163.

- Parla, N. M. A., Zulfuraini, Sani, N. K., N., N. (2025). Pengaruh Model Pembelajaran Discovery Learning Berbantuan Media Audio Visual Terhadap Hasil Belajar Kognitif Siswa Pada Mata Pelajaran IPAS Kelas Iv. *Jurnal Pendidikan Fisika Tadulako Online*, 13(1), 86–94.
- Sari, O. Z. P., Heldayani, E., & Fakhrudin, A. (2022). Efektivitas Penerapan Model Discovery Learning Terhadap Hasil Belajar Siswa Materi IPA Kelas 5 SD Negeri 23 Palembang. *Jurnal Pendidikan Dan Konseling*, 4(6), 12379–12385.
- Permatasari, Z., Agustini, F., & Handayani, D. E. (2024). *Pengaruh Model Pembelajaran Discovery Learning terhadap Hasil Belajar IPAS Materi Pengaruh Gaya terhadap Benda Kelas IV SD Negeri Tlogoweru 1 Kecamatan Guntur*. 2(1), 93–107.
- Sabrina, N. A., Rozi, F., Zainuddin. (2025). Pengaruh Model Pembelajaran Discovery Learning Terhadap Hasil Belajar IPAS Siswa. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, 10(3), 369–378.
- Setiawati, P., Mursidik, E. M., R S. (2024). Penerapan Model Pembelajaran Discovery Learning dalam Meningkatkan Keterampilan Proses Sains Peserta Didik Sekolah Dasar Kabupaten Madiun. *Journal of Comprehensive Science*, 3(1), 5586–5594.
- Rikmasari, R., & Rosesa, S. (2022). Model Pembelajaran Discovery Learning Sebagai Solusi Untuk Meningkatkan Hasil Belajar Pada Mata Pelajaran IPA Siswa Sekolah Dasar. *Pedagogik: Jurnal Pendidikan Guru Sekolah Dasar*, 10(1), 39–46.
- Rizkiyah, N. (2025). Strategi dan Tantangan Manajemen Pendidikan Tinggi: Systematic Literature Review Menggunakan Metode PRISMA. *Jurnal Ilmiah Literasi Indonesia*, 1(2), 194–202.
- Sasingan, M., & Wote, A. Y. V. (2022). Penggunaan Model Discovery Learning dalam meningkatkan hasil belajar IPA. *Journal for Lesson and Learning*, 5(1), 42–47.
- Sattvika, G. A., Margunayasa, I. G. (2024). Model Pembelajaran Discovery Learning Berbantuan Media Mind Mapping terhadap Hasil Belajar IPA Siswa Kelas V Sekolah Dasar. *Indonesian Journal of Instruction*, 5(1), 1–13.
- Sudirama, P. P., Japa, I. G. N., (2021). Pembelajaran discovery learning meningkatkan hasil belajar IPA siswa kelas IV sekolah dasar. *Journal for Lesson and Learning Studies*, 4(2), 165–173.
- Suharto, D. G., & Nugroho, R. A. (2022, December). The Use of Communication Technologies in Higher Education During the Pandemic: A Systematic Literature Review. In 7th International Conference on Social and Political Sciences (ICoSaPS, 2022) (pp. 425-431). Atlantis Press.
- Tapa, I. G. W., Dantes, N. (2023). Model Discovery Learning Berbasis Masalah Kontekstual Mempengaruhi Hasil Belajar IPA dan Self-Regulated Learning Pada Siswa Kelas V Sekolah Dasar. *Jurnal Ilmiah Pendidikan*, 7(2), 305–315.
- Yinuo, J. (2025). Measuring, Modeling, and Assessing Culture in International Trade : A Systematic Literature Review. *Journal of Information Systems Engineering and*

Management, 10(38s), 1058–1074.

Yulianti, L., & Andrijati, N. (2024). Peningkatan Keaktifan Dan Hasil Belajar Ips Dengan Menggunakan Model Discovery Learning. *Joyful Learning Journal*, 13(1), 40–48.



Enhancing Civic Nationalism Through Mind Maps Integrated with Darul Ahdi Wa Syahadah in Civic Education at Elementary Schools

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ABSTRACT

Declining nationalistic attitudes among elementary school students pose a challenge for civic character education in the globalization era. This study examines the effect of Mind Mapping media integrated with Darul Ahdi Wa Syahadah values — a Muhammadiyah framework connecting national identity to religious commitment, targeting the affective dimension of attitude formation — on the nationalistic attitudes of Grade VI students in Civic Education. Using a pre-experimental one-group pretest-posttest design, 22 students at SD Muhammadiyah 5 Porong were assessed via a validated 25-item instrument (Cronbach's Alpha = 0.897). Data were analyzed using a paired sample t-test and Partial Eta Squared. Results showed $t = -17.278$ ($p = 0.000 < 0.05$) and a Partial Eta Squared (η^2) value of 0.934. Although this value exceeds the typical educational research range ($\eta^2 = 0.10-0.30$) — likely due to the small sample and absence of a control group — the findings provide preliminary evidence that combining visual-cognitive (Mind Mapping) and affective-religious (Darul Ahdi Wa Syahadah) approaches can strengthen nationalistic attitudes. Future research with larger samples and control groups is recommended.

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1. INTRODUCTION

Education is a conscious and planned effort aimed at creating a learning environment and process that encourages the active development of students, including spiritual values related to religious aspects, self-control, personality building, intelligence development, instilling noble character, and mastering the skills needed for themselves and society (Rahman et al., 2022). Education can be considered one of the paths that most people take to determine their future (Nurhayati & Handayani, 2020). The objective of Civic Education is to shape students to grow into individuals with noble character, knowledge, skills, and attitudes that can be used to develop a love for their homeland and nationality. (Mahardika, 2023). Beyond mere knowledge, Civics Education also includes participating in developing students' character through learning about ethics, morals, and social values (Nurhalisyah et al., 2024).

Civics is a fundamental subject that plays an important role in shaping students' nationalistic attitudes, particularly in the formation of Darul Ahdi Wa Syahadah values, which are very important considering that students are in the early stages of developing their personalities and social values. Darul Ahdi Wa Syahadah, which means the house of covenant and testimony, shows that a shared commitment to the ideology of Pancasila is not enough; that commitment must be proven through the application of ethics in national life (Junaedi et al., 2021). The Pancasila state is the result of a national agreement. It serves as a justification or reality for the realization of a peaceful and secure country, as well as for the realization of a developed, just, prosperous, dignified, and sovereign life (Yusril & Syahputra, 2025). Muhammadiyah's thoughts on the relationship between the state and religion were conveyed at the 46th Muhammadiyah Congress, which took place in Yogyakarta in 2010 (Yusril & Syahputra, 2025). The written agreement resulted in the understanding that dar al-'ahdi means that the state is a vessel for achieving national consensus, which is understood as the result of a process involving all elements of the nation, whose existence must always be maintained and upheld (Yusril & Syahputra, 2025). Pancasila as Wa Al-syahadah is interpreted as a country that serves as a place of testimony and proof through the struggle to defend and advance the nation (Yusril & Syahputra, 2025). Muhammadiyah interprets Indonesia as a Pancasila State, a State that is the result of a national agreement and a State that functions as a form of testimony, namely, dar al-'ahdi wa al-syahadah (Yusril & Syahputra, 2025). Muhammadiyah's view of dar al-'ahdi wa al-syahadah is in line with Islamic aspirations for an ideal state, namely a state that is considered the best and is under the grace of Allah SWT (Yusril & Syahputra, 2025). Together with dar al-'ahdi wa al-syahadah, Muhammadiyah focuses on creating an Indonesian state based on Pancasila as dar al-salam and not dar al-islam, so that Indonesia is not made into a religious state but is built by making religion a value in the life of the nation and state as stated in the five principles of Pancasila (Yusril & Syahputra, 2025).

The importance of fostering a nationalistic attitude among students as a tangible manifestation of their commitment to national values based on Pancasila. A deepening of nationalistic attitudes can be demonstrated through appreciation of Indonesian culture, willingness to make sacrifices, preservation of the nation's cultural wealth, achievement of excellence, protection of the environment, love of the homeland, discipline, obedience to the law, and recognition and acceptance of cultural, religious, and ethnic diversity (Andara et al., 2021). Instilling a nationalistic attitude in students is also in line with Muhammadiyah's view of dar al-'ahdi wa al-syahadah, which is to make every citizen a guardian of the nation's noble covenant (Pancasila) as well as an active witness in maintaining a national life based on the values of justice, unity, and humanity (Yusril & Syahputra, 2025). Nationalism is a tangible

manifestation of love for one's homeland, which grows from a collective awareness to build power and reach agreement in designing a state based on a shared identity. This attitude becomes the ultimate goal in carrying out various social and economic activities (DJ & Jumardi, 2022).

Indonesia's younger generation is at risk of losing their nationalistic spirit because in the current era of globalization, there are two sides, positive and negative, that can influence the behavior of each individual. However, the effects of globalization currently tend to be negative, resulting in a decline in love for the homeland (Andara et al., 2021). One of them is that within the school environment, students find it difficult to appreciate differences of opinion and respect the diversity of ethnicities, religions, and cultures around them. This problem occurs due to a lack of positive understanding of the material being taught or a lack of relevance of the material to everyday life (Irdianti et al., 2020). Issues in the learning process cause this problem, as the lack of student participation in the learning process also results in problems that need to be addressed (Hardyanti & Isnarmi, 2020). Many students were inactive in the civic education learning process, which delayed the achievement of learning objectives (Abdurrohman, 2021). Furthermore, problems in teaching abstract material can affect students' understanding of citizenship concepts (Pradnyana et al., 2020).

In relation to the explanation of issues related to this situation, several measures can be applied to improve the factors that influence these issues. Therefore, modifications need to be made, especially to the learning model used in Civic Education. One model that can be introduced is Mind Mapping. Mind Mapping is a learning approach that utilizes visual media to organize and group lesson materials, so that the information presented can be more easily understood, learned, and analyzed by students (Anwar & Widiartanto, 2021). Tony Buzan states that Mind Mapping is an easy method for putting information into the mind and capturing knowledge from outside the mind. This model is considered capable of influencing student learning outcomes because students can produce material from what they have learned in the form of mind maps that can be designed according to their abilities so that they are easy to understand and remember (Nurrachmawati & Istaryatiningtias, 2022).

Mind mapping is not only done manually, but also supported by the Edraw Mind Map digital application. This application is designed to help users organize and present their ideas in a more structured manner through easy-to-understand diagrams (Hikmah & Hadi, 2021). This application is equipped with various innovative features that can encourage and develop students' creativity in its use (Herianto et al., 2025). Students can take advantage of a variety of excellent features, ranging from an easy-to-use interface, diverse layout options, a collection of high-quality clipart icons, attractive preset themes, import and export facilities, and a wide selection of ready-to-use templates (Putra Priyandana et al., 2021). In Civic Education, which plays an important role in shaping students' character to become critical citizens with national awareness and integration, the application of this model is considered highly appropriate and relevant (Herianto et al., 2025). Faced with complex Civic Education material that requires in-depth understanding, the use of the Mind Mapping learning model with the help of the Edraw Mind Map application is expected to improve students' ability to understand, summarise, and apply the material more optimally (Herianto et al., 2025). With this method, learning objectives will be more structured and easier to implement (Anjani et al., 2020).

The results of an interview with the principal of SD Muhammadiyah 5 Porong on 4 August 2025 revealed that the students' ability to solve problems covering a broad range of material

is still relatively low. Some students often forget the material that has been taught, and they tend to listen to the teacher's explanations without taking the initiative to ask questions. In addition, interview results with VI students also showed that they had difficulty working on questions that covered a lot of material. This situation demonstrates the need for appropriate and effective problem-solving measures. One solution that can be implemented is the use of contextual learning media that is in line with the demands of modern development, especially in the use of technology. The application of learning media combined with teaching materials by educators is expected to encourage changes in the way students learn, from being passive to becoming more active and participatory in the learning process.

Essentially, the learning medium that has developed and is widely used in educational practice today is Mind Mapping, which is known as a modern learning approach. Its advantages lie in its attractive appearance and ease of use, which can help overcome the obstacles often faced by students in achieving optimal learning outcomes. By applying concept-based learning principles, Mind Mapping can help students understand subject matter with many topics. In the literature obtained, several studies analyzed the effectiveness of Mind Mapping media in learning, such as the study by Nurrachmawati & Istaryatiningtias (2022). The Mind Mapping model affects students' Civic Education learning outcomes. This effect is proven by the average score of 86.93 and a percentage of 86.9% for the experimental group, while the average score for the control group was 78.8 with a percentage of 79%. In other studies (Anwar & Widiartanto, 2021), it is explained that the implementation of the Mind Mapping method can significantly improve the learning outcomes of fourth-grade elementary school students in Civics Education. In the study (Anggun Murta Sati, 2020), there is an impact of the application of the Mind Mapping learning model on the creative character of students in Civic Education learning in Grade III at SD Negeri 32 in Bengkulu City.

Based on the previous description, it can be concluded that the application of Mind Mapping media is highly relevant for teaching Cultural Diversity in Indonesia. Through this medium, it is hoped that it will have a positive influence on students' nationalistic attitudes. The subject of Cultural Diversity in Indonesia is included in basic competency 3.2, which is to identify various forms of cultural diversity in Indonesia, 3.3, which is to understand the importance of unity in diversity, and 4.2, which is to present information related to cultural diversity through simple media. The material covers a fairly broad scope, so it requires organizing the concepts to make them easier to understand. The teaching materials, organized in accordance with the Mind Mapping model, make it easier for students to understand the learning material in a structured and coherent manner.

Determining the appropriate learning media plays an important role in the process of shaping students' character. The use of technology-based media, such as Edraw Mind Map, can create a more engaging learning environment and encourage innovation in learning. Through a structured visual display, the delivery of material containing national values can be carried out more optimally and be easily understood. The effectiveness of the media is further strengthened when combined with the values of Darul Ahdi Wa Syahadah. This national concept emphasizes the importance of loyalty to the country, a sense of unity, and responsibility as citizens. Theoretically, the integration of Mind Mapping and Darul Ahdi Wa Syahadah is grounded in complementary frameworks: Mind Mapping operationalizes dual coding theory (Paivio, 1991) by simultaneously activating verbal and visual information processing, while Darul Ahdi Wa Syahadah provides a value-laden ideological framework that connects national identity to religious commitment, thereby targeting the affective dimension of attitude formation. Together, these two elements are hypothesized to produce

deeper and more durable attitude change than either approach in isolation — Mind Mapping by structuring the cognitive representation of nationalism, and Darul Ahdi Wa Syahadah by providing the motivational and affective meaning that drives internalization. This integrated theoretical rationale distinguishes the present study from prior research that has examined Mind Mapping and civic values education separately. A review of existing studies reveals a clear research gap: while studies such as Nurrachmawati and Istaryatiningtias (2022) have demonstrated the effect of Mind Mapping on Civic Education learning outcomes. Stefani and Amrullah have shown the impact of Darul Ahdi Wa Syahadah-based learning on nationalistic attitudes; no study to date has systematically combined both approaches within a single intervention targeting nationalistic attitude formation at the elementary school level. The present study addresses this gap by integrating both elements, providing the first empirical test of their combined effectiveness in a Muhammadiyah primary school context.

The importance of this research lies in its effort to present creative alternative learning strategies by integrating Mind Mapping media based on the Edraw Mind Map application into Civic Education learning. This study is expected to make a tangible contribution to the development of more effective Civic Education teaching methods that foster a sense of nationalism in students from an early age. Based on this background, this study explicitly formulates the following research questions: (1) Does the use of Mind Mapping media containing Darul Ahdi Wa Syahadah values significantly affect the nationalistic attitudes of Grade VI students at SD Muhammadiyah 5 Porong? (2) How large is the effect of this intervention on students' nationalistic attitudes as measured by the Partial Eta Squared coefficient? In this study, nationalistic attitude is operationally defined as a student's evaluative disposition toward the nation, comprising three measurable dimensions: (a) cognitive — knowledge and understanding of national identity, history, and symbols; (b) affective — emotional attachment, pride, and sense of belonging to the nation; and (c) behavioral — active participation in upholding national values, respecting diversity, and contributing to the common good. These dimensions align with the civic education framework and are reflected in the 25-item measurement instrument used in this study. The term "civic nationalism" as used in the title refers to a form of nationalism grounded in shared civic values and institutional commitment, consistent with the Darul Ahdi Wa Syahadah concept. In contrast, "nationalistic attitude" in the body of the study refers to the measurable behavioral and affective expression of this commitment among individual students. Both terms refer to the same construct examined at different levels of analysis — societal and individual, respectively. The results of this study are intended to identify alternative teaching strategies that are not only visually appealing and easy to understand, but also capable of enhancing students' sense of national identity.

2. METHODS

This study utilizes a quantitative research approach. In this study, a pre-experimental model was used in the form of a one-group pre-test post-test study (Anwar & Widiartanto, 2021). In this study, only one series of experiments was conducted, namely a pre-test (O1) to understand the initial findings. After that, there is a post-test (O2) to determine the final results. Next, there is treatment (X) (Torang Siregar et al., 2025). Researchers can compare the conditions before and after treatment. The research design is as follows. The results of the tests mentioned above were then analyzed to determine the impact of the treatment using the symbol (O2) (Torang Siregar et al., 2025), as can be clearly seen in Table 1 below.

Table 1. One Group Pretest-Posttest

	<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
	O ₁	X ₁	O ₂
Information:			
O1 : experimental class pretest			
O2 : experimental class posttest			
X1 : Treatment with multi-representation worksheets			

If there is a significant difference between the pre-test and post-test results, it can be said that the use of Mind Mapping as a learning tool has an impact on the learning outcomes of students at SD Muhammadiyah 5 Porong. This research was conducted at Muhammadiyah 5 Porong Primary School, located on Jalan Raya, Dusun Pojok, Lajuk, Porong, Sidoarjo Regency, East Java. The population for this study consisted of all 22 sixth-grade students at Muhammadiyah 5 Porong Elementary School, comprising 11 boys and 11 girls. The sampling technique used in this study was saturated sampling, as the number of students did not reach 30. Saturation sampling is a sampling technique in which all members of the population are included in the research sample (Torang Siregar et al., 2025). The research data were collected through initial observation at school, tests using pre-tests and post-tests consisting of 25 multiple-choice questions, and documentation (Sianturi et al., 2024). The intervention was carried out in a structured manner over three consecutive days, including initial measurements (pre-test), one 120-minute learning session using the Mind Mapping strategy integrated with Darul Ahdi Wa Syahadah values, and a final measurement (post-test), so that the pedagogical treatment designed based on visual-conceptual representation was given intensively in a two-hour meeting in the subject of Pancasila and Citizenship Education.

This research activity utilizes primary and secondary data. Primary data is key information obtained by researchers directly from the source during the research process (Kolkman & Blackburn, 2014). In this study, primary data was obtained directly from the source, namely through the results of the pre-test and post-test given to sixth-grade students at SD Muhammadiyah 5 Porong. In addition to primary data, this study also integrates secondary data. Secondary data is a type of research data obtained by researchers through intermediaries or media. (Kolkman & Blackburn, 2014). Primary data was sourced from various reliable references, such as scientific publications, books, and information obtained from reputable websites (Kolkman & Blackburn, 2014).

The research procedure was carried out in five stages. First, researchers prepared pre-test and post-test instruments and learning materials to be given to students, Second, administering a pre-test to VI students to assess their knowledge or skills before treatment is given, Third, administering a post-test used as a tool to assess improvements in student learning outcomes after treatment was given, fourth, analysis of pre-test and post-test data

to determine whether there is a significant effect on student learning outcomes after receiving treatment using SPSS software version 25 (Nova Siti Ismila & Rosi Iskandar, 2023).

The instruments used in this study were pre-test and post-test research instruments in the form of multiple-choice questions used to assess student learning outcomes, and experimental design research instruments in the form of teaching modules, teaching materials, and student worksheets. Test instruments undergo validity and reliability testing. Validity testing is used in research employing construct validity, while reliability testing uses the Cronbach Alpha formula (Mawaddah et al., 2021). According to Sugiyono (2023), construct validity testing is conducted after the instrument questions have been compiled with aspects assessed based on specific theoretical foundations, and then consulted with experts to ensure that the instrument used is consistent with the theory and does not measure other variables. The validity of the instrument was assessed through expert judgment based on theoretical indicators of nationalism and the principles of Darul Ahdi Wa Syahadah. Before implementation, the Mind Mapping tool and design were validated by experts to ensure the suitability of the material and its usability. The validation results showed that the tool was suitable with minor revisions, and it was then implemented in the experimental stage. Next, a reliability test was conducted to determine whether the instrument provides consistent results and measures the consistency of the instrument across questions. In a reliability test to measure the consistency of an instrument using the Cronbach Alpha formula, a score < 0.60 is considered unreliable (Teni & Yudiyanto, 2021).

This study utilized a prerequisite test, namely a normality test, to determine whether the pre-test and post-test data were normal or not, which was tested using the Shapiro-Wilk formula (Octaviana et al., 2023). The Shapiro-Wilk method is a normality method for small samples < 50 (Octaviana et al., 2023). In the normality test, the hypotheses used are H_0 : the data are normally distributed and H_1 : the data are not normally distributed. If the significance value (p-value) calculated with the normality test statistic is greater than the significance level (for example, 0.050), then the hypothesis H_0 is accepted and the data is normally distributed (Sonjaya et al., 2025).

The next step in this analysis is to perform a T-test, namely a paired-samples t-test. The T-test is used to assess the significance of the relationship between variables X and Y, in order to determine whether the independent variable, namely the use of mind mapping media containing Darul Ahdi Wa Syahadah values, has a real influence on the dependent variable, namely students' nationalistic attitudes, partially or separately (Rahmi & Alfurqan, 2021). The coefficient of the independent variable can be interpreted using the Unstandardized Coefficient or Standardized Coefficient, taking into account the significance value of each variable at a significance level of $\alpha = 5\%$ (Rahmi & Alfurqan, 2021). If the t-value is less than the t-table value and α is greater than 0.05, it can be concluded that the independent variable does not have a significant impact on the dependent variable, so H_0 is accepted, and H_1 is rejected. Conversely, if $t_{hitung} > t_{tabel}$ and $\alpha < 0.05$, there is a significant effect between the independent variable, namely the use of mind mapping media containing Darul Ahdi Wa Syahadah values, and the dependent variable, namely students' nationalistic attitudes, so that H_0 is rejected and H_1 is accepted (Rahmi & Alfurqan, 2021). If all prerequisite tests have been met, then the final step is to perform the eta squared test. The eta squared test was conducted to measure the extent of the influence of using Mind Mapping media containing Darul Ahdi Wa Syahadah values on the development of students' nationalistic attitudes in the

Pancasila Education learning process in Grade VI of elementary school (Farohah & Tirtoni, 2024).

3. RESULTS AND DISCUSSION

3.1. Origin of lactic strains studied

Research shows the urgency of instilling nationalism in students in an era of globalization marked by a weakening of national identity among the younger generation. The integration of Darul Ahdi Wa Syahadah values into Mind Mapping media was chosen as a learning intervention because this concept emphasizes the responsibility of every citizen as guardians of the nation's noble covenant and active witnesses in national life. To ensure measurement accuracy, research instruments first undergo a series of rigorous feasibility tests.

The first step in ensuring the quality of the instrument was to test the construct validity of 30 items on nationalism. This test is crucial because invalid instruments will produce data that cannot be scientifically accounted for. Using the biserial correlation technique with the Dcriterion $r_{hitung} > r_{tabel}$ (0.423) at a significance level of 5%, it was found that five items (numbers 11, 14, 15, 24, and 27) did not meet the validity criteria. A closer examination of these invalid items revealed two primary causes of invalidity. First, items 11, 15, and 24 suffered from wording clarity issues, where the sentence structures were ambiguous and could be interpreted differently by respondents, leading to inconsistent responses that weakened item-total correlations. Second, items 14 and 27 exhibited content misalignment, meaning the item content did not sufficiently represent the nationalism construct being measured and instead captured peripheral concepts unrelated to the core indicators of nationalistic attitude as defined in this study. The elimination of these five items is not merely a statistical

Procedure, but rather an effort to ensure that each item truly measures the construct of nationalism, not other variables that could obscure the research results. The remaining 25 valid questions indicate that 83.3% of the initial instrument met reliable measurement standards. A valid research instrument needs to be supported by good reliability so that the measurement results can be trusted. Thus, reliability testing using Cronbach's Alpha was conducted to identify the level of consistency of the instrument in providing stable results upon repeated use under equivalent conditions. The test results are presented in Table 2.

Table 2. Instrument Reliability Test Results of Reliability Statistics

Cronbach's Alpha	N of items
,897	30

A Cronbach's Alpha value of 0.897 is significant in the context of this study. According to George and Mallery's (2003) classification, an α value > 0.9 is categorized as "excellent", while a value between 0.8 and 0.9 is considered "good". Thus, the coefficient of 0.897 is on the threshold of the excellent category, indicating that 89.7% of the observed score variance is true score variance, while only 10.3% is measurement error variance. Implicitly, this instrument has a high degree of reliability in measuring students' attitudes towards nationalism, so that differences in scores between respondents can be trusted as genuine differences in attitude, not artifacts of measurement inconsistency. (Teni & Agus Yudiyanto, 2021).

Before conducting a parametric hypothesis test, the assumption of data normality must be met. Violation of this assumption can lead to misleading statistical conclusions because parametric tests such as the paired sample t-test assume a normal distribution in the population. The Shapiro-Wilk method was chosen because it is more sensitive and accurate for small samples ($n < 50$) than the Kolmogorov-Smirnov test. (Sonjaya et al., 2025). The results of normality testing are presented in Table 3.

Table 3. *Results of Normality Tests for Pre-test and Post-test Data*

Data	Shapiro-Wilk			Description
	Statistic	df	Sig.	
Pretest	,952	22	,346	Normal
Posttest	962	22	,526	Normal

The SPSS output shows Shapiro-Wilk significance values of 0.346 for the pre-test and 0.526 for the post-test. The statistical interpretation is as follows: since both Sig. values $> \alpha$ (0.05), H_0 (data is normally distributed) is accepted. The Shapiro-Wilk statistical value approaching 1 (pre-test = 0.952; post-test = 0.962) further strengthens the conclusion that the data distribution is close to a perfect normal distribution. In practical terms, the study found that the participants' nationalistic attitude scores were symmetrically distributed around the mean value, without any extreme outliers that could distort the analysis. The fulfillment of the normality assumption provides legitimacy to proceed to the paired sample t-test stage. (Farohah & Tirtoni, 2024).

The essence of this experimental study is to examine whether there is a significant difference in the nationalistic attitudes of students before and after learning intervention using Mind Mapping media containing the values of Darul Ahdi Wa Syahadah. The paired sample t-test was chosen because it compares two measurements on the same subject (within-subject design), thereby controlling for individual variability. The results of the analysis are presented in Table 4.

Table 4. *Results of the Paired Sample T-Test*

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRETEST - POSTTEST	-14.182	3.850	.821	-15.889	-12.475	-17.278	21	.000

The results of the paired sample t-test show that the mean difference value of -14.182 indicates that the average post-test score is 14.182 higher than the pre-test score (the negative sign is due to the calculation of the pre-test minus the post-test). The relatively small standard deviation of 3.850 points compared to the mean indicates that the increase in scores

among students was fairly consistent; there were no extreme variations where some students improved dramatically while others improved only slightly. The test results show that the t -value of -17,278 (absolute value = 17,278) is well above the t -table value at a degree of freedom (df) = 21 and a significance level (α) = 0.05 (t_{table} = 2,080). This huge difference is reflected in the comparison $|t_{hitung}|/t_{tabel}$ = 8,3 times, so it can be interpreted that the difference obtained is very unlikely to occur by chance. In addition, the significance value (2-tailed) = 0.000 (actually < 0.001) further strengthens the finding that the probability of this difference occurring if H_0 is true is less than 0.1%.

In other words, there is very strong statistical evidence to reject H_0 and accept H_a : the use of Mind Mapping media containing Darul Ahdi Wa Syahadah values has a significant effect on students' attitudes toward nationalism. (Rahmi & Alfurqan, 2021). Statistical significance does not fully reflect the practical significance of an intervention. Studies with large sample sizes have the potential to produce statistically significant p -values even though the observed differences are practically trivial. Therefore, the effect size was calculated using the Eta Squared (η^2) test to measure the actual effect of the learning intervention on the dependent variable. The results of the analysis using Repeated Measures ANOVA in SPSS version 25 are presented in Table 5.

Table 5. Effect Size Test Results (Partial Eta Squared)

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	2212.364	1	2212.346	298.514	0.000	0.934
Error(Time)	Linear	155.636	21	7.411			

The Partial Eta Squared (η^2) value of 0,934 is a statistically significant finding. To understand its meaning, it is necessary to know that η^2 measures the proportion of variance in the dependent variable that the independent variable can explain. With η^2 = 0,934, it means that 93,4% of the change in students' nationalism attitude can be attributed to the use of Mind Mapping media containing Darul Ahdi Wa Syahadah values. In comparison, only 6,6% is caused by other factors outside the treatment. However, it is important to acknowledge that this η^2 value is considerably higher than what is typically found in educational intervention research, where effect sizes generally range between η^2 = 0,10–0,30 for large effects (Cohen, 1988). Several methodological factors inherent to this study likely contributed to the exceptionally high effect size value. First, the small sample size (n = 22) tends to inflate the t -value statistically, which in turn produces a larger η^2 through the formula $\eta^2 = t^2/(t^2 + df)$. As the denominator (df = 21) is disproportionately small relative to t^2 = 298,53, the resulting η^2 naturally approaches 1,00. Second, the one-group pre-experimental design without a control group means that all observed score changes are fully attributed to the treatment, without the ability to isolate the effects of external variables such as the testing effect (students' familiarity with the instrument after the pretest) or maturation effect (students' natural development over time). Third, the highly focused and contextually relevant intervention — integrating Darul Ahdi Wa Syahadah values within the Muhammadiyah school environment — may have produced greater short-term attitudinal changes compared to more generic instructional approaches. Therefore, while the directional finding remains valid that the intervention produced a statistically and practically significant improvement in students'

nationalistic attitudes, future research is strongly recommended to employ a larger sample size and a true experimental design with a randomized control group to obtain a more conservative and generalizable effect size estimate.

Referring to Cohen's (1988) interpretation guidelines, which have become the standard in social and educational research, η^2 values are categorized as follows: 0,01 (small effect), 0,06 (medium effect), and 0,14 (large effect). With a value of 0,934, the learning intervention is classified as having a large effect. Nevertheless, a critical appraisal of this value is necessary. This η^2 value substantially exceeds the typical range for educational research ($\eta^2 = 0,10-0,30$), and its validity as a true reflection of the intervention's effectiveness must be questioned through a skeptical lens. Three methodological artifacts likely inflated this value. First, the small sample size ($n = 22$) mathematically inflates the t -value, which directly inflates η^2 through the formula $\eta^2 = t^2/(t^2 + df) = (-17,278)^2/((-17,278)^2 + 21) = 298,53/(298,53 + 21) \approx 0,934$ — as df shrinks, η^2 approaches 1,00 regardless of true effect magnitude. Second, the absence of a control group means that all score variance is attributed to the treatment, when in reality external factors also contribute. Third, demand characteristics may have played a role: students who are aware of being in an intervention study may consciously or unconsciously align their posttest responses with what they perceive the researcher expects, artificially elevating posttest scores. The large Type III Sum of Squares value for the TIME factor (2212,364), which exceeds the Error value (155,636) by a ratio of approximately 14:1, reflects great pre-post change but cannot confirm that this change is attributable solely to Mind Mapping. Researchers and practitioners should therefore treat this η^2 value as an upper-bound estimate rather than a precise measure of the intervention's true effect. Future studies with larger, randomized samples and control groups are essential to produce a more conservative and reliable effect size estimate.

The effectiveness of implementing interventions in efforts to improve character education achievement can be explained through several interrelated mechanisms operating at three distinct levels: cognitive, affective, and behavioral. At the cognitive level, Mind Mapping engages both hemispheres of the brain simultaneously — the left brain, which processes information logically and sequentially, and the right brain, which functions in visual and spatial processing. This dual engagement produces a dual coding mechanism (Paivio, 1991) that strengthens memory retention and deepens conceptual understanding. When students map concepts of nationalism in structured visual forms, they are not merely memorizing abstract principles, but actively constructing personal and interconnected networks of meaning that facilitate deeper processing. At the affective level, creating mind maps requires students to make value judgments about which concepts are most important and how ideas relate to one another, fostering emotional engagement with the content. The integration of Darul Ahdi Wa Syahadah values specifically targets this affective dimension by connecting nationalism to personal religious identity, making the material personally meaningful rather than academically distant. This emotional connection is a critical driver of attitude change, as attitudes are formed not only through knowledge acquisition but through felt significance. At the behavioral level, the collaborative and creative nature of the Mind Mapping activity — designing, discussing, and presenting maps — required students to enact nationalistic values through participatory behavior in the classroom, reinforcing attitudinal change through action. Among the three dimensions, the affective and behavioral mechanisms are

particularly likely to drive the observed changes in nationalistic attitude scores, as attitude instruments primarily capture evaluative dispositions rather than factual knowledge (Anwar & Widiartanto, 2021). The second aspect, the integration of Darul Ahdi Wa Syahadah values, provides a philosophical framework that is relevant to the Indonesian and Muhammadiyah context of students at SD Muhammadiyah 5 Porong. The concept of Indonesia as dar al-'ahdi (the land of covenant) and wa al-syahadah (the land of testimony) brings a spiritual dimension to nationalism, making love for the homeland not merely an emotional sentiment, but also part of the practice of religious values. Cultural relevance creates meaningful learning that is more effective than learning detached from students' socio-religious context. However, while these theoretical explanations are compelling, it is equally important to consider alternative explanations for the observed improvement in posttest scores. Three alternative explanations warrant serious consideration. First, the Hawthorne effect may have played a role: students may have performed better on the posttest simply because they received special attention as research participants, rather than as a direct result of the Mind Mapping intervention itself. The novelty of being observed and treated differently from routine instruction may have motivated students to engage more seriously, regardless of the specific content of the intervention. Second, the testing effect must be acknowledged: exposure to the pretest may have familiarized students with the item content and format, enabling them to perform better on the posttest not because their nationalistic attitudes genuinely improved, but because they had already encountered similar questions. This is particularly relevant given that the same 25-item instrument was used for both pretest and posttest. Third, demand characteristics represent a plausible confound: students who understood that the study aimed to measure nationalism may have consciously adjusted their posttest responses to align with socially desirable nationalistic attitudes, rather than reflecting authentic attitudinal change. The absence of a control group and the one-group design make it statistically impossible to isolate the true treatment effect from these alternative explanations. Future research should employ counterbalanced designs, parallel test forms, and blind assessment procedures to minimize these threats to internal validity (Yusril & Syahputra, 2025).

The findings are consistent with previous studies, but with a higher magnitude of effect. Nurrachmawati's Research (Mawaddah et al., 2021). on III students at SDN Susukan 07 Pagi reported a $t\text{-count} = 7.844 > t\text{-table} = 2.054$, indicating a significant effect of Mind Mapping on Civic Education learning outcomes. The study produced a $t\text{-count}$ that was more than double (-17.278), indicating that the addition of Darul Ahdi Wa Syahadah values strengthened the effectiveness of Mind Mapping media in the context of nationalism.

The results of the study are also in line with the concept of Darul Ahdi Wa Syahadah, which Syamsuddin first proposed in his national sermon on August 18, 2011, entitled "NKRI as Darul Ahdi Was Syahadah," which was then formalized at the 47th Muhammadiyah Congress in Makassar in 2015. According to Din Syamsuddin, this concept has not been fully discussed in the literature on Islamic political thought. It is a unique interpretation by Muhammadiyah in understanding the relationship between Islam and the Pancasila. Din Syamsuddin emphasized that Indonesia as darul ahdi (a country of agreement) must be balanced with darus syahadah (a country of testimony), which means that every citizen must contribute to and participate in the development of the nation by receiving a fair share. This concept emphasizes the mission of khalifatullah fi al-ard (God's representative on earth) to create a safe, peaceful,

just, and prosperous country under divine protection (Baladatun thayyibatun wa Rabbun ghafur).

In line with this, Muhlasin's research (Stefani & Amrullah, n.d.) proves that Darul Ahdi Wa Syahadah's national education has a significant impact on elementary school students' understanding of nationalism and religious attitudes. The results showed an N-Gain value of 0,82, which is classified as effective, with a Paired Sample T-Test significance value of 0,00 ($p < 0,05$). The findings reinforce the argument that integrating national values and religiosity into learning can shape students' character as a generation that loves their country and upholds religious values (Stefani & Amrullah, n.d.). Thus, the use of Mind Mapping media containing the values of Darul Ahdi Wa Syahadah in this study proved to be effective as a learning strategy that combines cognitive and affective aspects in shaping students' nationalistic attitudes.

From a practical perspective, the results of this study produce several implications and recommendations that can be considered. Based on the study, it shows that Muhammadiyah educational institutions have the opportunity to implement Mind Mapping media that integrates the values of Darul Ahdi Wa Syahadah as an alternative strategy for Civic Education learning that has been proven to provide effective results. Proving its effectiveness in enhancing students' nationalistic attitudes, the η^2 value of 0,934 indicates that other variables only contribute 6,6% to changes in nationalistic attitudes, making the consistent application of this media a key factor for success. In addition, teacher training in creating digital Mind Maps using the Edraw Mind Map application needs to be intensified, considering that students initially experience confusion in compiling mind maps. The implications of this study can be examined at three levels. At the pedagogical level, this study demonstrates that integrating institutional ideological values such as Darul Ahdi Wa Syahadah into visual-based learning media is an effective strategy for character education. Teachers can adopt this approach as a routine instructional practice in Civic Education, particularly when teaching materials related to nationalism, unity, and civic responsibility. At the institutional level, schools under the Muhammadiyah organization can use this study as an empirical foundation to develop curriculum policies that systematically embed Darul Ahdi Wa Syahadah values across various subjects, not limited to Civic Education alone. At the policy level, education policymakers can consider this evidence-based approach as a model for strengthening character education programs that align national values with religious and organizational identity, supporting the broader goal of producing students who are both academically competent and morally grounded as responsible citizens.

Although the results of the study show significant positive impacts, several important limitations must be foregrounded — not merely acknowledged but understood as directly affecting the interpretation of the findings' strength and scope. These limitations do affect interpretation strength and should not be treated as minor caveats. First, the pre-experimental one-group pre-test post-test design does not have a control group, making it statistically impossible to rule out alternative explanations such as the Hawthorne effect, testing effect, or demand characteristics — all of which could inflate post-test scores independent of the treatment. This limitation directly weakens the causal claim that Mind Mapping caused the attitude improvement. Second, the limited sample size of 22 students

from a single Muhammadiyah school restricts generalizability both statistically and contextually. Students at SD Muhammadiyah 5 Porong are already embedded in a Muhammadiyah institutional culture that actively promotes Darul Ahdi Wa Syahadah values, which means the observed attitude change may reflect existing institutional exposure rather than the specific effect of the Mind Mapping intervention. Whether the same results would be obtained in non-Muhammadiyah or secular school contexts remains entirely unknown. Third, the claim that Darul Ahdi Wa Syahadah cultural relevance creates meaningful learning, while theoretically grounded, is assumed rather than empirically verified in this study. No qualitative data — such as student reflections, interviews, or classroom observations — were collected to confirm that students actually connected the Darul Ahdi Wa Syahadah values to their personal identities or found the content more meaningful than standard instruction. This assumption, if incorrect, would undermine a core theoretical claim of the study. Fourth, practical limitations related to technology access were not addressed. The Edraw Mind Map application requires devices and stable internet connectivity, raising questions about whether this intervention is sustainable and equitable across schools with different levels of technological infrastructure. The costs of teacher training, device procurement, and ongoing technical support represent real barriers to scalability that should be openly discussed. Fifth, digital divide issues — differences in students' prior familiarity with digital tools — may have introduced performance variation that was not controlled for, potentially confounding the results. Despite these limitations, this study makes meaningful contributions in three areas. 1) From a theoretical perspective, this study adds to the body of knowledge on integrating religious-organizational values into Civic Education, which has received relatively little empirical attention. 2) Methodologically, the validated 25-item nationalistic attitude instrument has potential for reuse in future studies. 3) Practically, the findings offer preliminary evidence — subject to the limitations above — that contextually relevant, visually structured learning media can support attitudinal development in character education.

4. CONCLUSION

This study contributes to the literature on civic education by showing that the integration of visual-structural media and institutional ideological values can strengthen the formation of nationalistic attitudes. Empirically, the results of the paired sample t-test showed a significant difference between the scores before and after the intervention ($t(21) = -17.278$, $p < 0.001$), with an effect size of $\eta^2 = 0.934$ that exceeded Cohen's (1988) criteria for a large effect. From a theoretical perspective, these findings support the visual constructivism approach and dual coding theory, in which graphic representations aid the integration of verbal and visual information, thereby strengthening meaning processing. Furthermore, integrating Darul Ahdi Wa Syahadah values broadens the framework of character education by positioning nationalism as a contextual ethical-religious practice, rather than merely a normative cognitive understanding. Although the pre-experimental design limits strong causal inferences, this study opens up space for the development of a systematically integrated value-based citizenship pedagogy model. Further research needs to test this model in a cross-school context and through a more rigorous experimental design to strengthen its external and theoretical validity.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirm that the paper is free of plagiarism.

6. REFERENCES

- Abdurrohman. (2021). Civic Education Persfective. *Journal FKIP*, 1(1), 23–33.
- Andara, S., Dewi, D. A., & Furnamasari, Y. F. (2021). Meningkatkan semangat nasionalisme melalui pembelajaran PPKn di sekolah dasar. *Jurnal Pendidikan Tambusai*, 5(3), 7733–7737.
- Anggun Murta Sati. (2020). Pengaruh model pembelajaran mind mapping terhadap karakter kreatif siswa pada mata pelajaran PKn di kelas III SD Negeri 32 Kota Bengkulu. *Jurnal Ilmu Pendidikan*, 7(2), 809–820.
- Anjani, A., Syapitri, G. H., & Lutfia, R. I. (2020). Analisis metode pembelajaran di sekolah dasar. *Fondatia*, 4(1), 67–85. <https://doi.org/10.36088/fondatia.v4i1.442>
- Anwar, M. L. K., & Widiartanto, W. (2021). Pengaruh brand image, brand awareness dan product quality terhadap keputusan pembelian laptop merek asus (Studi pada konsumen laptop Asus di Plasa Simpang Lima Semarang). *Jurnal Ilmu Administrasi Bisnis*, 10(1), 822–828. <https://doi.org/10.14710/jiab.2021.29822>
- DJ, N., & Jumardi, J. (2022). Peran guru dalam menanamkan sikap nasionalisme terhadap peserta didik sekolah dasar. *Jurnal Basicedu*, 6(5), 8341–8348. <https://doi.org/10.31004/basicedu.v6i5.3775>
- Farohah, N. A., & Tirtoni, F. (2024). Pengaruh model pembelajaran multikulturalisme pada mapel pendidikan pancasila untuk meningkatkan berpikir kritis siswa kelas IV SD. *Jurnal Pendidikan Dasar Flobamorata*, 5(1), 165–173. <https://doi.org/10.51494/jpdf.v5i1.1460>
- Hardyanti, N., & Isnarmi, I. (2020). Keterlibatan siswa dalam proses pembelajaran PPKn di SMP N 3 Bukittinggi. *Journal of Civic Education*, 3(3), 339–349. <https://doi.org/10.24036/jce.v3i3.363>
- Herianto, E., Sumardi, L., & Mataram, U. (2025). Inovasi pembelajaran digital : Studi pengaruh mind mapping berbantuan aplikasi E-Draw Mind terhadap hasil belajar PPKn. *Jurnal Pendidikan: Kajian dan Implementasi*. 7(1), 113–124.
- Hikmah, N., & Hadi, N. F. (2021). Implementasi Edraw Mind Map Berbasis discovery learning dalam meningkatkan hasil belajar PAI. *Jurnal Tarbiyah dan Ilmu Keguruan Borneo*, 2(3), 147–161. <https://doi.org/10.21093/jtikborneo.v2i3.4179>
- Irdianti, P. R., Mahadewi, L. P. P., & Widian, I. W. (2020). Hubungan minat belajar dan perilaku empati terhadap hasil belajar PKn. *Jp2*, 3(3), 459–472.
- Junaedi, M., Muharram, F., & Yani, M. (2021). Negara pancasila sebagai darul ahdi wa syahadah: Internalisasi nilai-nilai Islam Dalam membangun wawasan kebangsaan di lingkungan perguruan tinggi Muhammadiyah. *Jurnal Pancasila dan Kewarganegaraan*, 6(1), 11–24. <https://doi.org/10.24269/jpk.v6.n1.2021.pp11-24>
- Kolkman, R., & Blackburn, S. (2014). Sulung. *Tribal Architecture in Northeast India*, 5(September), 121–125. https://doi.org/10.1163/9789004263925_015
- Mahardika, I. (2023). Peran guru pendidikan pancasila dan kewarganegaraan sangat penting

- untuk membantu memperkuat identitas nasional di era abad 21. *KRAKATAU (Indonesian of Multidisciplinary Journals)*, 1(1), 27–34. <http://jurnal.desantapublisher.com/index.php/krakatau/index>
- Mawaddah, A. W. Al, Hidayat, M. T., Amin, S. M., & Hartatik, S. (2021). The effect of using quizizz learning media on student learning outcomes in mathematics subjects through online in elementary schools. *Journal Basicedu*, 5(5), 3109–3116.
- Nova Siti Ismila, & Rosi Iskandar. (2023). Peningkatan hasil belajar PKn melalui penerapan model pembelajaran kooperatif tipe teams games tournament pada murid kelas V. *Mitra Pilar: Jurnal Pendidikan, Inovasi, Dan Terapan Teknologi*, 2(2), 89–96. <https://doi.org/10.58797/pilar.0202.06>
- Nurhalisyah, A., Dewi, D. A., & Adriansyah, M. I. (2024). Pentingnya Kewarganegaraan dalam pendidikan pelajar. *MARAS: Jurnal Penelitian Multidisiplin*, 2(1), 74–79. <https://doi.org/10.60126/maras.v2i1.130>
- Nurhayati, H., & Handayani, N. W. L. (2020). Pembangunan karakter religius peserta didik melalui kegiatan ekstrakurikuler di Madrasah Ibtidaiyah. *Jurnal Basicedu*, 5(5), 524–532.
- Nurrachmawati, R., & Istaryatiningtias, I. (2022). Pengaruh model pembelajaran mind mapping terhadap hasil belajar PPKn siswa sekolah dasar. *Jurnal Basicedu*, 6(5), 8026–8032. <https://doi.org/10.31004/basicedu.v6i5.3597>
- Octaviana, D., Simanjuntak, V. G., Yanti, N., Hidasari, F. P., & Ali, R. H. (2023). Upaya meningkatkan kemampuan gerakan kata Heian Nidan pada ekstrakurikuler karate di MTSn 1 Sintang. *Jurnal Dunia Pendidikan*, 3(November), 67–78. <http://jurnal.stokbinaguna.ac.id/index.php/JURDIP/article/view/2083>
- Pradnyana, I. K. A., Pradnyana, I. M. A., & Suyasa, P. W. A. (2020). Pengembangan multimedia pembelajaran interaktif PPKn untuk siswa tunagrahita dengan konsep gamifikasi. *Jurnal Pendidikan Teknologi dan Kejuruan*, Vol.17(2), 166–176. <https://ejournal.undiksha.ac.id/index.php/JPTK/article/view/25189>
- Prof. Dr. Sugiyono. (2023). *Metode penelitian kuantitatif, kualitatif, dan R&D* (M. Dr. Ir. Sutopo. S.Pd (Ed.)). Bandung: Alfabeta.
- Putra Priyandana, I. W., Dibia, I. K., & Rahayu Ujianti, P. (2021). Upaya meningkatkan hasil belajar IPA melalui media pembelajaran mind mapping berbantuan aplikasi edraw mindmaster. *MIMBAR PGSD Undiksha*, 9(2), 287. <https://doi.org/10.23887/jjpgsd.v9i2.36520>
- Rahman, A., Munandar, S. A., Fitriani, A., Karlina, Y., & Yumriani. (2022). Pengertian pendidikan, ilmu pendidikan dan unsur-unsur pendidikan. *Al Urwatul Wutsqa: Kajian Pendidikan Islam*, 2(1), 1–8.
- Rahmi, L., & Alfurqan. (2021). Pengaruh Penggunaan media audio visual terhadap minat belajar siswa pada masa pandemi covid-19. *Jurnal Education and Development*, 9(3), 580–589. <http://journal.ipts.ac.id/index.php/ED/article/view/2671>
- Sianturi, R., Lumbantobing, M. T., & Simanjutak, M. M. (2024). Pengaruh media gambar

terhadap hasil belajar siswa kelas IV pada tema 4 sub tema 1 jenis-jenis pekerjaan di SD Negeri No . 094133 Manik Rambung. *Journal of Social Science Research Volume*, 4(1), 794–807.

Sonjaya, R. P., Aliyya, F. R., Naufal, S., & Nursalman, M. (2025). Pengujian prasyarat analisis data nilai kelas: uji normalitas dan uji homogenitas. *Jurnal Pendidikan Tambusai*, 9(1), 1627–1639.

Stefani, E. W., & Amrullah, M. (n.d.). *Syahadah on understanding the nasionalist religious attitude of students elementary school [Pengaruh pembelajaran kebangsaan darul ahdi wa syahadah terhadap pemahaman sikap nasionalis religius siswa sekolah dasar]*. 1–8.

Teni, & Agus Yudiyanto. (2021). Pengaruh motivasi belajar terhadap hasil belajar siswa kelas VII SMP Negeri 2 Kedokan Bunder Kabupaten Indramayu. *Jurnal Pendidikan Indonesia*, 2(01), 105–117. <https://doi.org/10.59141/japendi.v2i01.73>

Torang Siregar, Abadi, A. M., Andayani, S., Rangkuti, A. N., & Sungkono, J. (2025). Uji normalitas gain untuk pemantapan dan modul dengan one group pre and post test di SMP Negeri 1 Padangsidempuan. *Dedikasi : Jurnal Pengabdian Kepada Masyarakat*, 3(2), 499–504. <https://doi.org/10.53276/dedikasi.v3i2.206>

Yusril, M., & Syahputra, I. (2025). Implementasi Konsep darul 'ahdi wa syahadah dalam kehidupan berbangsa dan bernegara. *Jurnal Pendidikan dan Pembelajaran*, 04(02), 1355–1364.



Effectiveness of Qur'anic-Based Multicultural Instruction in Strengthening Tolerance among Primary Learners in Indonesia

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ABSTRACT

This study aims to analyze the impact of multicultural learning based on Surah Al-Hujurat, integrated with a deep learning approach, on students' tolerant attitudes within the context of Pancasila Education. The study was conducted at SD Muhammadiyah 1 Candi Labschool Umsida (Muhammadiyah University of Sidoarjo), Sidoarjo, East Java, Indonesia. The research employed a quantitative approach, specifically a pre-experimental design with a one-group pretest-posttest form. Data were collected using several instruments, namely pretest-posttest and teaching modules. The results of the paired-sample t-test showed $p < 0.001$. Furthermore, the partial eta squared value of 0.279 indicates a moderate effect size. These findings demonstrate that the integration of multicultural learning based on Surah Al-Hujurat, implemented through a deep learning approach, contributes significantly to character education, particularly in fostering a culture of tolerance in elementary schools.

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1. INTRODUCTION

Education is a key pillar in shaping character in the face of the complex realities of national life. Its function is to instill moral values in students in order to create a harmonious nation despite differences. This is in line with Law No. 20 of 2003, Article (3) on the National Education System, which states that national education aims to develop the potential of students to become people who are faithful and devoted to God Almighty, have noble character, are healthy, knowledgeable, skilled, creative, independent, and become democratic and responsible citizens. This objective reinforces the meaning that education in Indonesia does not focus on academic achievement but also instills awareness to respect differences in a heterogeneous society. The urgency of national education lies in its potential to produce a young generation that is not only skilled but also has a personality and character in line with the moral values of the nation and religion (Nurhayani, Yaswinda, and Movitaria 2022).

In addition to education, religion also plays an important role in shaping attitudes of tolerance. In Islamic teachings, human and social values are upheld through the concept of *habluminannas* (Fita Mustafida, 2020), which emphasizes the importance of harmonious relationships between fellow human beings. The Qur'an provides a normative basis for addressing diversity, particularly through verses 9–13 of Surah Al-Hujurat, which affirm the principles of justice, peaceful conflict resolution, and the acceptance of differences in ethnic and cultural backgrounds as decreed by Allah Subhanahu wa ta'ala (Hakim & Bayyinah, 2023). These values affirm that Islamic teachings are substantially compatible with the concept of multiculturalism. The concept of multiculturalism not only emphasizes religious and cultural diversity, but also includes diversity in all components and elements of life (Ningsih, Mayasari, and Ruswandi 2020). However, diversity, which should be a strength of the Indonesian nation, often triggers conflict. Societies living in diversity still face several problems in building and creating peace between community groups. One form of conflict that remains unresolved to this day is conflict between religious adherents. A more specific case is the burning of churches and boycott actions between religious leaders (Nugraha et al., 2020). Therefore, efforts to maintain unity amid diversity pose a unique challenge for the Indonesian nation, especially in terms of religion.

This challenge is reflected even among students. Data from Setara Institute (2023) also shows that the number of actively intolerant students has increased compared to 2016. At that time, around 2.4% of students were classified as actively intolerant, and 0.3% had been influenced by ideas that conflicted with the values of tolerance. In line with this, based on preliminary observations conducted by researchers in grade VI at SD Muhammadiyah 1 Candi Labschool Umsida, it was found that some students had demonstrated tolerance in the learning process. These findings indicate that tolerance cannot be fostered solely through the teaching of normative values; rather, a learning approach is needed that connects tolerance values with students' everyday social experiences.

Multicultural education is a relevant approach to instilling tolerance. Multicultural learning provides a pedagogical framework for students to understand diversity through equal and reflective interaction in the classroom, where each individual has the same opportunity to participate in the teaching and learning process without discrimination based on cultural, social, or personal identity (Irnawati et al., 2024). For tolerance to have moral strength and be internalized more deeply, a contextual ethical foundation grounded in students' social

experiences is needed. The values conveyed in verses 9–13 of Surah Al-Hujurat, which emphasize justice, brotherhood, and respect for differences, can be employed to reinforce the moral dimension of multicultural learning. Integrating these values into Pancasila Education subjects through a deep learning approach allows students not only to understand tolerance cognitively, but also to relate it to their social experiences in an inclusive school environment. This approach can theoretically bridge the gap between the normative values taught and students' daily social practices.

In line with efforts to integrate the value of tolerance in Indonesian schools, the concept of multicultural learning has also been developed globally by experts, one of whom is James A. Banks. James A. Banks argues that multicultural learning is a movement for reform and a process of education whose main objective is to change the structure of educational institutions so that male and female students, students with special needs, and students from specific groups, races, and ethnicities have equal opportunities to achieve academic success at school (Firtikasari & Andiana, 2024). According to James A. Banks, multicultural learning has five important dimensions. First, the incorporation of multicultural values into the learning curriculum. Second, the formation of knowledge. Third, strategies for reducing prejudice. Fourth, a fair learning approach. Fifth, the empowerment of school culture and an inclusive social system (Bank & Banks, 2010). Based on this, teachers play an important role in instilling diversity through multicultural learning by applying various relevant strategies (Suryaningsih et al., 2023).

Several previous researchers have examined the influence of multicultural learning in shaping tolerance attitudes in educational environments. Research by Nurhasanah shows that there is a positive influence in the integration of multicultural learning into Islamic Religious Education at SD 037 Sabang Bandung. Multicultural learning can create a comfortable and conducive learning atmosphere. This also affects the smooth running of school activities because students are instilled with a high level of tolerance, so there are no conflicts that can cause division. In addition, several aspects of Islamic Religious Education learning are highly relevant to the concept of multiculturalism, including the Qur'an and Hadith, Aqidah, Akhlak, Fiqih, and Tarikh (Nurhasanah, 2021).

Research by Zamroni explains that multicultural learning in inclusive schools also has a significant effect, with the concept of inclusive schools that equalize the learning process and also the role of teachers in building students' awareness of the importance of respecting and appreciating human differences. Positive results were found, namely that students with disabilities were able to live harmoniously with their peers. This is because there was no longer any discrimination. They also ultimately had the opportunity to grow and develop (Zamroni et al. 2024).

Another study by Arzaq highlights that verse 13 of Surah Al-Hujurat emphasizes the important role of tolerance education in a multicultural society. The concept of multiculturalism referred to in this verse is not limited to religious diversity but also includes diversity in race, ethnicity, culture, and customs. This verse also emphasizes that diversity is the basis for building brotherhood and mutual understanding among fellow human beings (Shofri et al., 2020).

Several previous studies have examined the influence of multicultural learning on attitudes of tolerance. However, this study is particularly important as it aims to examine multicultural learning in depth, exploring how it can foster tolerance in students by linking it to the Islamic

values contained in verses 9–13 of Surah Al-Hujurat. In this study, multicultural learning is integrated into the Pancasila Education curriculum. In practice, Pancasila Education emphasizes intellectual and social-ethical aspects, while attitudes and values of faith are also necessary to support student development. The integration of verses 9–13 of Surah Al-Hujurat into Pancasila Education is expected to offer students opportunities to comprehend the meaning of tolerance from both national and Islamic perspectives.

The establishment of inclusive schools is also one of the revitalizations in this study. Multicultural learning in inclusive schools has the principle and goal of upholding diversity and justice in carrying out education (Amaliani et al., 2024). Relevant to this and based on the latest policy direction from the Indonesian government, which emphasizes the implementation of a meaningful learning curriculum, this study uses an updated deep learning approach model. The deep learning approach directs students to relate their personal experiences to the learning process. By applying the deep learning approach during the learning process, it is hoped that graduates will have critical reasoning skills, be able to analyze things well, and have emotional and social sensitivity in the life of the nation and state (Nurhakim et al., 2025)—learning, mindful learning, and joyful learning. In meaningful learning, students are required to be able to connect learning materials with real-life experiences. Mindful learning focuses on learning activities that focus on students. Learners are fully present in the learning process so that they can examine their understanding, identify obstacles, and solve problems in the classroom learning process. Joyful learning emphasizes a pleasant learning atmosphere. With joyful learning, learners are expected to have good learning motivation, which encourages participation in the classroom environment (Arif et al., 2025).

The deep learning approach serves as a relevant pedagogical bridge for integrating multicultural education, Islamic ethical values, and inclusive learning. Although these three elements are considered essential in shaping tolerant attitudes, research examining their simultaneous integration into formal subjects remains limited, as previous studies have generally discussed religious education, Pancasila education, and inclusive learning in isolation; consequently, an integrated learning model is not yet available. Thus, empirical evidence regarding the impact of this integration on students' tolerant attitudes—particularly in inclusive elementary schools—remains scarce.

In this context, the present study focuses on integrating Islamic ethical values—specifically those contained in surah Al-Hujurat verses 9–13, which emphasize peace, justice, and respect for differences—into Civic Education through a deep learning approach to strengthen students' tolerant attitudes in inclusive schools. The research questions are formulated as follows: 1) how the Islamic ethical values in surah Al-Hujurat verses 9–13 can be integrated into Civic Education in inclusive elementary schools; 2) how the implementation of the deep learning approach in Civic Education can internalize the values of surah Al-Hujurat within students; and 3) how the integration of multicultural education based on the values of surah Al-Hujurat through a deep learning approach influences the development of students' tolerant attitudes in inclusive elementary schools.

Based on these considerations, this study comprehensively examines the impact of implementing multicultural learning based on surah Al-Hujurat on students' tolerant attitudes, specifically within inclusive schools, by integrating the values of verses 9–13 into the Civic Education curriculum through a deep learning approach. This implementation is expected to enable students to apply the meaning of tolerance in real-life contexts, both

within the school environment and society at large. Furthermore, it serves as a reference for teachers in creating instructional innovations that integrate diversity, are human-oriented, and remain aligned with social realities.

2. METHODS

This study uses quantitative methods. Quantitative methods are an approach based on empirical philosophy to examine populations or samples using research instruments and data analysis processes using statistical tests to examine predetermined hypotheses. (Sugiyono 2024). A quantitative approach was chosen because the researcher aimed to test the effect of the independent variable, namely surah Al-Hujurat–based multicultural learning, on the dependent variable, students' attitudes toward tolerance, using data that are objectively measurable and amenable to statistical analysis.

This type of research uses a Pre-Experimental Design in the form of a One-Group Pretest-Posttest Design. This design only uses one group of subjects who will be given a pretest and a posttest. The results of the two tests are compared to determine the cause and effect between the independent and dependent variables, as clearly presented in Table 1 as follows:

Table 1. One Group Pretest-Posttest Design

<i>One Group Pre-test and Post-test Design</i>			
Group	<i>Pre-test</i>	Treatment	<i>Pos-test</i>
Experiment	→ O1	X→	→ O2

Descriptions:

O1 : *Pre-test*

X: *Treatment*

O2 : *Post-test*

The research subjects were sixth-grade students at SD Muhammadiyah 1 Candi Labschool Umsida in the 2024/2025 academic year. The sampling technique used was nonprobability sampling with a saturated sample, where the entire population was used as the sample. A saturated sample was chosen because the population size was relatively small, allowing the researcher to include the entire population. The object of this study was students' attitudes toward diversity, which were analyzed after receiving treatment in the form of surah Al-Hujurat–based multicultural learning, specifically verses 9–13. This objective was the main focus because tolerance is one of the important attitudes that students must have from elementary school age.

This study was conducted through three structured meetings, with a time allocation of two lesson periods each, equivalent to 75 minutes per session. The first meeting was dedicated to administering a pretest to measure students' initial abilities. The second meeting was carried out intensively to provide the treatment in the form of multicultural learning based on Surah Al-Hujurat verses 9–13, which was integrated into the Pancasila Education subject through a deep learning approach. The third meeting was used to administer a posttest to measure changes in students' attitudes toward tolerance following the treatment.

The main variable in this study is student tolerance, which is defined as the readiness and ability of students to accept, appreciate, and respect differences in the school environment. Tolerance is measured through three dimensions, namely cognitive, affective, and behavioral. The cognitive dimension encompasses students' understanding of tolerance, the value of diversity, and the principles of justice as outlined in Pancasila and in verses 9–13 of Surah Al-Hujurat. The affective dimension includes students' feelings and emotional attitudes toward differences, such as empathy, concern, and appreciation for friends of different cultures, religions, or special needs. The behavioral dimension includes students' concrete actions in demonstrating tolerance, such as cooperating, helping friends, respecting differences, and avoiding discrimination.

The data collection technique used several research instruments. The first instrument was a pretest and posttest consisting of 25 multiple-choice questions, compiled based on indicators of the three dimensions and adapted to the context of the Grade VI Pancasila Education subject, so that it could comprehensively represent students' attitudes toward tolerance. The second instrument is a teaching module used as a learning guideline containing learning objectives, materials, methods, activities, and assessments.

The research procedure consists of five stages carried out sequentially. The first stage is preparation, which includes initial observation at the school, sample determination, and research instrument development. The second stage is the implementation of a pretest to the research subjects to determine the students' attitudes of tolerance before being given treatment. The third stage involves administering the treatment, in which one class receives multicultural learning based on Surah Al-Hujurat. This is integrated into the Pancasila Education subject utilizing a deep learning approach. The fourth stage is the implementation of a posttest to measure changes in tolerance attitudes after treatment. The fifth or final stage is the processing of research data.

Data analysis was carried out through several processes. First, the validity of the instrument was tested using the Pearson product-moment technique. Second, a test was conducted to measure the consistency of the instrument between items, called a reliability test. The reliability test in this study was conducted using Cronbach's alpha coefficient. Third, a normality test was conducted using Shapiro–Wilk because the sample size was less than 50. If the data obtained were normally distributed, the fourth data analysis used a paired sample t-test. The paired sample t-test was used to test two paired samples at different times, namely before and after the treatment was given. The final data analysis used the partial eta square test to determine the extent of the effect of the treatment given. All stages of data analysis in this study use SPSS version 25. The use of SPSS makes it easier for researchers to make decisions with objective and valid statistical results.

3. RESULTS AND DISCUSSION

Research instrument testing was conducted to ensure the feasibility and quality of the data obtained. The research instruments were first tested to ensure the feasibility and validity of the data collected. Based on the stages of research that had been carried out, the initial data analysis focused on testing the feasibility of the instruments through a validity test with reference to an r-table value of 0.361. The following Table 2 presents the results of the SPSS version 25 validity test calculation.

Table 2. Validity Test Results

Test Items	<i>r</i> -value	<i>r</i> -table	Sig.	Decision
Question_1	0.746	0.361	0.000	Valid
Question_2	0.852	0.361	0.000	Valid
Question_3	0.455	0.361	0.011	Valid
Question_4	0.455	0.361	0.011	Valid
Question_5	0.136	0.361	0.474	Invalid
Question_6	0.161	0.361	0.395	Invalid
Question_7	0.725	0.361	0.000	Valid
Question_8	0.508	0.361	0.004	Valid
Question_9	0.136	0.361	0.475	Invalid
Question_10	0.668	0.361	0.000	Valid
Question_11	0.643	0.361	0.000	Valid
Question_12	0.629	0.361	0.000	Valid
Question_13	0.411	0.361	0.024	Valid
Question_14	0.419	0.361	0.021	Valid
Question_15	0.537	0.361	0.002	Valid
Question_16	0.464	0.361	0.010	Valid
Question_17	0.095	0.361	0.617	Invalid
Question_18	0.610	0.361	0.000	Valid
Question_19	0.484	0.361	0.007	Valid
Question_20	0.0419	0.361	0.021	Valid
Question_21	0.497	0.361	0.005	Valid
Question_22	0.423	0.361	0.020	Valid
Question_23	0.415	0.361	0.023	Valid
Question_24	0.457	0.361	0.011	Valid
Question_25	0.482	0.361	0.007	Valid
Question_26	0.415	0.361	0.023	Valid
Question_27	0.600	0.361	0.000	Valid
Question_28	0.404	0.361	0.027	Valid
Question_29	0.727	0.361	0.000	Valid
Question_30	0.048	0.361	0.800	Invalid

The validity test results showed that of the 30 items tested, 25 items were declared valid because they had a calculated *r*-value > *r*-table (0.361). Meanwhile, 5 items were declared invalid because they had a calculated *r*-value < *r*-table and did not consistently represent indicators on the cognitive, affective, and behavioral dimensions of tolerance. Thus, these five items were excluded from the analysis, while the 25 valid items were used as research instruments. After the instruments were declared valid, the next stage was a reliability test to assess the consistency of the instruments in measuring students' attitudes toward tolerance. The instrument was declared reliable if Cronbach's alpha coefficient was > 0.700 (Abigail Soesana, Hani Subakti, Karwanto, Anisa Fitri Sony Kuswandi, Lena Sastri, Ilham Falani Novita Aswan, Ferawati Artauli Hasibuan 2023). The results of the reliability test are presented in Table 3.

Table. 3 Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of items
0.897	25

The reliability criteria for the instrument were determined based on the Cronbach's alpha coefficient value. The closer the value is to 1.00, the higher the reliability of the instrument. The reliability test results showed a Cronbach's alpha coefficient of 0.897 for the instrument consisting of 25 items, indicating a very high level of reliability. (Abigail Soesana, Hani Subakti, Karwanto, Anisa Fitri Sony Kuswandi, Lena Sastri, Ilham Falani Novita Aswan, Ferawati Artauli Hasibuan 2023). Thus, the items used had strong internal consistency in measuring tolerance attitudes. Instruments that met the reliability criteria were then used in the treatment phase.

The data obtained from the instrument testing were then analyzed through a normality test. The normality test was conducted to determine the appropriate statistical analysis technique, particularly for interval and ratio scale data, and to ensure the suitability of the normal distribution assumption. (Setyawan 2021). In this study, the Shapiro-Wilk normality test was used, with a significance level of 0.05. Data were declared to be normally distributed if the p-value > 0.05. Conversely, if the p-value < 0.05, the data were not normally distributed, so further analysis used nonparametric statistical tests. The results of the normality test are presented in Table 4.

Table 4. Normality Test Results

Shapiro-Wilk				
Data	Statistic	df	Sig.	Description
Pretest	0.942	30	0.104	Normal
Posttest	0.933	30	0.060	Normal

The normality test results obtained were 0.104 and 0.060. These values are greater than 0.05, so it can be concluded that the instruments are normally distributed. Next, hypothesis testing was conducted to determine the significance of the effect of surah Al-Hujurat-based multicultural learning on the tolerance attitudes of elementary school students. The hypothesis test used by the researcher was the paired sample t-test.

The paired sample t-test is a statistical analysis technique used to compare two measurements with the same subjects before and after the study (Syafriani et al. 2023). The significance level used in the paired-sample t-test was 0.05. If the p-value was less than 0.05, H_0 was rejected and H_1 was accepted, indicating that surah Al-Hujurat-based multicultural learning had a significant effect on the tolerance attitudes of elementary school students. However, if the p-value was greater than 0.05, H_0 was accepted and H_1 was rejected, meaning that surah Al-Hujurat-based multicultural learning had no significant effect on students' tolerance attitudes. The following is the paired sample t-test table 5.

Table 5 Paired Sample t-Test Results

		Paired Samples Test							
		Paired Difference							
					95% Confidence				
			Std.	Std.	Interval of the				Sig. (2-
		Mean	Deviation	Error	Difference		t	df	tailed)
			n	Mean	Lower	Upper			
Pair 1	Pretest & Posttest	-16,8000	6,59362	1,20383	-19,26210	-14,33790	-13,956	29	0.000

The results of the paired sample t-test between the pretest and posttest scores show a t-value of -13.956 with a degree of freedom (df) of 29 and a significance value (Sig. 2-tailed) of 0.000. This value is less than 0.05, so it can be concluded that H_0 is rejected and H_1 is accepted, indicating that surah Al-Hujurat-based multicultural learning, integrated into Pancasila Education through a deep learning approach, has a significant effect on the tolerance attitudes of elementary school students. The next step was to conduct a partial eta squared test to measure the magnitude of the effect of a treatment. The results of the partial eta squared test are presented in the following Table 6.

Table. 6 Partial Eta Squared Test Results

	Sig.	Partial Eta Squared η^2
Pretest & Posttest	0.003	0.279

The partial eta squared (η^2) calculated using SPSS 25, yielded a value of 0.279, indicating a moderate effect. Consequently, this study found an increase in student tolerance of 0.279 following the intervention of multicultural learning based on Surah Al-Hujurat, which was integrated into the Pancasila Education subject through a deep learning approach. This finding is consistent with the results of the paired sample t-test, which showed a significance value of 0.000, signifying a difference in students' tolerance levels before and after the treatment. These results demonstrate that integrating multicultural learning with religious values provides a tangible, moderate contribution toward strengthening student character.

A proper understanding of multicultural learning, through curriculum planning, subject development, and the role of teachers, encourages students to develop social attitudes and reduce the tendency for discrimination between groups (Asmarita et al., 2022). In multicultural learning, students are integrated to respect differences in a pluralistic society, so that multicultural learning in Indonesia requires the development of teaching methods (Anam et al., 2021). Pedagogically, the application of multicultural learning has a real impact on changes in student attitudes and behavior. Students are not only introduced to the facts of diversity, but are also guided to internalize the value of acceptance of differences as part of community life. Through activities that highlight cultural, ethnic, and social background

diversity, students are trained to recognize, understand, and constructively appreciate differences. In addition, group discussions and collaboration in cultural project development can train students to respect opinions, consider various perspectives, and build habits of making decisions through deliberation. This learning process forms the basis for the development of tolerance because it provides direct experience in interacting and working together amid diversity.

Multicultural learning does not only emphasize understanding and appreciation of diversity, but also requires a robust normative foundation so that students can thoroughly internalize the values of tolerance. The principles of surah Al-Hujurat verses 9–13, which underscore peace, justice, respect, and acceptance of diversity, serve as ethical guidelines that strengthen the normative basis of tolerance education. The effectiveness of learning based on Surah Al-Hujurat in transforming students' tolerant attitudes can be explained through three interrelated primary mechanisms.

First, the religious authority of surah Al-Hujurat provides a moral and ethical foundation that motivates students to instill tolerance as both a cognitive and affective obligation. Students understand that respecting differences is a religious mandate, thereby enhancing cognitive understanding of justice and diversity while simultaneously forming affective responses, such as empathy and concern for others. Second, integrating surah Al-Hujurat content into Pancasila Education allows students to relate religious values to social and civic contexts. This integration encourages contextual cognitive development, as students analyze social and cultural differences within the school environment, while also supporting behavioral changes, such as cooperation, respectful interaction, and the avoidance of discrimination in daily activities.

Third, a deep learning pedagogical approach is applied through meaningful, reflective, and joyful learning, which actively engages students in direct experiential and student-centered activities. Meaningful learning links the material to real-life experiences (Wafa and Nadhif 2025) through role-playing based on scenario cards regarding tolerance, enabling students to gain a concrete understanding of tolerance while building empathy. Reflective learning positions students to analyze and resolve social problems related to diversity, strengthening affective awareness and encouraging proactive behavior (Ginting, 2024). Joyful learning, through the creation of diversity posters, stimulates students to express and internalize the values of tolerance creatively, thereby building sustained motivation to implement tolerant attitudes.

The interaction of these three mechanisms produces a comprehensive shift in students' tolerant attitudes. The cognitive, affective, and behavioral dimensions are simultaneously engaged, ensuring that the resulting changes are meaningful, contextual, and manifest in social interactions. With proper lesson planning and collaboration among all educational elements, the likelihood of creating an environment that consistently strengthens student character becomes significantly greater (Fitriyah, Amrullah, and Rezania 2025), as illustrated in Figure 1 below.

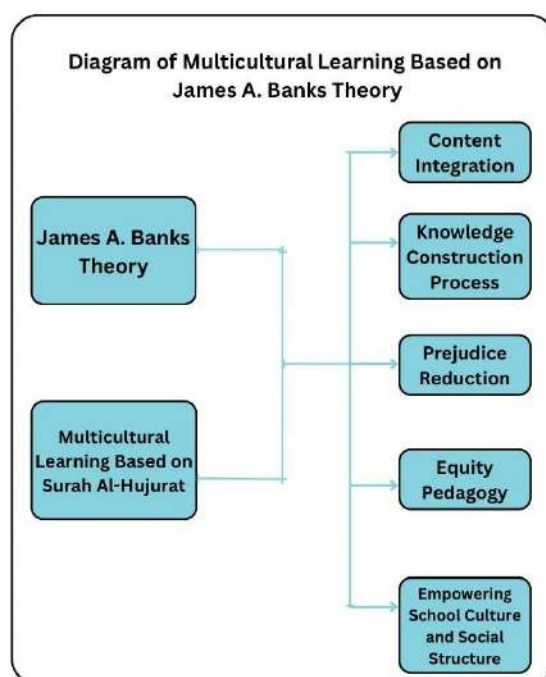


Figure 1. Diagram of Multicultural Learning Based on James A. Banks' Theory

The results of the study are consistent with the five main dimensions of James A. Banks' multicultural learning theory. First, content integration is reflected in the incorporation of the values of verses 9–13 of Surah Al-Hujurat into the Pancasila Education curriculum, providing students with a normative-ethical foundation regarding fairness, conflict mediation, and, as emphasized in verse 13, the acceptance of ethnic and cultural differences as decreed by Allah Subhanahu wa ta'ala. Second, knowledge construction is seen through the application of learning strategies using a deep learning approach. Meaningful learning encourages students to relate the material to real experiences. This leads to a more contextual understanding of tolerance. Mindful learning places students at the center of learning so that they can examine their understanding and problem-solving skills. Third, prejudice reduction is realized when the message contained in Surah Al-Hujurat is raised in the learning process, and students are guided to control negative attitudes and replace them with mutual respect. Fourth, equity pedagogy is evident in the context of inclusive schools that provide equal learning opportunities for all students. Fifth, empowering school culture is evident in an inclusive classroom culture that is student-centered and minimizes exclusion through collaborative and participatory learning (Ana & Arsyadana 2025).

Previous studies have indicated similar findings that reveal the positive impact of multicultural learning on tolerance attitudes. Nurhasana (2021) shows that integrating multicultural learning in the school environment can initiate a calm and supportive classroom atmosphere. Zamroni (2024) emphasizes the reduction of discriminatory attitudes in inclusive schools. Arzaq (2020) shows the relevance of Surah Al-Hujurat verse 13 in fostering tolerance in a pluralistic society. These findings reinforce the argument that the application of religious and national values-based multicultural learning not only impacts knowledge and attitudes but also students' actual behavior, supporting the development of positive, inclusive, and highly ethical character.

While this study indicates a positive influence of multicultural learning based on Surah Al-Hujurat on students' tolerant attitudes, several limitations warrant consideration. First, the research was conducted in a single inclusive elementary school; therefore, generalizing the findings to other schools with different characteristics and cultural contexts should be done with caution. Second, the cultural context and religious values of this specific school may have influenced student responses, suggesting that implementation in different environments might yield varying effects. Third, the relatively small sample size $n=30$ limits the statistical power and the precision of effect estimates for a broader population. Fourth, the research design employed a One-Group Pretest-Posttest model without a control group, meaning that changes in students' tolerant attitudes could be influenced by external factors other than the treatment.

These limitations underscore the need for further research using more robust experimental designs, larger samples, and diverse contexts to strengthen the generalizability and validity of the findings. In an educational context, it can be concluded that multicultural learning based on Surah Al-Hujurat carries significant implications at the elementary school level. Teachers can utilize this approach as a strategy in Pancasila Education, particularly within the framework of inclusive learning. At the school level, the implementation of this approach can be reinforced through instructional policies that balance the integration of religious and national values. Consequently, such learning not only contributes to enhancing student tolerance but also supports the realization of comprehensive and consistent character education amidst a diverse society.

4. CONCLUSION

This study demonstrates that multicultural learning based on surah Al-Hujurat, integrated into Pancasila Education through a deep learning approach, is capable of significantly increasing the tolerant attitudes of elementary school students. The integration of religious and ethical values through meaningful, reflective, and joyful learning experiences fosters an appreciation for diversity, awareness of justice, and inclusive behavior in social interactions. These results have implications for Indonesian education, particularly in the implementation of the Kurikulum Merdeka (Independent Curriculum) and religious moderation programs, while providing a foundation for developing instructional strategies that practically instill the values of tolerance in inclusive classrooms. The limitations of this research include the one-group pretest-posttest design and a sample size of 30. emphasize the necessity for further studies involving larger samples, longitudinal designs, and the exploration of other integrative pedagogical approaches. As a follow-up, educators may adopt value-based multicultural learning, policymakers can develop systematic curriculum guidelines, and researchers are encouraged to investigate the mechanisms of attitudinal change as well as the long-term impact of this approach.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

Abigail Soesana, H., Subakti, H., Karwanto, Kuswandi, A. F. S., Sastri, L., Aswan, I. F. N., & Hasibuan, F. A. (2023). *Metodologi penelitian kuantitatif*. Yayasan Kita Menulis.

- Amaliani, R., Yunitasari, S. E., Fajriah, D., & Gustini, E. (2024). Sarana dan prasarana sekolah inklusi: Kunci sukses pendidikan inklusi. *Aksara: Jurnal Ilmu Pendidikan Nonformal*, 10(1), 361–366. <https://doi.org/10.37905/aksara.10.1.361-366.2024>
- Ana, A. I. M., & Arsyadana, A. (2025). Manajemen pendidikan multikultural berbasis dimensi James A. Banks: Studi kasus Madrasah Diniyah Nurul Hidayah Nganjuk. *Allimna: Jurnal Pendidikan Profesi Guru*, 4(1), 54–68. <https://doi.org/10.30762/allimna.v4i01.3960>
- Anam, S. C., Alhamuddin, & Khambali. (2021). *Pendidikan multikultural perspektif Al-Qur'an Surah Al-Hujurat ayat 11–13. Prosiding Pendidikan Agama Islam*. Universitas Islam Bandung.
- Arif, M. N., Parawansyah, M. I., Huda, F. H., & Zulfahmi, M. N. (2025). Strategi menumbuhkan minat belajar siswa melalui pendekatan deep learning. *Jurnal Muassis Pendidikan Dasar*, 4(1), 8–16. <https://doi.org/10.55732/jmpd.v4i1.989>
- Asmarita, N., Kusen, & Daheri, M. (2022). *Konsep nilai-nilai pendidikan multikultural dalam Al-Qur'an Surat Al-Hujurat ayat 11–13 dan implementasi pada pendidikan di era Revolusi Industri 4.0* [Doctoral dissertation, Institut Agama Islam Negeri Curup].
- Banks, J. A., & Banks, C. A. M. (2010). *Multicultural education: Issues and perspectives* (7th ed.). John Wiley & Sons.
- Firtikasari, M., & Andiana, D. (2024). *Buku ajar pendidikan multikultural*. Cahaya Smart Nusantara.
- Ginting, D. (2024). Pendekatan berpusat pada peserta didik: Ragam jenis dan model pembelajarannya. In I. Ariffudin, F. A. Gultom, S. Gatot, & T. Sulisty (Eds.), *Interseksi kearifan lokal, sains, dan teknologi: Menghargai perbedaan menuju kesatuan* (pp. 449–482). Kanjuruhan Press.
- Hakim, L. N., & Bayyinah, I. (2023). Etika sosial perspektif mufassir Nusantara: Kajian QS. Al-Hujurat ayat 9–13 dalam Tafsir Al-Ibriz, 1(1), 70–86.
- Irnowati, F., M., Setiyorini, N. D., Setyowati, H., Irdyansah, A., & Mubarak, A. S. (2024). *Pendidikan multikultural: Teori, praktik, dan transformasi sosial*. PT Nasya Expanding Management.
- Mustafida, F. (2020). Integrasi nilai-nilai multikultural dalam pembelajaran Pendidikan Agama Islam (PAI). *Jurnal Pendidikan Islam Indonesia*, 4(2), 173–185. <https://doi.org/10.35316/jpii.v4i2.191>
- Ningsih, I. W., Mayasari, A., & Ruswandi, U. (2020). Konsep pendidikan multikultural. *Jurnal Edusampul: Pendidikan*, 6(1).
- Nugraha, D., Ruswandi, U., & Erihadiana, M. (2020). Urgensi pendidikan multikultural di Indonesia. *Jurnal Pendidikan Pancasila dan Kewarganegaraan*, 1(2), 140.
- Nurhakim, H. Q., Rojibillah, I., Harsing, S., & Zakiah, Q. Y. (2025). Inovasi kurikulum dan teknologi pembelajaran (deep learning). *Eduteach: Jurnal Pendidikan dan Teknologi Pembelajaran*, 6(2), 143–143.
- Nurhasanah, S. (2021). Integrasi pendidikan multikultural dalam pembelajaran Pendidikan Agama Islam (PAI) untuk membentuk karakter toleran. *Al-Hasanah: Islamic Religious Education Journal*, 6(1), 133–151.

- Nurhayani, Yaswinda, & Movitaria, M. A. (2022). Model evaluasi CIPP dalam mengevaluasi program pendidikan karakter sebagai fungsi pendidikan. *Jurnal Inovasi Pendidikan*, 2(8), 2353–2362. <https://doi.org/10.47492/jip.v2i8.1116>
- Setyawan, D. A. (2021). *Petunjuk praktikum uji normalitas dan uji homogenitas data dengan SPSS*. Tahta Media Group.
- Shofri, R., Arzaq, Z., Salim, M. N., & Said, A. (2020). Urgensi pendidikan toleransi dalam masyarakat multikultural (Studi analisis QS. Al-Baqarah [2]:256 dan QS. Al-Hujurat [49]:13). *El-Islam*, 2(2), 72–97.
- Sugiyono. (2024). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Suryaningsih, T., Maksum, A., & Marini, A. (2023). Membentuk profil Pelajar Pancasila dimensi berkebinekaan global melalui pendidikan multikultural di sekolah dasar. *Dwija Cendekia: Jurnal Riset Pedagogik*, 7(3), 1-16.
- Syafriani, D., Darmana, A., Syuhada, F. A., & Sari, D. P. (2023). *Buku ajar statistik uji beda untuk penelitian pendidikan: cara dan pengolahannya dengan SPSS*. Eureka Media Aksara.
- Wafa, A., & Nadhif, M. (2025). Transformasi pembelajaran Pendidikan Agama Islam berbasis deep learning: Dari pendekatan hafalan menuju internalisasi nilai. *Academicus*, 4(2), 103–116. <https://doi.org/10.59373/academicus.v4i2.95>
- Zamroni, A. D. K., Zakiah, L., Amelia, C. R., Shaliha, H. A., & Jaya, I. (2024). Analisis pengaruh implementasi pendidikan multikultural terhadap sikap toleransi keberagaman siswa sekolah dasar inklusi. *Jurnal Ilmiah Profesi Pendidikan*, 9(2), 1112–1119. <https://doi.org/10.29303/jipp.v9i2.2247>



Development of Canva-Based Animated Video Learning Media to Improve Elementary School Science Learning Outcomes

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ABSTRACT

Science learning in elementary schools often faces challenges because some materials are abstract and difficult for students to visualize. One concept that students often find difficult to understand is photosynthesis. This study aims to develop animated learning videos using the Canva application, determine the appropriateness of the learning media, and evaluate its effectiveness in improving students' learning outcomes on photosynthesis material. This research applied the Research and Development (R&D) approach based on the ADDIE model, comprising five stages: analysis, design, development, implementation, and evaluation. The subjects were 26 fourth-grade students at SDN Mangkang Wetan 03 Semarang. Data were collected through observation, interviews, questionnaires, documentation, and learning outcome tests in the form of pre-tests and post-tests. The findings showed that the animated video learning media developed was feasible based on expert validation. The media expert validation score reached 96%, and the material expert validation score was 93%, both categorized as very feasible. The mean pre-test score was 58.84, while the post-test score rose to 82.88. The N-gain value of 0.58 indicates a moderate level of improvement. These results indicate that Canva-based animated learning videos effectively improve students' learning outcomes on photosynthesis material.

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1. INTRODUCTION

Elementary education is a crucial stage in developing students' fundamental knowledge and skills. At this stage, students begin to enhance their scientific thinking skills through various subjects, including Natural and Social Sciences (IPAS). Science learning aims to help students understand scientific concepts related to everyday phenomena, including photosynthesis in plants. However, photosynthesis is often difficult for students to understand because the process cannot be directly observed and is abstract. Lectures or textbooks often fail to help students clearly visualize the process. Therefore, engaging learning media that can represent learning concepts visually are needed to enable students to understand the material more easily (Sari et al., 2025).

The application of technology-based learning media is known to improve the quality of classroom learning. Learning media that utilize digital technology allow for more stimulating, responsive, and contextual presentations for students. One widely used medium in learning is animated video. Research by (Nisa & Efendi, 2023) indicates that the use of animated video media can improve elementary school students' learning outcomes by presenting learning materials more appealingly and facilitating students' understanding of concepts. Furthermore, research carried out by (Aswatun et al., 2025) also demonstrates that the use of animated videos in learning can boost student motivation and engagement during learning activities.

The advancement of digital technology also creates opportunities for teachers to design more creative and innovative learning media. Multimedia-based learning media that combine text, images, audio, and animation can assist students in understanding abstract learning concepts more concretely. A study conducted by (Hilmiyati & Nafsi, 2024) shows that the use of Canva-based animated video media can improve elementary school students' thinking skills in science subjects. Furthermore, research by (Purba et al., 2024) shows that the development of Canva-based animated video media can enhance students' motivation and learning outcomes at the elementary level. However, many teachers continue to exist who have not fully utilized digital design applications to create interesting and interactive learning media (Rahma et al., 2023).

Referring to these conditions, there is a need for alternative learning media that are easy for teachers to use, engaging for students, and capable of improving learning outcomes. One application that can be utilized to develop such media is Canva, as it provides a variety of design features, animations, templates, and facilitates the creation of instructional videos (Agustiyan et al., 2024). Through the use of this application, teachers can create more creative and interactive learning media that align with the characteristics of elementary school students (Hidayatullah et al., 2023). Furthermore, previous studies have demonstrated that Canva-based animated videos have a positive effect on elementary school students' science learning outcomes (Safitri et al., 2026).

However, these studies still have limitations, namely that they have not specifically examined the design and development of Canva-based animated video media for certain materials, especially photosynthesis in grade IV of elementary school, and have not integrated many aspects of media feasibility, user response, and learning effectiveness comprehensively (Rahayuningsih & Muhtar, 2022; Rahma et al., 2023). Therefore, this study aims to develop an animated video learning media based on interesting and interactive photosynthesis materials and test its feasibility, user response, and effectiveness in improving the learning

outcomes of grade IV elementary school students. The novelty of this research lies in the development of media that is integrated with feasibility tests by experts, analysis of teacher and student responses, and effectiveness testing through a thorough comparison of pre-test and post-test results.

2. METHODS

This study employed a Research and Development (R&D) approach to create Canva-based animated video learning media for teaching photosynthesis in science subjects. The development process followed the ADDIE model, which includes five stages: analysis, design, development, implementation, and evaluation (Hidayat & Nizar, 2021).

The participants in this study were 26 fourth-grade students of SDN Mangkang Wetan 03, who were involved in the product trial and implementation phases. Data were collected using both test and non-test techniques. The test method was used to measure students' learning outcomes on photosynthesis material through pre-test and post-test assessments after using the developed media. Meanwhile, non-test techniques included observation, interviews, and questionnaires. Observations were conducted to examine classroom learning activities, particularly focusing on the use of instructional media, student participation, and their responses during the learning process. Semi-structured interviews were carried out with the fourth-grade teacher to gather information about the need for learning media, challenges in using instructional media, and teachers' perceptions of digital media integration in learning. Questionnaires were administered to collect responses from both teachers and students regarding the developed media. In addition, validation questionnaires were used to obtain data on media feasibility from media experts and content suitability from subject matter experts. The questionnaire items were developed based on learning media evaluation indicators, including aspects of visual appearance, ease of use, clarity of content, and usefulness. A total of 16 items were included in the questionnaire. To measure students' learning outcomes, a test consisting of 20 multiple-choice questions was designed based on competency indicators related to photosynthesis, covering knowledge and conceptual understanding. The test was administered as a pre-test and a post-test. Data analysis was conducted in several stages. Validation data from media and subject matter experts were analyzed to determine the feasibility of the developed media. Responses from teachers and students were analyzed using descriptive quantitative methods. Furthermore, students' learning outcomes were analyzed using statistical tests, including normality tests, paired-sample t-tests, and N-Gain analysis, to determine improvements in learning outcomes, with the assistance of SPSS software.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Analysis Stage

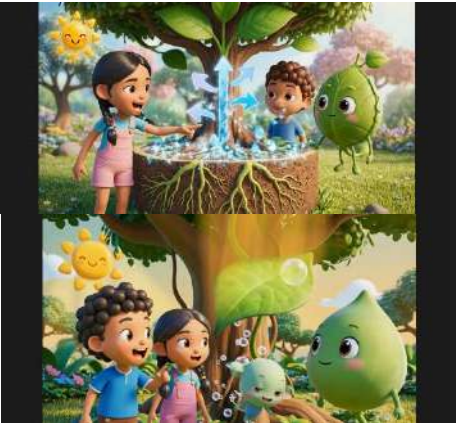
During the analysis phase, the researcher carried out a needs assessment by conducting interviews with teachers and distributing questionnaires to both teachers and fourth-grade students at SDN Mangkang Wetan 03. The interview results showed that photosynthesis was considered a challenging topic because it involves processes that cannot be directly observed. Meanwhile, data from the student questionnaires revealed that many students had difficulty understanding the material when it was delivered through textbooks and verbal explanations. They reported that learning became easier when supported by visual media such as animations, moving images, and audio elements.

3.1.2 Design Stage

In the design phase, the concept of animated video learning media was formulated by determining the sequence of materials, including Learning Outcomes (CP) and Learning Objectives (TP), preparing a storyboard, designing visuals, and developing animations for each scene adapted to the characteristics of elementary school learners. The animated video will consist of approximately 20 scenes, each 8 seconds long, for a total duration of 160 seconds (approximately 3 minutes 40 seconds). In the learning video, there are three main characters, namely Klory, Puti, and Made. Klory is depicted as a green leaf who acts as a moderator, is cheerful and always smiling, and has sparkling eyes with a fresh light green leaf shape. In addition, there are two other characters, namely Puti and Made, who are depicted as peers who have a high curiosity about natural phenomena. Puti is depicted as a cheerful girl with white skin, while Made is a brown-skinned boy who has a high enthusiasm for studying the natural environment. The characters and storyline in the video are designed according to the level of cognitive development of fourth-grade elementary students. Through Puti and Made's adventures in discovering how plants produce food, the topic of photosynthesis is presented contextually and engagingly. The presentation is simple, light, and straightforward, helping students to follow the explanations. The resulting animated video is as follows.

Table 1. Product Storyboard

No	Time	Image (Video Scene)	Narrative
1	00:00–00:04		The video begins with the learning title and the compiler's identity as initial information, and an introduction to the media for students.
2	00:05–00:15		The display of plant characters in a bright garden creates a pleasant learning atmosphere and attracts students' attention.
3	00:16–00:26		Children's characters appear with plants as an introduction to learning and to introduce the characters in the video.
4	00:27–00:58		Puti and Made are preparing a picnic in the park. While chatting, they start to feel hungry and quickly eat the snacks they brought. This demonstrates that living things need food.

No	Time	Image (Video Scene)	Narrative
5	00:59–01:30		A woodpecker's arrival in search of food demonstrates that animals need a source of livelihood. Puti explains that all living things need food to survive, including plants.
6	01:31–01:52		Puti, Made, and Klory introduce photosynthesis as the process by which plants make food.
7	01:53–02:01		Showing animation of photosynthesis materials, which include water, carbon dioxide, and the help of sunlight; photosynthesis can take place.
8	02:02–02:23		The process of photosynthesis begins with plants absorbing water from the soil through the roots; the water is distributed to the leaves through the stem.
9	02:24–02:55		Klory explained that sunlight is absorbed by leaves with the help of chlorophyll (the green substance in leaves). Leaves contain stomata (small openings for air to enter and exit).

No	Time	Image (Video Scene)	Narrative
10	02:55–03:16		An animation is shown showing the results of photosynthesis in the form of glucose and oxygen.
11	03:17–03:27		All the characters come together to present a conclusion about photosynthesis. The process of photosynthesis produces food for plants and oxygen for living things on Earth.

3.1.3 Development Stage

The subsequent phase involves development concerning learning media. The media was developed using the Canva application by utilizing the Canva AI feature to illustrate the flow of the coding script written by the researcher according to the characteristics of fourth-grade students; motion effects, explanatory text, and audio narration also support the delivery of the material. The material presented in the video includes the definition of photosynthesis, the process of photosynthesis, the function of photosynthesis for plants, and factors that influence the process of photosynthesis. Media and material experts subsequently reviewed the developed product to evaluate its level of feasibility. The assessment by material experts covered several aspects, namely the consistency of the learning content with learning achievements and learning objectives, precision of concepts and comprehensiveness of the material, and clarity of language use in delivering the material. Meanwhile, the assessment by media experts covered aspects of display design, use of color, visual and animation quality, integration between images, text, and audio, and ease of use of the media in learning. Experts' input and suggestions were used as a reference for improvements and refinements to the generated Canva-based animated video media. Referring to the results of the evaluation by material experts, the feasibility percentage was 93% with a very feasible category. Meanwhile, the assessment findings from media authorities showed a feasibility proportion of 96% with a significantly feasible category.

3.1.4 Implementation Stage

The implementation phase involved testing the animated video media on fourth-grade students at SDN Mangkang Wetan 03. The evaluation process was conducted in several

stages, including small-group and large-group trials, to identify students' responses to the developed media. Following the implementation, the effectiveness of the media was further supported by data obtained from teacher and student response questionnaires administered after the learning activities. The results of the teacher response questionnaire showed that the use of video-based learning media achieved a score of 99%, which falls into the "very good" category. This finding indicates that the video learning media is highly suitable for use in science instruction and assists teachers in delivering material in a clearer and more structured manner. Similarly, the student response questionnaire results showed a total score of 2574 out of a maximum possible score of 2600, corresponding to 99% and categorized as "very good."

3.1.5 Evaluation Stage

The evaluation stage was carried out to assess the effectiveness of the developed learning media in improving students' learning outcomes. This phase involved administering a pretest before the learning process and a posttest after students used the animated video media. The test instrument initially consisted of 40 items, which were subjected to validity, reliability, discrimination index, and difficulty level analysis. The results indicated that 26 items were valid, with a reliability coefficient of 0.88 categorized as very high. In addition, the discrimination analysis showed that 21 items fell into the good and excellent categories, while the difficulty level analysis revealed that most items were classified as medium to difficult. From these results, 20 questions were selected and used as the final test instrument. Furthermore, the pretest and posttest data were analyzed using statistical methods, including normality testing, paired sample t-test, and N-gain analysis, to determine data distribution, differences in learning outcomes, and the extent of improvement in students' understanding after using the developed media. The findings showed that the average pretest score was 58.84, which increased to 82.88 in the posttest. This indicates that students' learning outcomes improved after the implementation of the animated video media in the learning process. Subsequently, the pretest and posttest scores were further examined to determine whether the data were normally distributed using the Shapiro–Wilk normality test with the assistance of SPSS software. This test was selected because it is appropriate for sample sizes of fewer than 50 participants. The results of the normality test are presented in Table 2.

Table 2. Normality Test

One-Sample Kolmogorov-Smirnov Test			
		Pre_Test	Post_Test
N		26	26
Normal Parameters ^{a,b}	Mean	58.8462	82.8846
	Std. Deviation	9.08930	7.23506
Most Extreme Differences	Absolute	.142	.155
	Positive	.142	.155
	Negative	-.135	-.115
Test Statistic		.142	.155
Asymp. Sig. (2-tailed)		.187 ^c	.110 ^c

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

The normality test analysis showed that the pre-test data had a significance value (Sig.) of 0.187. Since this value is higher than 0.05, the pre-test data are categorized as normally distributed. In addition, the post-test data showed a significance value of 0.110. This result is also above 0.05, indicating that the post-test data are normally distributed.

Furthermore, a T-Test was carried out to examine whether there was a significant difference between students' pre-test and post-test scores. The test was conducted by comparing student learning outcomes before and after the use of Canva-based animated video learning media. The results of the T-Test analysis are presented in Table 3.

Table. 3 Paired Sample T-Test

Paired Samples Test									
Paired Differences									
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre_Test Post_Test	-24,03846	8,00240	1,56940	-27,27070	20,80622	-15,317	25	0,000

Based on the t-test analysis, the Sig. (2-tailed) value was 0.000. Since this value is less than 0.05, H_0 is rejected while H_a is accepted. Furthermore, an N-gain test was carried out to assess the improvement in student learning outcomes after engaging in learning through Canva-based animated video media. This test was applied to measure the extent of improvement in learning outcomes by comparing pre-test and post-test scores. The results of the N-gain test are presented in Table 4.

Table 4. N-gain Test

Average Pre-Test	Average Test	Max Score	N-Gain	Category
58,84	82,88	100	0,58	Sedang

Based on the data, the N-gain test analysis produced a score of 0.58. This score is categorized as moderate, showing that there was an improvement in students' learning outcomes after the use of animated video learning media.

4.2 Discussion

The findings are based on observations, teacher interviews, and questionnaires distributed to identify students' needs. The implementation of learning is still dominated by lectures and the use of textbooks, which leads to the utilization of visual as well as interactive learning media still being limited. Based on the analysis of observations and needs, this condition is in line with the cognitive Features of fourth-grade students at the concrete operational stage, who require visual and contextual presentations to bridge abstract concepts for easier understanding (Aini et al., 2025). Research (Hilmiyati & Nafsi, 2024; Purba et al., 2024) also supports the need for media innovations that can visualize the process of photosynthesis clearly and attractively, so that Canva-based animated video media was developed that integrates attractive designs, graphics, images, text, animation, and audio to support learning.

This media is designed in the form of an animated video consisting of 20 scenes with a total duration of approximately 3 minutes 40 seconds. The character of Klory complements the presentation of the material as a moderator, as well as two student characters, Puti and Made, who play a role during the learning process storyline. The incorporation of characters in learning media is intended to make the learning experience more contextual and engaging, enabling students to follow the flow of material explanations more easily. Animated media featuring visual characters can increase attention spans and learning motivation, and help students grasp learning concepts more clearly because the information is presented in an engaging and easy-to-follow manner (Faisal et al., 2024; Kurnia et al., 2025).

The presentation of material in the form of a simple adventure story is also designed to enable students to understand the process of photosynthesis through animated visualization gradually. The flow of material delivery is kept light, concise, and tailored to the cognitive developmental level of primary school students. This approach aligns with research showing that the utilization of animated videos can increase student engagement because the material is presented visually and dynamically, helping students understand abstract concepts more easily (Caella & Yulianto, 2024). Furthermore, animated video media has been shown to improve students' motivation and attention since it combines visual, audio, and narrative elements, making learning more engaging (Maulana et al., 2025).

The validation conducted by material experts yielded a feasibility percentage of 93%, which falls into the "very feasible" category. This finding suggests that the content presented in the animated video media aligns with the Learning Outcomes and instructional objectives, and demonstrates strong conceptual accuracy. Moreover, the way the material is delivered is considered well-structured, enabling students to comprehend the concept of photosynthesis gradually and systematically. Meanwhile, the evaluation from media experts resulted in a percentage of 96%, also categorized as "very feasible." This indicates that the developed media meets the required standards in terms of visual design, color usage, animation quality, the harmony between images and text, as well as the clarity of narration in explaining the material. The engaging visual presentation and animations tailored to the characteristics of elementary school students are believed to enhance students' attention and learning interest. Based on the student response questionnaire, a total score of 2574 out of a maximum score of 2600 was obtained, equivalent to 99%, and categorized as "very good." These results show that students are interested and feel supported in understanding photosynthesis material through the use of animated video media developed with the Canva application. This outcome is consistent with the study conducted by (Salma et al., 2025), which reported that 90% of students felt more engaged and found it easier to understand the material when using this instructional media. In addition, teachers also provided highly positive feedback, with 95% stating that the media is easy to use and significantly supports the science learning process.

The results of the feasibility evaluation show that the Canva-based animated video learning media possesses highly effective product specifications and is appropriate for use in the learning process. These results are consistent with previous studies, which state that animated video-based learning media can deliver material more engagingly and interactively, thereby helping students understand concepts more easily (Hilmiyati & Nafsi, 2024). Other

studies also reveal that the use of animated video media in science learning can enhance students' interest and learning outcomes, as the material is presented visually and dynamically, making it easier to comprehend (Caella & Yulianto, 2024). In addition, animated videos have been proven to improve students' attention and motivation by combining visual, audio, and narrative elements, resulting in a more engaging and effective learning experience (Ria et al., 2025). Therefore, the Canva-based animated video media developed in this study is considered highly suitable for use in learning and can proceed to the implementation stage in fourth-grade elementary science learning.

Effectiveness is indicated by statistical analysis, which reveals a meaningful difference between students' pre-test and post-test scores after the implementation of the developed learning media (Nisa & Efendi, 2023). The paired sample t-test produced a significance value of 0.000, demonstrating that the utilization of animated video media significantly influences students' educational outcomes (Yanda & Stavinibelia, 2024). In addition, the results of the N-gain analysis 0.58, which falls into the moderate category, indicate that the developed media can improve students' conceptual understanding quite effectively (Nurhidayah et al., 2025). This increase in learning outcomes indicates that the use of animated video media can assist students in understanding abstract material through more concrete visualizations (Caella & Yulianto, 2024). This result is in accordance with research indicating that the use of animated video media can enhance conceptual understanding and student learning outcomes because the material is presented visually, attractively, and easily understood by students (Nisa & Efendi, 2023). Other research also shows that animated video media can enhance students' learning motivation, engagement, and involvement in the learning process because it can combine visual, audio, and narrative elements in an integrated manner so that learning becomes more interactive (Aswatun et al., 2025).

In addition to improving learning outcomes, the creation of animated video media also brings positive effects for students' engagement and interest in learning during the learning process. (Wuryanti & Kartowagiran, 2016) Animated video media allows for a more contextual presentation of material through visual illustrations, animated movements, and narratives that help students understand scientific processes gradually. In the abstract material of photosynthesis, the use of animation can visualize processes that cannot be directly observed by students, thereby helping to improve conceptual understanding. This result is consistent with research indicating that the development of animation-based learning media can enhance the quality of the learning process because it can present complex concepts in a simpler and easier-to-understand way for elementary school students (Wibowo & Dahlan, 2025). Additionally, studies reveal that Canva-based animated videos can boost students' learning motivation and outcomes as the media provides visually appealing content, is easy to develop by teachers, and is appropriate to the characteristics of students at the elementary school level (Purba et al., 2024). Furthermore, another study (Salma et al., 2025) The findings also indicated that the use of animated video media in science learning led to an improvement in students' learning outcomes, ranging from moderate to high categories. Therefore, the development of animated video media based on the Canva application in this study can be considered appropriate for use in science learning, as it is capable of significantly increasing conceptual understanding, motivation for learning, along with students' learning results.

4. CONCLUSION

This study successfully developed learning media in the form of animated videos created using the Canva application for photosynthesis material to enhance elementary school students' learning outcomes. The developed media is characterized by engaging visual illustrations, concise and simple narration, animations that clearly depict the photosynthesis process, user-friendly instructions, and narration audio and background music that create an enjoyable learning atmosphere. The material presented covers the concept of photosynthesis, its processes, functions, and the factors influencing it, all of which are delivered contextually to facilitate students' understanding. In addition, the media is distributed in the form of an accessible link that can be opened on various devices without requiring additional application installation.

The results of expert validation, along with positive responses from teachers and students categorized as very good, as well as the improvement in student learning outcomes indicated by the increase in pre-test and post-test scores, demonstrate that the Canva-based animated video media is both valid and effective for use in learning. This media has proven to support students in understanding photosynthesis material in a more engaging, interactive, and comprehensible manner. Practically, this research contributes to elementary school teachers by offering an alternative learning medium that is easy to design and implement to improve the quality of science learning. Moreover, this media can serve as a solution to overcome the limitations of conventional teaching methods commonly used in classrooms. Theoretically, the findings of this study reinforce previous research highlighting the effectiveness of digital-based learning media, particularly animated videos, in improving students' learning outcomes. Nevertheless, this study has certain limitations, including its focus on a single topic and a relatively small sample size. Therefore, future studies are recommended to develop similar media for different topics, involve larger samples, and explore their impact on other aspects such as learning motivation, critical thinking skills, and student engagement in greater depth.

5. AUTHORS' NOTE

This research was conducted at SDN Mangkang Wetan 03, Semarang City, with fourth-grade students in a natural science lesson on photosynthesis. The author declares that this article is an original work free from plagiarism and has not been published or submitted to other journals. All sources used in writing this article have been listed in the bibliography in accordance with scientific writing standards.

6. REFERENCES

- Agustiyan, D., Tianna, V., Az-Zahra, V. S. Z., & Danuri, D. (2024). Penggunaan Canva sebagai media pembelajaran di sekolah dasar. *MIDA : Jurnal Pendidikan Dasar Islam*, 7(2), 178–195. <https://doi.org/10.52166/mida.v7i2.6915> (Ok)
- Aini, I., Alim, R., & Firmansyah, Y. (2025). On smart learning technologies implementation of Jean Piaget's cognitive development theory in. *Journal on Smart Learning Technologies*, 01(02), 77–97. <https://doi.org/10.26740/jslt.v1i2.46866> (ok)
- Aswatun, M., Haifattrahmah, & Sari, N. (2025). Efektivitas video pembelajaran animasi dalam meningkatkan motivasi dan hasil belajar siswa sekolah dasar. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, 10(04), 410–423. <https://doi.org/10.23969/jp.v10i04.36150> (Ok)

- Caella, L. A., & Yulianto, S. (2024). Keefektifan media video animasi untuk meningkatkan minat dan hasil belajar mata pelajaran IPAS Kelas IV SD Negeri Klumpit 01 Nusawungu Kabupaten Cilacap. *Jurnal Penelitian Pendidikan IPA*, 10(9), 6621–6630. <https://doi.org/10.29303/jppipa.v10i9.8445> (ok)
- Faisal, M., Ramadhani, L., & Hardyanti. (2024). *Pengaruh penggunaan media animasi terhadap hasil belajar dan motivasi belajar siswa*, JPK : Jurnal Pendidikan dan Kebudayaan, 01(03), 19–22. <https://doi.org/10.56842/jpk.v1i4.365> (ok)
- Hidayat, F., & Nizar, M. (2021). Model ADDIE (analysis, design, development, implementation and evaluation) dalam pembelajaran pendidikan agama islam. *Jurnal Inovasi Pendidikan Islam*, 01(01), 28–37. <https://doi.org/10.15575/jipai.v1i1.11042> (ok)
- Hidayatullah, A., Artharina, F. P., Sumarno, S., & Rumiarsi, E. (2023). Penggunaan aplikasi canva pada pembelajaran di sekolah dasar. *Jurnal Educatio FKIP UNMA*, 9(2), 943–947. <https://doi.org/10.31949/educatio.v9i2.4823> (ok)
- Hilmiyati, F., & Nafsi, A. G. (2024). The development of canva-based animated videos to improve critical thinking skills of elementary/islamic elementary school students in science classes on human digestive system materials. *Al-Aulad: Journal of Islamic Primary Education*, 7(1), 28–37. (ok)
- Kurnia, Y. D., Adrias, A., & Suciana, F. (2025). Tinjauan literatur: Pengaruh media video animasi dalam pembelajaran IPA terhadap pemahaman konsep dan motivasi belajar siswa sekolah dasar. *Jurnal Media Ilmu*, 4(1), 56–66. <https://doi.org/10.31869/jmi.v4i1.6565> (ok)
- Maulana, A., Yuliyanto, A., & Amanarrakhmah, I. (2025). The influence of animated video media on elementary school students ' motivation and learning outcomes in science learning. *Indonesian Journal of Elementary Education (IJEE)*, 7(2), 76–87. <https://doi.org/10.24235/ijee.v7i2.21792> (ok)
- Nisa, I. R., & Efendi, N. (2023). The effect of video animated video media on the cognitive learning outcomes of grade v student in elementary school. *pendas : jurnal ilmiah pendidikan dasar*, 08(01), 1–6. <https://doi.org/10.21070/ups.1875> (ok)
- Nurhidayah, N., Syahri, M., & Agus Tinus. (2025). Effectiveness of digital learning media on students' achievement in science education: A quasi-experimental study in islamic junior secondary school. *Jurnal Pendidikan Fisika*, 13(3), 400–415. <https://doi.org/10.26618/654nz478> (ok)
- Purba, S., Armelia, A., & Wulandari, E. (2024). Pengembangan media canva berbasis video animasi materi ekosistem untuk siswa sekolah dasar. *Indonesian Journal of Science, Technology, Engineering, Art, and Mathematics Education*, 03(02), 81–87. <https://doi.org/https://doi.org/10.33578/> (ok)
- Rahayuningsih, Y. S., & Muhtar, T. (2022). Pedagogik digital sebagai upaya untuk meningkatkan kompetensi guru abad 21. *Jurnal Basicedu*, 6(4), 6960–6966. <https://doi.org/10.31004/basicedu.v6i4.3433> (ok)

- Rahma, F. A., Harjono, H. S., & Sulisty, U. (2023). Problematika pemanfaatan media pembelajaran berbasis digital. *Jurnal Basicedu*, 7(1), 603–611. <https://doi.org/10.31004/basicedu.v7i1.4653> (ok)
- Ria, R. P. S., Muhammad Sofwan, & Desy Rosmalinda. (2025). Pengaruh penggunaan media pembelajaran video animasi berbasis canva terhadap motivasi belajar peserta didik di sekolah dasar. *Jurnal Tunas Pendidikan*, 7(2), 534–544. <https://doi.org/10.52060/pgsd.v7i2.2026> (ok)
- Safitri, M., Zain, M. I., & Hakim, M. (2026). Enhancing Science Learning Learning Outcomes Through Animated Video Media: Evidence from Indonesian Elementary Education. *JIRPE: Journal of Innovation and Research in Primary Education*, 5(1), 1905–1914. <https://doi.org/10.56916/jirpe.v5i1.2874> (ok)
- Salma, K., Listiani, I., & Kusumawati, N. (2025). Pengembangan media pembelajaran interaktif berbasis canva pada mata pelajaran ipas kelas 3 sekolah dasar. *SENASSDRA: Seminar Nasional Sosial, Sains, Pendidikan, Humaniora*, 5(3), 1689–1699. (ok)
- Sari, E., Aulia, E., & Mahdianur, M. (2025). Systematic review: Efektivitas media video animasi dalam pembelajaran ipa sekolah dasar. *Jurnal Cahaya Edukasi*, 02(04), 55–61. <https://doi.org/10.63863/jce.v2i4.142> (ok)
- Wibowo, S. P., & Dahlan, Z. (2025). Pengembangan media pembelajaran berbasis video animasi untuk meningkatkan pemahaman konsep IPA siswa kelas v sekolah dasar. *Cetta: Jurnal Ilmu Pendidikan*, 8(4), 375–388. <https://doi.org/10.37329/cetta.v8i4.4785> (ok)
- Wuryanti, U., & Kartowagiran, B. (2016). Pengembangan media video animasi untuk meningkatkan motivasi belajar dan karakter kerja keras siswa sekolah dasar. *Jurnal Pendidikan Karakter*, 7(2), 232–245. <https://doi.org/10.21831/jpk.v6i2.12055> (ok)
- Yanda, Y., & Staviniabelia. (2024). TOFEDU : The future of education journal the effect of animation video media towards ipas learning results. *TOFEDU: The Future of Education Journal*, 3(2), 656–664. <https://doi.org/10.61445/tofedu.v3i2.139> (ok)



Character Education Strengthening Management at the Elementary School Level in Nature-Based Schools in Realizing SDGs4: Quality Education

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ABSTRACT

This study aims to describe and analyze the management of nature-based character education strengthening in realizing SDGs4 of quality education at the elementary school level at Sekolah Rimba Indonesia and SD Sekolah Alam Pelopor. This study used a descriptive qualitative approach, with data collected through observation, interviews, and documentation studies. Research informants included school principals, teachers, foundation administrators, parents, and students. Data analysis was conducted using a management function framework consisting of planning, organizing, implementing, and supervising. The study shows that strengthening nature-based character education is designed systematically through the integration of intra-curricular, co-curricular, and extracurricular activities, as well as school culture, by utilizing nature as a living learning laboratory. This program has had a positive impact on strengthening students' religious character, independence, cooperation, responsibility, and environmental awareness. However, further improvements are needed in strategic planning and the establishment of a dedicated organizational structure for character education management.

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1. INTRODUCTION

Education in Indonesia is facing complex challenges, not only in terms of academic achievement but also in terms of character, personality, and student concern for the environment. Character education instills positive habits that students can apply in their daily lives (Mulyasa, 2016). Current facts show that cases of violence against children, bullying, drug abuse, risky sexual behavior, intolerance, and other deviant behavior involving students and adolescents are increasing, including in educational environments.

Based on data from the Indonesian Child Protection Commission (KPAI) and the National Commission for Child Protection (*Komnas Perlindungan Anak*), hundreds to thousands of cases of violence and sexual crimes against children are reported annually. At the same time, the National Narcotics Agency (BNN) and health institutions indicate an increase in drug abuse and HIV cases among adolescents. This condition confirms the occurrence of a serious character crisis and the suboptimal role of educational institutions as a space for the formation of a complete personality and protection for students. This is based on KPAI data that: Family and parenting problems reached 1,097 cases, child victims of sexual crimes 265 cases, children in the context of fulfilling education, use of free time, culture, and religion recorded 241 cases, children victims of physical and psychological violence numbered 240 cases, and children victims of pornography crimes as many as cases (KPAI, 2024).

These various problems demonstrate the moral crisis our nation is experiencing, and it is already deeply concerning. Based on this, it is crucial to involve all parties, including schools, households (families), and the community (Marisyah, 2020). Normatively, the goal of national education in Article 3 of Law Number 20 of 2003 emphasizes that education aims to develop the potential of students to become faithful people, pious, have noble character, are healthy, knowledgeable, capable, creative, independent, and responsible (Law No. 20 of 2003, 2003). The Character Education Strengthening Policy (PPK) outlined in Presidential Regulation Number 87 of 2017 (*Presidential Decree No. 87 of 2017*, 2017), and follow-up policies at the Ministry of Education, Culture, Research, and Technology place character and morals as the deepest dimensions of education that must be integrated into learning, school culture, and co-curricular/extracurricular activities. Within the framework of the Independent Curriculum, this vision is emphasized through the Pancasila Student Profile which contains six main dimensions, namely faith and noble character, independence, cooperation, global diversity, critical thinking, and creativity, which are operationalized, among others, through the Pancasila Student Profile Strengthening Project (P5) (Ministry of Education, Culture, Research, 2022), the existence of character education under the Ministry of Religious Affairs through the Pancasila and *Rahmatan lil alamin* Student Profile Strengthening Project (P5RA) (Directorate General of Islamic Education, Ministry of Religious Affairs, 2022). Currently, the development of character education in the independent curriculum with a *deep learning* approach through graduate profiles, covering 8 (eight) dimensions of graduate profiles that must be mastered by the end of each level of education, namely: a. faith and piety towards God Almighty; b. citizenship; c. critical reasoning; d. creativity; e. collaboration; (Kemendikdasmen, 2025).

On the other hand, various studies criticize educational practices that are still dominated by cognitive orientation and test scores. At the same time, the cultivation of the heart, feelings, and sports has not been developed in a balanced manner. Character education in many schools tends to be ceremonial, partial, and not integrated into systematic school management, so its impact on changing student behavior is less significant and difficult to measure. In this context, the nature-based school model (nature school) has emerged as an

alternative that offers a contextual learning approach by utilizing nature as a living laboratory, allowing students to learn through direct experience in gardening, raising livestock, managing waste, observing ecosystems, and interacting with the surrounding community.

Sekolah Rimba Indonesia (SRI) and SD Sekolah Alam Pelopor (SAP) are two nature-based educational institutions that explicitly prioritize character, a love of nature, and environmental sustainability as key pillars of their graduate profiles, alongside meeting national academic standards. Both integrate PPK (Community Empowerment and Child Protection), the Pancasila Student Profile, and environmental education into their operational curriculum, daily learning, and school culture. However, the success of strengthening nature-based character education depends heavily on how school management plans, organizes, implements, and oversees character programs in a structured, sustainable, and data-driven manner.

Initial findings indicate that the implementation of character education in many schools, including nature schools, is often not fully managed as a complete managerial system. Planning is not supported by adequate context analysis, the organization of character programs lacks a specific structure, implementation varies among teachers, and character assessments do not use consistent standardized instruments. This creates a gap between the ideals of the national PPK policy and the Pancasila Student Profile and field practice, particularly regarding the ability to produce graduates who are both strong in character and academically competent. However, the Minister of Primary and Secondary Education is encouraging nature schools to become a model for quality alternative education. As the Minister of Primary and Secondary Education (Mendikdasmen), Abdul Mu'ti, in a press release Number: 566/ sipers/A6/IX/2025 during a visit to the Indonesian Nature School in Pekanbaru. Friday, September 19, 2025, stated that "Nature schools are unique, creative, and close to real life educational services. This model must remain high quality, relevant, and meet community expectations. Education is not just about buildings, but also the process of building children's character into a healthy, intelligent, and characterful generation" (Kemendikdasmen, 2025).

Published research on the management of strengthening character education in nature-based elementary schools to achieve quality education is still minimal, and no research is the same as this one. Researchers have studied Character Education in Tahfidz Nature Schools (Maulida, 2021), Character Building for Environmental Care through Islamic Religious Education in Nature Schools (Kholilah, 2021), Implementation of the Nature School Curriculum in Building Student Character Education in Nature Schools (Kristina et al., 2021), and Implementation of *Total Quality Education (TQI). Management (TQM)* in Education in Nature-Based Schools (Muslimah et al., 2025). However, research on the Management of Strengthening Student Character Education in Nature-Based Schools in realizing this quality education has not been conducted, especially in publications over the past 10 years, namely in the period 2015 to 2025.

Based on this background, this study focuses on "Management of Strengthening Nature-Based Student Character Education in Improving Graduate Quality" with a descriptive study at Sekolah Rimba Indonesia and SD Sekolah Alam Pelopor. The objectives of character education include developing wise thinking, internalizing attitudes, and applying them in good behavior (Alfian et al., 2025). This study carries the POAC management function of George F. Terry (Terry, George R. and Rue, 2021), which is directed to answer questions about management functions in planning, organizing, implementing, and monitoring, and can be

applied in strengthening nature-based character education and can realize quality education in supporting and achieving SDG 4. The objectives of this study include being able to contribute theoretically and practically to the development of a management model for strengthening character education in schools throughout Indonesia, due to the urgency of research on student character education, so that it is easier to implement in schools, so that the achievement of goals will be easier to realize, especially in realizing quality education in the current digitalization era. Hence, researchers need to create and continue this research in a more beneficial direction according to current developments.

2. METHODS

This study used a qualitative approach with descriptive methods. This design was chosen to examine in-depth the management process of strengthening character education in a real-life context at Sekolah Rimba Indonesia and SD Sekolah Alam Pelopor. The qualitative approach allows researchers to understand the meaning, experiences, and perceptions of education practitioners regarding the implementation of nature-based character programs in supporting SDGs4 for quality education. The scope or object of this research is related to the management of strengthening character education in nature-based elementary schools, through management using POAC management functions, which consist of *planning, organizing, actuating, and controlling* (Terry et al., 2021).

The main materials and tools in this research are qualitative research; the main instrument or tool is the researcher himself (*human instrument*), who is assisted by in-depth interview guidelines, observation sheets for learning activities and school culture, documentation study guides, and research support tools, which include writing tools, voice/video recorders, *mobile phones, and iPad* cameras for documentation.

This research was conducted at two nature-based elementary school locations in the Bandung area of West Java Province, Indonesia, namely at the Indonesian Forest School (SRI) and the Pioneer Nature School Elementary School (SAP). Data collection techniques include three techniques, namely through observation, interviews and document studies: (1) observation of the implementation of nature-based learning activities, project activities, daily habits, and school culture; (2) in-depth interviews with school principals, foundation heads, teachers, education staff, and related *stakeholders* to explore planning, organizing, implementation, supervision, constraints, and solutions to character programs; (3) documentation studies of curriculum documents, annual programs, semester programs, lesson plans/teaching modules, PPK and P5 programs, activity reports, character assessment instruments, as well as student work portfolios and project documentation.

Informants (data sources) at the two elementary schools in this study included school principals, foundation leaders, teachers, education staff, parents, students, committee members, and stakeholders. Data sources were selected based on the informants' involvement and knowledge of nature-based character education management. Operational Definition: The variables that are the focus of this qualitative research include management functions according to George R. Terry, namely: first, planning, *by* determining priority character values and integrating them into the curriculum and nature-based school programs. Second, organizing, *by* structuring tasks and cooperative relationships between personnel in managing character programs. Third, implementation (*Actuating*), namely the realization of programs through an *experiential learning* approach and the use of nature as a living laboratory. Fourth, supervision (*Controlling*),

namely by assessing and evaluating student character development through attitude journals, portfolios, and daily observations to support SDG 4 of quality education.

Data analysis used the interactive model of Miles and Huberman (Miles et al., 2020), which includes data reduction, data presentation, and repeated drawing and verification of conclusions until a consistent pattern of findings was obtained. Data validity was ensured through triangulation of sources (principals, teachers, foundations, parents) and triangulation of methods (interviews, observation, documentation), as well as peer review and confirmation of findings with key informants (*member checks*).

3. RESULTS AND DISCUSSION

3.1 Planning for Strengthening Character Education in Nature-Based Elementary Schools

Management planning for strengthening nature-based character education at the Elementary School level is based on nature schools. Schools carry out this nature-based character education strengthening planning by integrating character values into curriculum documents, school programs, and learning activities. In nature-based schools, planning begins with determining priority character values such as responsibility, environmental awareness, cooperation, and independence, which are then translated into programs such as Rimba Class, gardening, water conservation, waste banks, thematic camping, and social projects in surrounding villages. These programs are integrated into *prota*, *promes*, RPP, and teaching modules, so that nature is present as part of the learning plan, not just an additional activity.

The planning of a nature-based character education program in schools refers to the Independent Curriculum and Learning Objectives, combined with nature projects (agriculture, animal husbandry, entrepreneurship) and the instilling of Islamic values, such as a food security program that encourages students to plant, care for, and manage crops as a means of learning across subjects and character. However, the analysis shows that a systematic SWOT analysis does not fully support the planning; planning focuses more on setting programs and objectives without comprehensive mapping of obstacles and long-term anticipation strategies.

The planning for strengthening nature-based character education in nature-based elementary schools, conducted at this school, demonstrates the integration of character values into the school curriculum and programs. This finding aligns with recent research, which confirms that in implementing the Independent Curriculum, character strengthening must be systematically designed through needs identification, integration into the curriculum, and the involvement of all school stakeholders. Curriculum development in elementary schools is crucial for enhancing character education (Aluf, 2024).

The first step implemented by the nature-based school is Terry's management function, which begins with planning, which is the initial function in management, because if the planning is good, then other management functions will be optimal. This matter regarding planning is in line with Hasibuan, who said, "Planning is a basic (fundamental) function of management, because organizing, staffing, directing, and controlling must also be planned (Hasibuan et al., 2018). This matter regarding planning is also in accordance with the Word of Allah SWT in the Al- Quran surah Al-Hasyr Verse 18 (Al-Quran, 2025).

Legally, this planning is also in accordance with the direction of national policy as stated in the Minister of Elementary and Secondary Education Regulation No. 10 of 2025 concerning Graduate Competency Standards (Kemendikdasmen, 2025), which emphasizes the importance of character dimensions such as faith, collaboration, creativity, and critical reasoning as the main educational achievements. This reinforces that character education planning is not only programmatic, but also a national policy mandate that must be integrated

into the curriculum. These Islamic values contribute to the formation of students' spiritual, social, and ecological character, which is in line with the principles of Islamic character education, SDG 4, good habits, and inclusive and sustainable education promoted by SDG 4 (Muhajang et al, 2026).

Based on the explanation above, it can be said that both schools have carefully planned their nature-based character education programs. This careful planning for integrating environmental education is a manifestation of SDG target 4.7, which emphasizes the acquisition of knowledge for sustainable development (UNESCO, 2021).

3.2 Organizing the Strengthening of Character Education in Elementary Schools Based on Nature Schools

The organization of nature-based character education reinforcement in both schools is implemented through existing formal structures, although they do not yet have a dedicated, explicit character program unit. In nature-based schools, the roles of the principal, vice principal for curriculum, vice principal for student affairs, infrastructure coordinator, and teachers are complemented by a small nature-based character strengthening team, such as a garden coordinator and environmental project coordinator. In these nature-based schools, the organization is carried out through the Kober–TK–SD–TPA ecosystem under one foundation, so that character education takes place continuously from an early age, with the KPK formula (exemplary, habituation, agreement) involving the entire school community. The results of this study indicate that the organization of the character program is still attached to the general school structure and does not yet have a dedicated. This is in line with recent research which states that effective character education management requires a holistic and integrated approach that covers cognitive, affective, social, and spiritual aspects as a whole (Aziz et al., 2025).

Theoretically, effective organization requires a clear task structure, efficient working relationships, and role satisfaction. The results of this study indicate that even though the organization of the character program is already underway, some character tasks are still blended with other tasks, resulting in a lack of focus and identity for the character unit, potentially leading to role fatigue. This condition indicates the need to establish a specific organizational structure for nature-based character education programs to strengthen program accountability and sustainability.

In terms of management function, the organization is implemented by involving the collaboration of human resources in both elementary schools, in accordance with Mulyono, that "this organization is by establishing cooperative relationships between personnel in carrying out tasks, in achieving goals" (Mulyono, 2017). Strengthened by Hanafiah et al., schools guarantee continuous quality development with professional management through integrated planning, organizing, implementing, and supervising, utilizing human resources and other sources (Hanafiah et al., 2019).

Similarly, regarding the importance of the role of school leaders, following other research, in the implementation of the Independent Curriculum policy, the principal's role as a manager is crucial in organizing character programs through coordination, task distribution, and strengthening school culture (Sofiana et al., 2025). This demonstrates the importance of creating a clear organizational structure for character education to optimize the effectiveness of character education programs. Thus, the findings of this study can reinforce the importance of establishing an organization within a character education strengthening team in schools specifically, to streamline performance according to the main duties and functions of each

individual, in facilitating the achievement of goals. This is part of modern, quality-based school governance to realize quality education.

3.3 Implementation of Strengthening Character Education in Nature-Based Elementary Schools

The implementation of character education strengthening programs in nature-based elementary schools relies heavily on experiential learning and nature-based learning approaches. In nature-based schools, activities such as Rimba Class, gardening, simple conservation, and social projects provide students with opportunities to learn directly from nature by planting, caring for, and observing plants, as well as engaging in social activities in their surroundings. Character values such as patience, discipline, responsibility, cooperation, and environmental awareness are cultivated through practice, not just through lectures. These practices and other practices are crucial for continued implementation in the current digital era. Handayani, in line with Handayani, stated that "moral education and practice in Salafi Islamic boarding schools remain unwavering amidst technological advances and developments" (Handayani et al., 2020). These nature-themed activities result in projects that are enjoyable and meaningful for students in addressing various life challenges.

In line with research by Ismi et al, "the implementation of quality projects or work programs with the concept of nature, as the main media and periodic evaluation to address the problems faced" (Muslimah et al., 2025). Likewise, other research has shown that implementing nature-based character education through experiential learning and project-based learning has proven effective in instilling character values.

This aligns with research showing that the Independent Curriculum provides real-world implementation through project activities (P5) oriented toward strengthening student character contextually (Ratu et al., 2023). Therefore, it can be said that the nature-based learning practices in this study are not only contextually relevant but also align with the modern learning paradigm that emphasizes learning by doing as an effort to achieve quality education.

Based on research findings, it can also be said that in nature-based schools, almost 90% of lower-class activities are carried out outdoors (saung, gazebo, garden, barn), while agricultural, livestock, and entrepreneurship projects become a means of learning across subjects and character, including the dimension of religiosity through prayer and exemplary stories of Muslim figures. The implementation of contextual learning through collaboration and real-life experiences fosters students' character in responsibility, independence, and social concern (Handayani Fitri, 2026). This experiential learning approach is also reinforced by 21st-century educational research trends that show that project-based learning and direct experience can significantly improve students' social, collaboration, and problem-solving skills (Yunis & Ginting, 2025).

However, some teachers still inconsistently integrate character values explicitly into lesson plans and learning steps; in some classes, character programs are still viewed as supplementary learning outside of class, rather than the core of the curriculum. This indicates that implementation is aligned with the concept of experience-based character education, but the degree of consistency among teachers varies. Qomar stated that "implementation is the realization of a plan to achieve goals, effectively and efficiently" (Qomar, 2018).

3.4 Supervision of Strengthening Character Education in Nature-Based Elementary Schools

Based on the research findings, monitoring and assessment of nature-based character education reinforcement in both schools were carried out through attitude journals, anecdotal notes, portfolios, and project documentation, as well as observations of students' daily behavior. In nature-based schools, character assessment is linked to the harmonization of heart, feeling, thinking, and physical development. Assessments emphasize the narrative of character development within the context of the Independent Curriculum Learning Objectives and the P5 project. However, the lack of a systematic standardized character assessment instrument and the limited involvement of the school committee and community in supervision mean that information on character development is not yet fully comprehensive or based on strong data. It can be said that the supervision and character assessment aspects in this study have not fully used standardized and participatory instruments. This finding is consistent with a recent study that showed that one of the main challenges in character education is the evaluation aspect, which is still subjective and not standardized nationally (Pujiono et al., 2025). Strengthening character education, the Independent Curriculum demands authentic assessment based on the process and student development, not just the result. Therefore, the development of a more comprehensive character assessment system is necessary, involving teachers, parents, and the community as part of the education ecosystem.

The results showed that both schools demonstrated a positive influence of character programs on graduate quality. SRI graduates were described as more independent, courageous, accustomed to working in teams, and environmentally conscious. In contrast, nature-based school graduates had a basic understanding of food security, concern for animals and the environment, a habit of working hard in nature, and the seeds of an entrepreneurial spirit. However, there were still variations in the consistency of academic discipline and independent learning, as well as the need to strengthen documentation of academic achievement to strengthen the image of nature schools in the public eye.

Supervision in these two elementary schools was carried out as Mujamil Qomar stated that "There are three things in supervision, namely planning, implementation, and objectives" (Qomar, 2018). Based on the explanation above, it can be said that the importance of managing character education through the application of management functions is to improve the quality of graduates, as the results of Fauzi Ali & Nuryani's research show that "schools realize the importance of implementing educational management to produce quality students" (Fauzi Ali & Nuryani, 2023). Proper management is crucial for achieving desired goals. Badrudin states that: "The lack of efforts to improve quality is caused by management not functioning properly." (Badrudin, 2016).

Overall, the findings of this study reinforce that the management of character education strengthening in nature-based elementary schools has high relevance to national education policy. Integration between management functions (POAC), experiential learning approaches, and regulatory support indicates that character education must be managed systematically, holistically, and sustainably. This emphasizes that the success of character education is not only determined by the program alone, but also by its management using management functions according to the steps. As a manifestation of the quality of educational management itself, as emphasized in various studies, the quality of education is influenced by the effectiveness of school management in managing the curriculum, learning, and evaluation in an integrated manner (Ratu et al., 2023).

4. CONCLUSION

This study demonstrates that multicultural learning based on surah Al-Hujurat, integrated into Pancasila Education through a deep learning approach, is capable of significantly increasing the tolerant attitudes of elementary school students. The integration of religious and ethical values through meaningful, reflective, and joyful learning experiences fosters an appreciation for diversity, awareness of justice, and inclusive behavior in social interactions. These results have implications for Indonesian education, particularly in the implementation of the Kurikulum Merdeka (Independent Curriculum) and religious moderation programs, while providing a foundation for developing instructional strategies that practically instill the values of tolerance in inclusive classrooms. The limitations of this research include the one-group pretest-posttest design and a sample size of 30. emphasize the necessity for further studies involving larger samples, longitudinal designs, and the exploration of other integrative pedagogical approaches. As a follow-up, educators may adopt value-based multicultural learning, policymakers can develop systematic curriculum guidelines, and researchers are encouraged to investigate the mechanisms of attitudinal change as well as the long-term impact of this approach.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirm that the paper was free of plagiarism.

6. REFERENCES

- Alfian, K., A., Kurniady, D. A., & Herawan, E. (2025). *Manajemen pendidikan karakter berbasis kearifan lokal: Strategi meningkatkan mutu lulusan sekolah dasar*. PT. Star Digital Publishing.
- Aluf, W. Al. (2024). Strategi pengembangan kurikulum merdeka dalam memperkuat karakter pada tingkat sekolah dasar. *Jurnal Basicedu*, 8(2), 1211–1223. <https://doi.org/10.31004/basicedu.v8i2.7275>
- Aziz, M., Napitupulu, D. S., & Salim, M. Q. (2025). Manajemen holistik pada kurikulum pendidikan karakter anak usia. (*IJECA*) *Indonesian Journal of Early Childhood: Jurnal Dunia Anak Usia Dini*, 7(2), 343–351. <https://doi.org/10.35473/ijec.v7i2.3872>
- Badrudin. (2016). The effectiveness of study program quality improvement (A case study at Islamic Education Management Department, Faculty of Tarbiyah and Teacher Training). In *Proceedings of the 6th International Conference on Educational, Management, Administration and Leadership (ICEMAL 2016) (Vol. 14, Advances in Economics, Business and Management Research*, pp. 118–122). Atlantis Press. <https://doi.org/10.2991/icemal-16.2016.25>
- Marisyah, A., Firman, F., & Rusdinal. (2019). *Pemikiran Ki Hadjar Dewantara tentang pendidikan*. *Jurnal Pendidikan Tambusai*, 3(3), 1514–1519. <https://doi.org/10.31004/jptam.v3i3.395>
- Direktorat Jenderal Pendidikan Islam, Kementerian Agama Republik Indonesia. (2022). *Panduan pengembangan proyek penguatan Profil Pelajar Pancasila dan Profil Pelajar Rahmatan lil Alamin*. Direktorat KSKK Madrasah, Direktorat Jenderal Pendidikan Islam, Kementerian Agama Republik Indonesia

- Ali, M. F., & Nuryani, L. K. (2023). Improving the quality of graduates by maximizing the functions of educational management in schools. *Journal of Education and Teaching (JET)*, 4(3), 324–338. <https://doi.org/10.51454/jet.v4i3.251>
- Hanafiah., Basari, M. H., & Handayani, F. (2019). Manajemen boarding school untuk membina karakter peserta didik SMA di Kota Bandung (Penelitian kualitatif di SMA Boarding School Daarul Qur'an). *Media Nusantara*, 16(1), 57–68. <https://doi.org/10.30999/medinus.v16i1.682>
- Handayani, F., Ahmad, N., Suhartini, A., & Hasan Basari, M. (2020). Pendidikan akhlak di Pondok Pesantren Salafiyah Al-Ilyaa siyah Cilengkrang Cibiru Bandung. *Jurnal Studi Islam Lintas Negara*, 2(2), 79–84. <https://doi.org/10.37567/cbjis.v2i2.345>
- Handayani, F. (2026). Rahmatan lil Alamin-oriented development design of the Pancasila student profile strengthening project based on the three educational centers in building student character. *AL GHAZALI: Jurnal Pendidikan dan Pemikiran Islam*, 6(1), 152–169. <https://doi.org/10.69900/ag.v6i1.547>
- Hasibuan, A. A., Syah, D., & Marzuki. (2018). Manajemen pendidikan karakter di SMA (Studi pada SMAN dan MAN di Jakarta). *Tarbawi: Jurnal Keilmuan Manajemen Pendidikan*, 4(2), 191–212. <https://doi.org/10.32678/tarbawi.v4i02.1230>
- Pusat Kurikulum dan Pembelajaran Badan Standar, Kurikulum, dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. (2024). *Panduan pengembangan proyek penguatan Profil Pelajar Pancasila*. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi.
- Kholilah, S. (2021). *Pembentukan karakter peduli lingkungan melalui pendidikan agama Islam di Sekolah Alam Cikeas Bogor* (Tesis magister, Sekolah Pascasarjana UIN Syarif Hidayatullah Jakarta). UIN Syarif Hidayatullah Jakarta Institutional Repository.
- Komisi Perlindungan Anak Indonesia (KPAI). (2024). *Laporan akhir tahun 2024: Penguatan pengawasan dan perlindungan anak di Indonesia*. <https://www.kpai.go.id/files/2026/04/LAT-KPAI-2024-Fn.pdf>
- Kristina, M., Sari, R. N., & Puastuti, D. (2021). Implementasi kurikulum sekolah alam dalam pembentukan pendidikan karakter peserta didik di Sekolah Alam Al Karim Lampung. *Idaarah: Jurnal Manajemen Pendidikan*, 5(2), 347–355. <https://doi.org/10.24252/idaarah.v5i2.24376>
- Maulida, D. (2021). Pendidikan karakter di sekolah alam tahfidz preneur [Skripsi, Universitas Islam Negeri Syarif Hidayatullah Jakarta]. Repository UIN Syarif Hidayatullah Jakarta.
- Sofiana, N. M. L., Yuliejantiningasih, Y., & Maryanto. (2025). The role of the school principal as a manager in the implementation of P5 in the Merdeka Curriculum at SD Negeri 2 Sanggrahan, Kranggan District. *Cetta: Jurnal Ilmu Pendidikan*, 8(3), 122–133. <https://doi.org/10.37329/cetta.v8i3.4220>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook*. Sage Publications.

- Kementerian Pendidikan Dasar dan Menengah. (2025). *Peraturan Menteri Pendidikan Dasar dan Menengah Nomor 10 Tahun 2025 tentang Standar Kompetensi Lulusan*. Kementerian Pendidikan Dasar dan Menengah Republik Indonesia. <https://jdih.kemdikbud.go.id/>
- Kementerian Pendidikan Dasar dan Menengah (Kemendikdasmen). (2025, September). *Siaran pers nomor: 566/sipers/A6/IX/2025: Mendikdasmen Dorong Sekolah Alam Jadi Model Pendidikan Alternatif yang Bermutu*. Kementerian Pendidikan Dasar dan Menengah Republik Indonesia. <https://www.kemdikbud.go.id>
- Muhajang, T., Basari, M. H., Aflaha, A., Handayani, F., Fatwanti, D., & Fakhruzaman, D. (2026). Integrating the 7 great habits of Indonesian children into Islamic character education: Supporting SDG 4 (quality education). *Edukasi Islami: Jurnal Pendidikan Islam*, 15(1), 383–396. <https://doi.org/10.30868/ei.v15i01.10020>
- Mulyasa, E. (2016). *Manajemen Pendidikan Karakter*. Bumi Aksara.
- Mulyono. (2017). *Manajemen administrasi & organisasi pendidikan*. Ar-Ruzz Media.
- Muslimah, I., Karimah, K., & Yasin, M. (2025). Pelaksanaan total quality management (TQM) dalam pendidikan di sekolah alam saka kediri. *Jurnal Kependidikan Islam*, 15(1), 87–95. <https://doi.org/10.15642/jkpi.2025.15.1.87-95>
- Pujiono, E., Rohbiyatun, H., Sulistiyahati, A., Tristiandari, H., Nurhayati, R., Agustin, T. F. S., Listyowati, & Egar, N. (2025). Perbandingan kurikulum 1947, 1964, 1968 dan Kurikulum Merdeka dalam konteks pelaksanaan pendidikan karakter. *Jurnal Manajemen Pendidikan (JMP)*, 14(2), 188–196. <https://doi.org/10.26877/jmp.v14i2.23166>
- Qomar, M. (2018). *Manajemen Pembelajaran Pendidikan Agama Islam (PAI)*. Emir Cakrawala Islam. (ok)
- Maulidia, Shufiatuddin, S. R. A., Damastuti, R., Istiqomah, S. A., Haq, R. R., & Sholeh, L. (2023). Implementasi manajemen kurikulum merdeka belajar dalam meningkatkan mutu pendidikan. *JlIP (Jurnal Ilmiah Ilmu Pendidikan)*, 6(8), 6424–6431. <https://doi.org/10.54371/jiip.v6i8.2781>
- Terry, George R. dan Rue, L. W. (2021). *Dasar-dasar manajemen (B. S. Fatmawati (ed.); 15th ed.)*. Bumi Aksara.
- UNESCO. (2021). Education for sustainable development. <https://www.unesco.org/en/sustainable-development/education>
- Yunis, R., Sudarto, Ginting, S. O., Jeni, M., Riri, & Wijaya, V. G. (2025). Strengthening digital literacy and organizational management system based on ISO 21001 to support Kurikulum Merdeka [Penguatan literasi digital dan sistem manajemen organisasi berbasiskan ISO 21001 untuk mendukung Kurikulum Merdeka]. *DINAMISIA: Jurnal Pengabdian Kepada Masyarakat*, 9(2), 404–414. <https://doi.org/10.31849/dinamisia.v9i2.23398>



The Role of Local Arts Communities in Supporting Multicultural Arts Learning in Primary Schools

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ABSTRACT

This study aims to describe the role of local art communities in supporting multicultural art learning in primary schools. Indonesia, as a multicultural country, faces various challenges in learning cultural arts, including limited learning time, a lack of teaching materials based on local culture, and limited educator resources. This research uses a qualitative approach with a literature research method. The literature review approach was used by analyzing relevant publications pulled from Google Scholar and national education databases published between 2010 and 2025. A total of 25 articles met the eligibility criteria and were analyzed using thematic content analysis. The results of the study show that the local art community has five main roles, namely as resource persons or guest teachers, learning facility providers, art activity organizers, developers of local culture-based teaching materials, and partners in extracurricular activities. This research also developed the Triadik Collaboration Model (KOLAB-TRI), which involves the art community, schools, and education offices as a partnership framework in multicultural art learning. The involvement of the local arts community contributes to increased cultural appreciation, tolerance, creativity, and student confidence. This study recommends strengthening partnerships between schools and local arts communities as a contextual, participatory, and sustainable multicultural arts learning strategy.

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1. INTRODUCTION

Indonesia is a multicultural country with more than 1,000 ethnic groups and a diversity of languages, ethnicities, races, and religions (Lodo, 2017). This diversity is a national wealth that needs to be preserved through various efforts, one of which is education. In a broader perspective, local culture needs to be maintained through adaptive strategies in dealing with the current trend of globalization, including in the social and cultural sectors of the community (Susilo & Soeroso, 2014). In this context, cultural arts education in elementary schools has a strategic role as a means of identifying, preserving, and developing cultural values, as well as shaping students' character. In line with that, culture is understood as a system of values, norms, and behavior patterns that guide the social life of the community (Setiadi, 2017), so that cultural strengthening through education becomes increasingly relevant.

In Indonesia, Azra (2007) and Warsah (2017) contextualized multicultural education into the national education system, while Baidhawiy (2005) and Puspita (2013) emphasized the importance of multicultural education from an early age as the foundation for the formation of students' character and social attitudes. This shows that multicultural values need to be systematically integrated in the formal education process, including at the elementary school level. In the dynamics of a global society, cultural identity also undergoes a negotiation process due to the intensity of intercultural interactions, so that the recognition of differences becomes increasingly important in multicultural education (Lash & Featherstone, 2002).

In the realm of art education, Rohidi (2016) emphasizes the role of art as a means of character formation, cultural expression, and strengthening students' multicultural awareness. In line with that, Supatmo (2021) underlines the urgency of multicultural literacy through cultural arts learning in facing the challenges of 21st-century education. Cultural arts education contributes to the development of students' physical, intellectual, emotional, social, creative, and aesthetic appreciation abilities (Supatmo, 2021). In addition, art learning also has the potential to foster an attitude of tolerance, respect for differences, care, and responsible cooperation (Rohidi, 2016). In the national education system, the learning of cultural arts in elementary schools is realized through the subjects of Cultural Arts and Crafts, which include fine arts, music, dance, theater, and crafts (Karli, 2014). From the perspective of child development, Yuni (2017) emphasized that music art learning in elementary school needs to be adjusted to the stages of cognitive, emotional, and psychomotor development of students so that the learning process takes place optimally and meaningfully. Education in this case is also understood as a system that not only takes place at the micro-learning level, but is also influenced by the macropedagogical dimension, which includes policies, social structures, and community culture (Dantes, 2014).

However, the implementation of cultural arts learning in elementary schools still faces various obstacles. Cultural arts learning is often positioned as a complementary subject, so it does not receive adequate attention (Chrisnahanungkara, 2020). Limited learning time, lack of local culture-based teaching materials, and lack of teacher competence in the field of arts are also obstacles to implementing cultural arts learning in elementary schools (Mawati et al., 2023). In addition, the availability of teachers who have competence in the field of cultural arts and local content is still a challenge in various educational units. This condition shows that schools' capacity to organize art learning based on local culture independently still needs to be strengthened.

On the other hand, Indonesia has various local art communities, such as dance studios, traditional music groups, folk theater communities, and fine arts societies that play a role in the preservation of regional culture. These communities have knowledge, experience, and resources that can be leveraged to support art learning in schools. Farid (2023) emphasized that learning local arts will be more optimal if it involves cultural ownership through studios and art communities. However, data from the Ministry of Education, Culture, Research, and Technology (2023) shows that only about 15% of traditional arts communities have partnership programs with elementary schools, indicating that the potential for collaboration between schools and the arts community has not been optimally utilized.

Various studies show that multicultural education plays an important role in developing tolerance, respect for diversity, and social justice through the integration of cultural values in the learning process (Banks, 2008; Torres & Tarozzi, 2020; Azra, 2007; Warsah, 2017). In the context of art education, learning based on local culture is considered able to strengthen students' cultural identity while increasing appreciation for cultural diversity in the community (Rohidi, 2016; Supatmo, 2021; Chrisnahanungkara, 2020). However, the implementation of multicultural arts learning in elementary schools still faces various limitations, especially in the use of cultural resources available in the environment around the school.

Several previous studies have highlighted the involvement of the arts community in education. Ambarwangi and Suharto (2013) found that collaboration with the art community can increase students' cultural appreciation. Iriani (2008) examines the involvement of the community in the learning of dance in elementary schools, but it is limited to one type of art. Meanwhile, Farid (2023) emphasizes the use of multicultural content in cultural arts learning materials. At the international level, Bastos and Zimmerman (2017) and Hunter-Doniger (2017) show that involving the arts community in education can increase creativity, cultural appreciation, and community participation in the learning process. However, the results of the study are still partial and come from diverse socio-cultural contexts, so they need adjustments when applied to the context of basic education in Indonesia.

Based on the study, research that specifically synthesizes the role of local arts communities as strategic partners in multicultural arts learning in elementary schools is still limited. In addition, there is not much research that offers a collaboration model that can be used as a reference in building sustainable partnerships between schools, the arts community, and education policymakers. Therefore, this study aims to describe the role of local art communities in supporting multicultural arts learning in primary schools and identify forms of collaboration that can be developed to strengthen contextual, participatory, and sustainable arts education.

2. METHODS

This study uses a qualitative approach with *the Systematic Literature Review* (SLR) method to collect, analyze, and synthesize various concepts and findings regarding the role of local art communities in multicultural arts learning in elementary schools (Zed, 2008). The study process follows the PRISMA 2020 protocol to ensure the transparency and reproducibility of research (Page et al., 2021).

The research stages include the formulation of research focus, determination of keywords and databases, identification of literature, screening and selection based on inclusion-exclusion criteria, data extraction, thematic analysis, and synthesis of findings. In this study,

the local art community is defined as an art group or studio that plays a role in preserving and developing regional cultural heritage. In contrast, multicultural art learning is understood as an art learning process that integrates the values of cultural diversity, tolerance, and respect for differences.

Research data sources include scientific journal articles, reference books, and policy documents relevant to multicultural education, cultural arts learning in elementary schools, and the role of local art communities. Literature was obtained through searches on Google Scholar, DOAJ, Indonesia OneSearch, and manual searches (snowballing) for relevant references. Searches were also carried out on the websites of the Ministry of Education, Culture, Research, and Technology and the Central Statistics Agency.

Inclusion criteria include research that discusses the role or collaboration of the arts community in education, focuses on the elementary school level, is published in Indonesian or English, and is published in the period 2010–2025, except seminal works. The exclusion criteria include research unrelated to education, research that does not involve the arts community, research that focuses on levels other than elementary school, or opinion articles without empirical data.

The selection process follows three stages of PRISMA, namely identification, screening, and feasibility. The search was conducted using a combination of keywords related to the local arts community, arts education, multiculturalism, and elementary school with Boolean operators. After removing duplicates using Mendeley, the articles were filtered by title and abstract by two researchers independently, then evaluated against the full text according to the established criteria. The selection results are presented in the PRISMA flowchart (Figure 1).

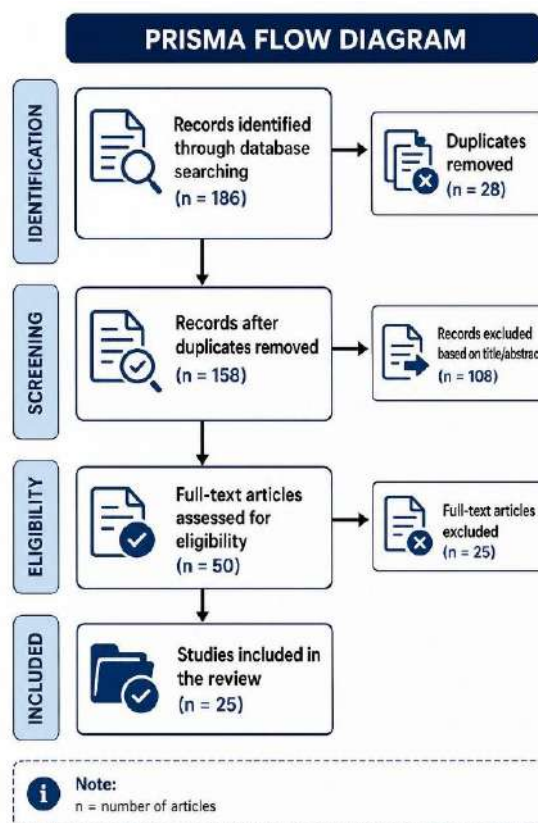


Figure 1. PRISMA Flowchart

The data collection technique uses a documentation method with instruments in the form of a *checklist* of source classification and a data recording format (Arikunto, 2010; Zed, 2008). The literature is classified based on six study focuses, namely multicultural education, cultural arts learning in elementary schools, multicultural content in the arts, the role of local art communities, school-community collaboration models, and the impact of multicultural arts learning.

Data analysis was carried out using thematic analysis with an inductive approach through the process of reading, coding, categorization of themes, synthesis of findings, preparation of analytical narratives, and concluding (Krippendorff, 2018). This approach allows the identification of patterns and relationships between concepts from various sources (Bastos & Zimmerman, 2017; Knight, 2019).

As a literature study, this study has limitations because the findings have not been empirically tested and depend on the availability of accessible literature. Therefore, follow-up research in the form of case studies or classroom action research is needed to test the validity of the resulting collaboration model. This research does not involve human subjects directly, so it does not require ethical approval. However, it still upholds the principles of scientific ethics through the inclusion of accurate sources and the objective presentation of findings.

3. RESULTS AND DISCUSSION

3.1 The Role of Local Art Communities in Multicultural Art Learning in Elementary Schools

Based on the synthesis of literature (Ambarwangi & Suharto, 2013; Iriani, 2008; Farid, 2023), five main forms of the role of the local art community in multicultural art learning in elementary schools are resource persons or guest teachers, learning facility providers, organizers of joint art activities, developers of local culture-based teaching materials, and partners in extracurricular activities. Based on the synthesis of the literature, the involvement of local arts communities in multicultural arts learning in primary schools can be classified into five main role forms. The five forms of roles are presented in Table 1.

Table 1. The Role of Local Art Communities in Multicultural Art Learning in Elementary School

Yes	Role Form	Description	Examples of Activities
1.	Guest Speaker/Lecturer	Community members teach directly at school	Traditional dance training, regional musical instrument workshop
2.	Learning Facility Providers	Communities provide places, tools, and learning tools	Study visits to studios, borrowing musical instruments
3.	Organizer of Joint Art Event	Collaboration in performing arts between schools and communities	School cultural festival, year-end performance
4.	Teaching Material Developer	Community helps compile local art-based materials	Regional song module, archipelago dance guidebook
5.	Extracurricular Partners	Community becomes a permanent partner of arts extracurricular activities	Extracurricular angklung, karawitan, or traditional dance

These findings suggest that local art communities not only serve as cultural preservers but also as learning resources that enrich students' experiences through direct interaction with regional arts practices. The involvement of the art community allows the process of inheriting cultural values, knowledge, and practices to be contextualized for the younger generation through learning experiences that are close to their cultural environment (Rohidi, 2016; Triyanto, 2018).

These roles are found in various fields of art, including music, dance, art, theater, and craft. The forms of involvement carried out include traditional musical instrument training, learning regional dances, making artworks based on local culture, performing folk theater, and traditional craft activities. This engagement allows students to get to know cultural diversity in a more contextual and participatory way.

In addition to facilitating learning, the art community also plays a role in appreciation, expression, and art creation activities. According to Farid (2023), the involvement of the art community in these three aspects contributes to cultural preservation while supporting the regeneration process of artists and cultural actors in society.

3.2 Local Art Community-School Collaboration Model

Based on a synthesis of various literature on multicultural education, community-based arts education, and collaboration between schools, communities, and policymakers, this study proposes a Triadic Collaboration Model (KOLAB-TRI) in the context of basic education. The KOLAB-TRI model was developed through a conceptual synthesis of various research findings on school-community partnerships, multicultural education, and community-based arts education. This model involves three main pillars, namely the local arts community, schools, and education offices, that collaborate to support sustainable multicultural arts learning (Figure 2).

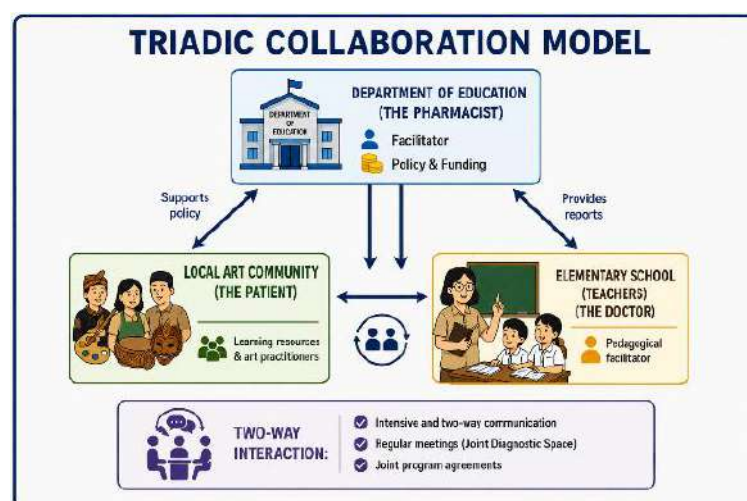


Figure 2. Triadik Collaboration Model (KOLAB-TRI) in Multicultural Art Learning in Elementary Schools

In this model, the arts community acts as a provider of traditional arts knowledge and skills, and schools function as pedagogical facilitators who integrate multicultural values into learning. In contrast, the education office or school committee plays the role of providing

policy support, funding, and program coordination. The synergy of the three parties is expected to create art learning that is relevant to the local cultural context while supporting the strengthening of students' multicultural character.

The main concept in this model is the existence of a "shared diagnostic space", which is a communication forum that brings together the art community, teachers, principals, and policy makers to design, implement, and evaluate art learning programs collaboratively. Through the forum, students' learning needs can be aligned with the local cultural potential of the community so that art learning becomes more contextual, participatory, and sustainable.

3.3 Factors Supporting and Inhibiting Collaboration

The results of the study show that the success of collaboration between schools and the local art community is influenced by several supporting factors, namely a common vision regarding the importance of arts and multicultural education, commitment of both parties, support from the principal and school committee, availability of resources, and intensive and two-way communication (Iriani, 2008). On the other hand, the obstacles that are often encountered include limited time for art learning, lack of funding, the absence of regulations that support school and community cooperation, differences in activity schedules, and teachers' low understanding of the potential of local art communities (Chrisnahanungkara, 2020; Mawati et al., 2023).

To overcome these obstacles, strategies are needed in the form of integrating community programs into extracurricular activities, utilizing alternative funding sources such as school committees and CSR, drafting memorandums of understanding (MoU), flexible scheduling, and capacity building of teachers through training and socialization on the use of the arts community as a learning partner (Ambarwangi & Suharto, 2013).

3.4 The Impact of Art Community Involvement on Elementary School Students' Multicultural Appreciation

Based on the synthesis of the literature, the involvement of the local arts community in multicultural arts learning has a positive impact on students' affective, cognitive, and psychomotor domains. In the affective domain, the involvement of the art community helps increase cultural appreciation, tolerance, empathy, and appreciation for diversity. Through learning experiences that introduce various art traditions, students learn to understand differences as cultural richness and develop the ability to work together in diverse environments (Desyandri, 2014; Atikah & Hikmat, 2022).

In the cognitive domain, students gain a broader understanding of the cultural diversity of the archipelago, including traditional art forms, socio-cultural functions, and the values contained in them (Ambarwangi & Suharto, 2013). Meanwhile, in the psychomotor domain, the involvement of the art community through direct practice activities can develop creativity, creative skills, and students' confidence in expressing themselves through art (Marni & Mayar, 2023). These findings show that the collaboration of schools and local art communities not only supports cultural preservation but also contributes to the holistic development of students' character and competencies.

3.5 Discussion: Towards a Healthy Cultural Ecosystem in Elementary Schools

The results of the study show that the local art community has a strategic role in multicultural art learning in elementary schools through its functions as resource persons, learning facility providers, art activity organizers, teaching material developers, and extracurricular partners. These findings expand the research of Ambarwangi and Suharto (2013), which previously only highlighted the role of the community as resource persons and supporters of art performances. In the context of elementary schools, community involvement has become more diverse due to the characteristics of learners who require concrete and contextual learning experiences (Morrison, 2019).

The study also shows that the success of multicultural arts learning is not dependent on the use of local cultural content alone, but requires the active involvement of the arts community as an educational partner. These findings complement the results of Farid (2023) and show that art communities can contribute not only to cultural appreciation and expression activities but also to the development of authentic learning experiences. Compared to international research on *Community-Based Arts Education* (Bastos & Zimmerman, 2017; Hunter-Doniger, 2017), collaboration in Indonesia tends to rely on local initiatives and cultural preservation orientations, rather than solely on institutional support and formal funding.

Factors supporting collaboration include shared vision, commitment of the parties, school support, availability of resources, and effective communication. On the other hand, limited time, funding, regulations, and teachers' low understanding of the potential of the arts community are the main obstacles. These findings suggest that the success of collaboration is determined not only by pedagogical aspects but also by adequate structural and policy support.

In response to these needs, this study proposes a Triadik Collaboration Model (KOLAB-TRI) involving schools, the arts community, and education offices. This model develops a school-community partnership pattern that has tended to be binary by adding elements of policy support and funding. The main innovation of this model is the existence of a "Shared Diagnostic Room" as a structured communication forum for designing, implementing, and evaluating learning programs collaboratively. This concept aligns with Torres and Tarozzi (2020) on the importance of involving policy actors in multicultural education and strengthening the principle of cultural dialogue in *Community-Based Arts Education* (Bastos & Zimmerman, 2017).

The positive impact of art community involvement on students' cultural appreciation, tolerance, creativity, and self-confidence supports Banks' (2008) multicultural education theory, especially in the aspects of prejudice reduction and school cultural empowerment. Direct interaction with cultural actors allows students to have a more authentic learning experience while strengthening their understanding of cultural diversity.

Theoretically, this study enriches the study of multicultural education and arts education through the integration of school, community, and educational policy perspectives. Practically, this study offers five forms of the role of the art community, the KOLAB-TRI model,

and the identification of supporting and inhibiting factors that can be used as a reference in the development of school and community partnerships. However, as a literature study, the findings of this research still require empirical testing through case studies, classroom action research, and longitudinal research. Therefore, policy support is needed that encourages school-community partnerships so that multicultural arts learning based on local culture can take place sustainably.

4. CONCLUSION

Based on the results of the literature review, the local art community has a strategic role in supporting multicultural art learning in elementary schools through five main roles, namely as resource persons or guest teachers, learning facility providers, organizers of collaborative art activities, developers of local culture-based teaching materials, and partners in extracurricular activities. The success of the collaboration is supported by the KOLAB-TRI model, which involves the art community, schools, and education offices through the "Joint Diagnostic Room" as a forum for collaborative planning and coordination.

This research contributes to the development of the study of multicultural education and arts education by affirming the importance of community involvement as learning partners. In addition, this research offers an operational framework for school-community partnerships that can be used as a reference in the development of multicultural art learning based on local culture.

However, the findings of this study are still limited to the results of the literature synthesis and have not been empirically tested. Therefore, further research through case studies, classroom action research, or longitudinal research is needed to test the effectiveness of the KOLAB-TRI model in various elementary school contexts. This research recommends strengthening partnerships between schools and local arts communities through policy support, funding, and facilitation of ongoing collaboration.

5. AUTHORS' NOTE

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6. REFERENCES

- Ambarwangi, S., & Suharto, S. (2013). Pendidikan multikultural di sekolah melalui pendidikan seni tradisi. *Harmonia: Journal of Arts Research and Education*, 13(1), 77–85. <https://doi.org/10.15294/harmonia.v13i1.2535>
- Arikunto, S. (2010). *Metode Penelitian*. Jakarta: Rineka Cipta.
- Azra, A. (2007). *Identitas dan Krisis Budaya, Membangun Multikulturalisme Indonesia*. Jakarta: Pustaka Indonesia.
- Badan Pusat Statistik. (2021). *Statistik Indonesia 2021*. Jakarta: BPS.
- Baidhawry, Z. (2005). *Pendidikan Agama Berwawasan Multikultural*. Jakarta: Erlangga.
- Banks, J. A. (2008). *An Introduction to Multicultural Education*. University of Washington.
- Bastos, F., & Zimmerman, E. (2017). Creativity in art education: Intersecting with design,

- visual culture, and social justice. *Revista GEARTE*, 4(3), 384–401. <https://doi.org/10.22456/2357-9854.75178>
- Chrisnahanungkara, A. J. (2020). Pendidikan seni musik berbasis bahan ajar multikultural. *Tonika: Jurnal Penelitian dan Pengkajian Seni*, 3(1), 39–50. <https://doi.org/10.37368/tonika.v3i1.139>
- Dantes, N. (2014). *Landasan pendidikan: Tinjauan dari dimensi makropedagogis*. Graha Ilmu.
- Desyandri. (2014). Peran seni musik dalam pendidikan multikultural. *Jurnal Pembangunan Pendidikan: Fondasi dan Aplikasi*, 2(1), 1–12. <https://doi.org/10.21831/jppfa.v2i1.2613>
- Farid, M. (2023). Pemanfaatan konten multibudaya dalam pembelajaran seni budaya di sekolah dasar. *The Elementary*, 1(1), 20–27. <https://doi.org/10.56404/tej.v1i1.48>
- Lentho, H. (2026, April 1). *Surabaya perkuat ekosistem kebudayaan dengan forum triadik*. [Pernyataan pers]. Komunitas Surabaya Juang.
- Iriani, Z. (2008). Peningkatan mutu pembelajaran seni tari di Sekolah Dasar. *Komposisi: Jurnal Pendidikan Bahasa, Sastra, dan Seni*, 9(2). <https://doi.org/10.24036/komposisi.v9i2.98>
- Karli, H. (2014). Perbedaan Kurikulum Tingkat Satuan Pendidikan 2006 dan Kurikulum 2013 untuk jenjang sekolah dasar. *Jurnal Pendidikan Penabur*, 13(22), 85–94.
- Kemendikbudristek. (2022). *Panduan pengembangan proyek penguatan profil pelajar pancasila*. Jakarta: Kemendikbudristek.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. (2022). *Data warisan budaya tak benda indonesia*. Jakarta: Kemendikbudristek.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. (2022). *Indikator kinerja program direktorat pengembangan dan pemanfaatan kebudayaan*. Jakarta: Kemendikbudristek.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. (2023). *Data komunitas seni tradisional di indonesia*. Jakarta: Kemendikbudristek.
- Hunter-Doniger, T., & Berlinsky, R. (2017). The power of the arts: Evaluating a community artist-in-residence program through the lens of studio thinking. *Arts Education Policy Review*, 118(1), 19–26. <https://doi.org/10.1080/10632913.2015.1011814>
- Krippendorff, K. (2018). *Content analysis: An introduction to its methodology*. Sage Publications.
- Lash, S., & Featherstone, M. (Eds.). (2002). *Recognition and difference: Politics, identity, multiculture (Vol. 2)*. Sage.
- Lodo, N. S. A. (2017). Analisis sikap dan muatan pembelajaran SBDP pada tema lingkungan sahabat kita kurikulum 2013 kelas v serta potensi budaya lokal pendukung dalam pembelajaran. *Jurnal Ilmiah Pendidikan dan Pembelajaran*, 1(1), 57-67.

<https://doi.org/10.23887/jipp.v1i1.11962>

- Marni, Y., & Mayar, F. (2023). Mengoptimalkan pembelajaran seni rupa di sekolah dasar: Strategi dan praktek terbaik. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 9(2), 2658-2667. <https://doi.org/10.36989/didaktik.v9i2.950>
- Mawati, A. T., Hanafiah, H., Arifudin, O., & Kartika, I. (2023). Dampak Pergantian kurikulum pendidikan terhadap peserta didik sekolah dasar. *Jurnal Primary Edu*, 1(1), 69-82. 10.63878
- Morrison, G. S. (2019). *Dasar-dasar pendidikan anak usia dini*. Jakarta: PT Indeks.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., et al. (2021). *The PRISMA 2020 statement: An updated guideline for reporting systematic reviews*. *BMJ*, 372, n71.
- Pusat Kurikulum dan Perbukuan. (2021). *Survei kompetensi guru seni budaya di sekolah dasar*. Jakarta: Kemendikbudristek.
- Puspita, W. A. (2013). Multikulturalisme dalam pendidikan anak usia dini. *VISI: Jurnal Ilmiah Pendidikan dan Tenaga Kependidikan Pendidikan Non Formal*, 8(2), 144-152. <https://doi.org/10.21009/JIV.0802.8>
- Rohidi, T. R. (2016). Pembelajaran seni dari Tradisional ke pasca tradisional: Strategi kebudayaan dengan sumber kearifan lokal. *Makalah Seminar Nasional, UPI*.
- Setiadi, E. M. (2017). *Ilmu sosial & budaya dasar*. Jakarta: Kencana.
- Supatmo. (2021). Meneguhkan literasi multikultural melalui pendidikan seni: Perspektif dan urgensi pembelajaran seni budaya abad 21 di sekolah. *Prosiding Seminar Nasional Pascasarjana*, 4(1), 32–38. <https://proceeding.unnes.ac.id/index.php/snpasca/article/view/818>
- Susilo, Y. S., & Soeroso, A. (2014). *Strategi pelestarian kebudayaan lokal dalam menghadapi globalisasi pariwisata: Kasus kota Yogyakarta*. BAPPEDA Kota Yogyakarta, 3.
- Torres, C. A., & Tarozzi, M. (2020). Multiculturalism in the world system: Towards a social justice model of inter/multicultural education. *Globalisation, Societies and Education*, 18(1), 7–18. <https://doi.org/10.1080/14767724.2019.1690729>
- Triyanto, T. (2018). Pendekatan kebudayaan dalam penelitian pendidikan seni. *Jurnal Imajinasi*, 12(1), 65-76. <https://doi.org/10.15294/imajinasi.v12i1.14358>
- Warsah, I. (2017). Kesadaran multikultural sebagai ranah kurikulum pendidikan. *Ta'dib: Jurnal Pendidikan Islam*, 6(2), 268-279. <https://doi.org/10.29313/tjpi.v6i2.2845>
- Yuni, Q. F. (2017). Kreativitas dalam pembelajaran seni musik di sekolah dasar: Suatu tinjauan konseptual. *ELEMENTARY: Islamic Teacher Journal*, 4(1), 55-77. <http://dx.doi.org/10.21043/elementary.v4i1.1980>
- Zed, M. (2008). *Metode penelitian kepustakaan* (Ed. ke-2). Yayasan Pustaka Obor Indonesia.



Needs Analysis for Developing ROLL-PAJA Learning Media to Support SPO Sentence Writing in Grade II Elementary School

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ABSTRACT

This study aimed to analyze the needs for developing ROLL-PAJA learning media to improve students' ability to construct SPO sentences. This research employed a qualitative descriptive approach with a case study design, involving 1 Grade II classroom teacher and 10 Grade II students at SDN 3 Sedayulawas as data sources. Data were collected through observation, interviews, and documentation. The findings revealed that students remained passive during instruction, struggled to visualize SPO sentence structure without concrete aids, relied solely on textbook exercises with no hands-on practice, and showed low engagement due to the absence of interactive activities. Interviews further identified students' need for kinetic interactivity, contextual learning, differentiated support, and operational flexibility. Based on these findings, ROLL-PAJA was designed with four integrated components: a rolling ball, an SPO board, fictional snacks, and a color-coding system to distinguish each sentence element visually. In conclusion, ROLL-PAJA contributes a practical and evidence-based learning media prototype that supports active and differentiated Indonesian language learning at the elementary level, and can serve as a replicable model for developing interactive media aligned with the Merdeka Curriculum framework.

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1. INTRODUCTION

The implementation of the Merdeka Curriculum in Indonesia has brought significant transformation to the national education landscape. This curriculum philosophically emphasizes creative thinking, freedom, student independence, and the creation of an active, meaningful, and student-centered learning ecosystem. Angga et al. (2023) affirm that the Merdeka Curriculum is explicitly designed to develop the Pancasila student profile through contextual and relevant learning approaches, granting autonomy to teachers and educational institutions to innovate in their pedagogical practices, so that the learning process is no longer confined to rigid and uniform patterns. This transformation demands that teachers not only deliver content but also design meaningful, challenging, and individually responsive learning experiences.

In the context of Indonesian language learning, Samiha et al. (2023) state that the four language skills—listening, speaking, reading, and writing—are the main pillars that must be integrated into every learning design; however, the reality in the field shows that many teachers still rely on theoretical and rote learning techniques, causing learning activities to proceed stiffly, monotonously, and with little meaning for students. This concern is supported by empirical evidence at the national level. Maharani and Wahidin (2022), through a study examining the literacy competency of elementary school students using the Minimum Competency Assessment (AKM) framework, found that the majority of students were categorized at the basic level, with most unable to reach the expected cognitive levels in reading literacy — including the ability to find information, develop understanding, and evaluate text content. This finding is consistent with Hafizha and Rakhmania (2024), who reported that the implementation of literacy strengthening programs in elementary schools has not yet produced significant improvement in AKM literacy outcomes, indicating that foundational literacy weaknesses persist systematically across schools in Indonesia. At the level of writing competency specifically, Puspawati et al. (2022) found that elementary school students demonstrated persistent errors across all basic sentence structure components — including subject, predicate, and object indicators — in their written outputs, confirming that the mastery of sentence structure remains a critical and unresolved challenge in Indonesian elementary education. This condition emphasizes that early-level writing and language structure skills are not merely curriculum targets but critical foundations that determine student literacy success in the future. Without a strong grasp of basic sentence structure from an early age, students will experience cumulative difficulties in expressing ideas in writing at higher educational levels.

One of the basic competencies that second-grade elementary school students must master is the ability to compose sentences following the Subject-Predicate-Object (SPO) pattern. This ability encompasses the cognitive skill of organizing words into a coherent, logical, and communicative whole. This constructive process cannot be completed through mere verbal instruction from the teacher. Nurmalasari (2023) empirically found that lower-grade students still struggle with all aspects of language skills, including writing and combining words into correctly structured sentences; the primary causes are learning methods ill-suited to students' developmental characteristics and the absence of contextual and concrete learning media. This is compounded by Ahmad and Mustika (2021), who found that many teachers experience difficulties in selecting, developing, and operating media capable of bridging abstract content with students' real experiences. Thus, the gap between SPO competency targets and students' actual achievement is a systemic problem in the design and implementation of learning media at the lower-grade level.

Psychologically, second-grade elementary school students are in the concrete operational phase. Marinda (2020) affirms that children aged 7–11 are sufficiently mature to think logically, but only with respect to physical objects they can observe, touch, and manipulate directly; abstract concepts including sentence structure are still very difficult to absorb without the aid of concrete representation. Delivering content that relies solely on verbal explanation and textbooks carries a high risk of creating deep-rooted misconceptions in students' linguistic understanding. They tend to show far greater enthusiasm when learning activities are presented in an enjoyable, healthily competitive atmosphere integrated with dynamic game elements (Sari et al., 2021). These characteristics demand a media design approach that is truly aligned with children's cognitive developmental stage and psychological needs.

The theoretical grounding of this study rests on five foundational perspectives that collectively explain why an integrated, game-based, and differentiated media approach is necessary for SPO sentence learning at the lower-grade elementary level. From a developmental standpoint, Piaget's theory of cognitive development establishes that children aged 7–11 occupy the concrete operational stage, wherein logical thinking remains inseparable from the direct manipulation of physical objects (Hayat et al., 2024). This developmental reality means that SPO sentence structure — an inherently abstract grammatical concept — cannot be effectively transmitted through verbal instruction or printed text alone; it requires media that students can physically handle, arrange, and reorganize. Complementing this, Vygotsky's sociocultural theory, particularly the Zone of Proximal Development (ZPD), holds that meaningful learning occurs in the space between what a student can do independently and what they can achieve with guided support (Lei & Bakar, 2025). Applied to SPO learning, this principle demands that instructional media be designed not merely as a content container but as a dynamic scaffold — one that provides graduated structural cues, withdraws support progressively, and positions the teacher or peer as a mediating agent rather than a sole knowledge transmitter.

Bruner's theory of representation further specifies the sequencing logic that effective media must follow. Bruner proposed that learners construct knowledge most durably when instruction moves through three successive modes: enactive (learning through physical action), iconic (learning through visual representation), and symbolic (learning through abstract language) (Arsyad et al., 2024). A media design for SPO learning that begins with a kinetic game mechanic — where students physically move and arrange sentence components — before transitioning to color-coded visual representations of subject, predicate, and object, and only then to the complete written sentence, embodies this enactive-to-symbolic progression precisely. Alongside Bruner, Mayer's Cognitive Theory of Multimedia Learning provides the cognitive architecture for how such media must be engineered (Mayer, 2024) and demonstrates across more than 200 experiments that humans process verbal and visual information through separate cognitive channels, each with limited capacity, and that meaningful learning requires the active integration of both channels simultaneously. For SPO media specifically, this means that color-differentiated visual cues for each sentence component must be presented concurrently with verbal or written labels — not sequentially — so that both channels are engaged without either being overloaded (Mayer, 2024).

The fifth theoretical pillar, Tomlinson's framework of Differentiated Instruction, addresses a dimension that purely cognitive theories leave unresolved: the reality that students in any single classroom bring meaningfully different levels of language readiness, motivation, and

prior experience with sentence structure. Gibbs (2025), extending Tomlinson's framework, argues that instructional effectiveness is determined not only by the quality of content delivery but by the degree to which teaching strategies are aligned with individual learner characteristics — adjusting content, process, and product according to actual student needs. In the context of game-based SPO media, this principle manifests as a motivational reinforcement system that is differentiated rather than uniform, offering feedback and challenge levels calibrated to each student's readiness rather than applying a single standard to all. This theoretical requirement directly informs the design specification for differentiated motivational reinforcement identified in Table 1 as absent from all prior media studies in this domain. Taken together, these five theoretical perspectives converge on a unified set of design imperatives that the present needs analysis seeks to operationalize into concrete media specifications grounded in field data from SDN 3 Sedayulawas Grade II.

International research further corroborates these findings. Alotaibi (2024) demonstrated through a systematic review and meta-analysis that game-based learning produces moderate to large positive effects on cognitive, social, emotional, motivation, and engagement outcomes in early childhood education, affirming its promise as a foundational pedagogical strategy for young learners. At the sentence-structure level specifically, Singgaravi and Ahmad (2022) investigated gamification as an intervention for Year 2 pupils in primary schools. They found that it significantly improved students' ability to write simple S-V-O sentences correctly while creating a fun and engaging learning environment that motivated low-proficiency learners. Beyond gamification, interactive game formats have also proven effective in broader language contexts: Moquerio et al. (2025) confirmed through a quasi-experimental study that interactive sentence-building games significantly enhanced sentence construction skills among Grade 7 learners compared to those receiving conventional grammar instruction. Regarding writing intervention design, Zeng et al. (2024) demonstrated that a comprehensive game-based intervention incorporating multisensory approaches, explicit instruction, and motivating activities at the sub-lexical, lexical, and sentence levels effectively improved writing skills among elementary-age children. With respect to the integration of concrete and manipulative media, Quane (2024) established that concrete materials providing tactile experiences enable students to model, explore, and reflect on abstract concepts, forging meaningful connections between physical experience and conceptual understanding — a finding particularly relevant for young learners who are still developing abstract reasoning capacity.

The gap between ideal conditions and field reality forms the primary background of this research. Indonesian language instruction in elementary schools is still frequently dominated by a teacher-centered approach that positions students as passive, uncritical, and unproductive knowledge receivers (Hutasoit, 2021), directly correlating with low student motivation and learning achievement. As shown in Table 1, previous media innovations have each contributed positively within their respective fields; however, each addresses only one dimension of the learning challenge. A systematic search of Scopus, Google Scholar, and ERIC databases (conducted in January 2026, limited to 2018–2025, yielding 47 results after title and abstract screening) using the terms “SPO sentence media,” “game-based language media elementary,” “rolling ball learning media,” and “differentiated manipulative media Indonesian” yielded no study that integrates kinetic game mechanics, concrete structural visualization, and differentiated motivational reinforcement within the specific context of SPO sentence learning for lower-grade elementary students — confirming the novelty of this integrated approach. To provide a clearer overview of the current state of research and justify

the need for this study, Table 1 summarizes relevant previous studies and identifies the research gap that this study seeks to address.

Table 1. Comparison of prior media studies and the research gap addressed by this study

Researcher	Media/Approach	Finding	Limitation Related to Research Gap
(Puspawati et al., 2022)	Analysis of SPO writing ability	Students frequently made errors in subject, predicate, and object components.	Identified SPO difficulties but did not provide instructional media, game mechanics, or motivational reinforcement
(Singgaravi & Ahmad, 2022)	Gamification for SVO sentence writing	Improved students' sentence construction ability through gamification	Included motivational game elements but lacked concrete SPO visualization and manipulative learning media
(Azami et al., 2021)	Rolling ball media	Increased student engagement and participation	Provided kinetic game mechanics but was not designed for SPO learning and did not include SPO visualization or reinforcement system
(Martiasari & Kelana, 2022)	Manipulative media	Improved conceptual understanding through hands-on activities	Provided concrete learning experiences but did not incorporate game mechanics or motivational reinforcement
(Sabikah et al., 2024)	Rolling ball game	Improved motivation and learning attention	Combined rolling ball and game elements but did not address SPO sentence structure or provide concrete SPO visualization
This Study	Integrated needs analysis	Identifies media requirements for SPO sentence learning	Findings are derived from a single classroom at one coastal school; transferability to other contextual settings requires further investigation

This gap underscores the need for a needs analysis study that systematically identifies the specific media requirements for SPO sentence learning at the lower-grade elementary level. Unlike previous studies that each addressed only a single dimension of the learning challenge, this study offers novelty in the form of an integrated needs analysis that simultaneously examines the requirements for kinetic game mechanics, concrete structural visualization of SPO patterns, and differentiated motivational reinforcement—three elements that a systematic review of the available literature confirms have not been integrated in any single prior study within the context of Indonesian language learning at the lower-grade elementary level. This study therefore aims to conduct an in-depth, field-data-based analysis of the media specifications genuinely needed by teachers and students at SDN 3 Sedayulawas Grade II, to ensure that the media developed will have a strong empirical basis and can serve as a real solution for improving SPO sentence composition ability in the Merdeka Curriculum era.

2. METHODS

This study uses quantitative methods. Quantitative methods are an approach based on empirical philosophy to examine populations or samples using research instruments and data analysis processes using statistical tests to examine predetermined hypotheses (Sugiyono 2024). A quantitative approach was chosen because the researcher aimed to test the effect of the independent variable, namely surah Al-Hujurat–based multicultural learning, on the dependent variable, students' attitudes toward tolerance, using data that are objectively measurable and amenable to statistical analysis.

This study employed a qualitative descriptive approach with a case study design. Khairiyah et al. (2026) affirm that a case study design within educational contexts enables researchers to explore a phenomenon in depth through multiple data sources, capturing the complexity of a specific and bounded situation in its natural setting — particularly appropriate when the aim is to understand how and why a phenomenon occurs rather than how often. This approach was selected because the study aims to describe in depth the objective conditions in the field, analyze the specific challenges encountered in Indonesian language learning on SPO material, and map the underlying factors driving the need for ROLL-PAJA media development, all within the bounded context of a single Grade II classroom at SDN 3 Sedayulawas.

The research subjects consisted of one Grade II classroom teacher and ten Grade II students of SDN 3 Sedayulawas, Brondong District, Lamongan Regency. The ten students represented the entire Grade II class enrollment at the school, and all were directly and actively involved in the Indonesian language learning process. Subject selection was carried out purposively because the characteristics of this class were considered the most contextually relevant and information-rich for exploring the specific media needs addressed in this study. Several interconnected reasons underlie this selection. First, SDN 3 Sedayulawas is located in a coastal area of Brondong District, Lamongan Regency, where the majority of students come from fishing families with limited access to educational resources and learning support at home — a socioeconomic context that directly shapes students' prior literacy exposure and makes the availability of concrete, engaging, and contextually meaningful learning media particularly critical. Second, Grade II at this school is at a pivotal stage of the Merdeka Curriculum implementation, in which teachers are expected to design student-centered and contextually relevant learning experiences; however, field observations indicate that instructional practices in Indonesian language learning remain largely teacher-centered and media-poor, creating a visible and urgent gap between curriculum expectations and classroom reality. Third, preliminary identification revealed that Grade II students at this school demonstrate specific and recurring difficulties in constructing sentences following the SPO pattern in their written outputs, making this class a particularly information-rich case for examining what kinds of media features are genuinely needed to address those difficulties. The convergence of these three factors — coastal socioeconomic context, Merdeka Curriculum implementation challenges, and documented SPO learning difficulties — makes Grade II at SDN 3 Sedayulawas a bounded and contextually representative case for this needs analysis study. This aligns with Dahal et al. (2024), who affirm that in qualitative case study research, participant selection should be driven by the contextual richness and relevance of the case to the research phenomenon, rather than by numerical representation. Accordingly, the relatively small number of participants in this study — one teacher and ten students — reflects a deliberate methodological decision consistent with the bounded case study design, rather than a practical or technical limitation: the unit of analysis is the case itself, and with a single classroom teacher and the full class enrollment of ten students serving as the only participants, all available informant perspectives within the site were captured. Cross-source triangulation across observation, interview, and documentation further confirmed that no new thematic categories emerged beyond those already identified, indicating that data saturation was achieved and that the data set was sufficient to address the study's research questions.

Data collection was conducted through three complementary methods. Chand (2025) explains that integrating observation, interview, and document analysis in qualitative case

study research enables researchers to construct a nuanced and multidimensional picture of the phenomenon by capturing behavioral data, individual perspectives, and contextual evidence simultaneously. First, structured observation was conducted across two learning sessions using a checklist instrument. Second, a semi-structured in-depth interview was conducted with the classroom teacher in one session lasting approximately 30–45 minutes, conducted face-to-face at the school with the teacher's full consent. Ruslin et al. (2022) affirm that the semi-structured interview allows researchers to follow a guided thematic structure while simultaneously probing deeper into responses, making it particularly effective for uncovering in-depth perspectives that structured instruments alone cannot capture. Third, documentation in the form of teacher daily lesson notes, student-written work samples, and other relevant supporting data was used to reinforce and validate field findings. The complete data collection instruments and their indicators are presented in Table 2.

Table 1. Data Collection Techniques, Instruments, and Indicators

Technique	Instrument	Indicators
Observation	Structured observation checklist (2 sessions)	(1) Learning methods used; (2) Presence and type of learning media; (3) SPO structure visualization during learning; (4) Student engagement and psychological responses; (5) Teacher–student interaction patterns.
Interview	Semi-structured interview guide (12 questions, 1 session, ±30–45 minutes)	(1) Teacher's difficulties in teaching SPO sentence structure; (2) Students' common errors in constructing SPO sentences; (3) Learning media currently used and their limitations; (4) Desired features and specifications of learning media; (5) Contextual and motivational factors affecting SPO learning.
Documentation	Document review sheet	(1) Teacher's lesson plans and daily teaching notes; (2) Samples of students' written work on SPO sentence construction; (3) Classroom learning documentation and activity records.

The collected data were analyzed using Miles and Huberman's interactive qualitative data analysis model, comprising three interdependent stages: data reduction, data display, and conclusion drawing. In the data reduction stage, the researcher performed open coding of raw field notes and interview transcripts, systematically identifying recurring patterns and labeling them into initial categories. These initial codes were subsequently grouped into thematic clusters through focused coding, resulting in a structured categorization of media needs across three dimensions: kinetic engagement needs, structural visualization needs, and motivational reinforcement needs. Hanisah et al. (2024), in a comparable needs analysis study for Indonesian language learning media at the elementary level, applied an identical analytical sequence and demonstrated that this three-stage coding process effectively maps media development requirements from qualitative field data systematically and transparently. In the data display stage, the categorized information was compiled in the form of descriptive narratives and analytical tables to facilitate conclusion drawing. In the conclusion drawing stage, inductive interpretation was applied to derive meaning from the categorized data in relation to the study's research questions.

To maintain data validity and credibility, the researcher applied two forms of triangulation. Source triangulation was conducted by cross-checking data obtained from the classroom teacher, ten students, and documentation sources, verifying the consistency of findings across multiple informants. Technique triangulation was conducted by comparing and corroborating data gathered through observation, interview, and documentation, ensuring that convergent findings across all three methods could be considered credible and transferable. Manouilidou et al. (2024), in a triangulation study conducted in elementary school settings, demonstrated that the concurrent application of source and technique triangulation substantially strengthens the trustworthiness of qualitative findings by reducing single-source bias and increasing interpretive depth — a principle directly applied in the present study to ensure that the media needs identified are empirically grounded and contextually valid.

To further strengthen credibility, the researcher's positionality is acknowledged here. The first author is a faculty member at PGRI Ronggolawe University of Tuban who has no formal institutional relationship with SDN 3 Sedayulawas, ensuring structural independence from the research site. To minimize observer bias, field notes were recorded using a standardized checklist instrument without interpretive annotation during observation sessions, and interview data were audio-recorded and transcribed verbatim prior to analysis. Member checking was not conducted in this study, which constitutes a limitation; this was primarily due to time constraints in the data collection phase and limited re-accessibility of the participant following the conclusion of formal fieldwork. However, the cross-source triangulation procedure described above partially mitigates this gap by verifying consistency across independently gathered data sources.

3. RESULTS AND DISCUSSION

3.1 Result

The results of this study are drawn from three complementary data sources collected at SDN 3 Sedayulawas Grade II during February 2026: direct classroom observation across two learning sessions, a semi-structured interview with the Grade II classroom teacher (Ms. Rohmatul Inayah, S.Pd.), and documentation of student written work samples. Each source is presented separately to preserve the integrity of the field data.

3.1.1 Analysis of Classroom Learning Problems

Classroom observation at SDN 3 Sedayulawas revealed a consistent and recurring pattern of difficulties in Indonesian language learning on Subject–Predicate–Object (SPO) material. The school is situated in a coastal area of Brondong District, Lamongan Regency, where students actively use vocabulary shaped by their fishing community environment in daily communication. Although the 10 students demonstrated adequate verbal communication skills in informal contexts, they experienced significant difficulties when required to transform their oral language competence into formal written sentence structures following the Subject–Predicate–Object (SPO) pattern. The detailed findings from both observation sessions, organized according to the five observation checklist indicators, are presented in Table 3.

Table 3. Classroom Observation Results

Indicator	Session 1 (5 February 2026)	Session 2 (12 February 2026)
(1) Learning methods used	Teacher delivered instruction exclusively through verbal explanation; students copied sentence examples from the	The same teacher-centered pattern was observed; instruction remained lecture-

	board; no student-centered or interactive activity was conducted.	based with no variation in delivery method.
(2) Presence and type of learning media	Only a textbook was present; no manipulative aids, word cards, visual boards, or any hands-on instructional materials were available in the classroom.	Identical condition confirmed; the classroom contained no learning media other than the textbook and board.
(3) SPO structure visualization during learning	No visual representation of SPO structure was provided; the teacher explained sentence patterns verbally without any structural diagram, color coding, or positional aid.	Same condition observed; students had no visual reference for SPO positioning during the writing task.
(4) Student engagement and psychological responses	A majority of students appeared disengaged — looking outside the classroom, losing concentration, and participating minimally during sentence-construction tasks	The same disengagement pattern persisted; students responded passively to teacher prompts and showed low motivation during written exercises
(5) Teacher-student interaction patterns	Interaction was one-directional; the teacher explained, and students copied; no dialogue, peer activity, or manipulative interaction was initiated.	The same unidirectional pattern was maintained; when students made errors, the teacher re-explained verbally without introducing any structural or visual corrective aid.

3.1.2 Identification of Strategic Needs According to the Teacher

The near-identical findings across both observation sessions, rather than being a limitation, serve an important methodological function: they confirm the stability and consistency of the observed instructional patterns across time. The replication of identical conditions across two independent sessions conducted one week apart (5 and 12 February 2026) substantially strengthens the claim that the patterns identified — teacher-centered instruction, absence of media, no SPO visualization, low student engagement, and unidirectional interaction — represent stable structural features of this classroom's learning environment rather than isolated or context-specific events.

A semi-structured in-depth interview was conducted with one participant (T1), Ms. Rohmatul Inayah, S.Pd., the Grade II classroom teacher at SDN 3 Sedayulawas, to validate and enrich the classroom observation findings. The interview explored the teacher's experiences in teaching Subject–Predicate–Object (SPO) sentence construction, the learning difficulties encountered by students, the limitations of the instructional media currently used, and the characteristics of learning media considered effective for supporting SPO instruction. In addition, the interview examined contextual and motivational factors influencing students' participation during learning activities. Analysis of the interview data resulted in four major themes: (1) students' structural difficulties in SPO sentence construction, (2) limitations of existing learning media, (3) desired characteristics of learning media, and (4) contextual and motivational factors affecting learning.

Students' Structural Difficulties in SPO Sentence Construction

The interview revealed that students' difficulties in constructing Subject–Predicate–Object (SPO) sentences were persistent throughout the learning process. Although most students possessed adequate vocabulary, they frequently experienced confusion when arranging

sentence elements into the correct grammatical order. According to the participant: *"Students often confuse the predicate with the object, and sometimes they even omit one of these sentence elements. They actually know the words, but they are unsure where each word should be placed within the sentence."* (T1, Grade II Classroom Teacher, Interview, February 2026; translated by the authors).

Limitations of Existing Learning Media

The interview further revealed that Indonesian language instruction relied primarily on textbooks as the main learning resource. The participant explained that textbook-based learning often failed to sustain students' attention because it provided limited opportunities for movement, hands-on interaction, and game-based activities. The participant stated: *"When learning relies only on textbooks, students quickly become bored. They enjoy activities that involve movement, games, and objects they can touch and manipulate."* (T1, Grade II Classroom Teacher, Interview, February 2026; translated by the authors).

Desired Characteristics of Learning Media

Regarding the characteristics of effective learning media, the participant emphasized that instructional media should accommodate differences in students' learning readiness by providing tasks with varying levels of difficulty. The participant also highlighted the importance of presenting a clear visual representation of the Subject–Predicate–Object (SPO) structure and incorporating concrete, hands-on learning experiences. The participant explained: *"I need learning media that can provide different levels of task difficulty because students in my classroom have different learning abilities. However, with the current textbooks, every student is expected to complete exactly the same exercises."* (T1, Grade II Classroom Teacher, Interview, February 2026; translated by the authors).

Contextual and Motivational Factors

The participant also explained that students were more motivated when learning activities reflected their daily experiences and were presented in the form of games rather than conventional written exercises. According to the participant, presenting learning tasks as playful activities encouraged students to participate more actively and confidently during lessons. The participant stated: *"When practice activities are presented as games, students do not feel as though they are being tested. They become more willing to participate, try solving the tasks, and are no longer afraid of making mistakes."*

3.1.3 Documentation Findings

Review of teacher lesson plans, daily teaching notes, and student written work samples provided independent corroboration of the patterns identified through observation and interview. The documentation findings, organized according to the three review sheet indicators, are presented in Table 4.

Table 4. Documentation Review Findings

Indicator	Documentation Findings
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(1) Teacher's lesson plans and daily teaching notes	Review of the teacher's daily teaching notes confirmed that Indonesian language lessons on SPO material were consistently planned using a lecture-and-copy format, with no manipulative activity, visual structural aid, or differentiated task provision recorded across the observed instructional period
(2) Samples of students' written work on SPO sentence construction	Analysis of student written work samples revealed four recurring error types across the majority of students: (a) positional transposition, in which predicate and object elements were placed in reversed order; (b) object omission, in which the sentence was terminated at the predicate without completing the SPO structure; (c) predicate omission, in which only the subject and object were written without a connecting predicate; and (d) single-word response, in which the student produced only one word without attempting sentence construction.
(3) Classroom learning documentation and activity records	Classroom activity records confirmed the complete absence of any manipulative media, game-based activity, or differentiated task delivery during the documented instructional period; all recorded activities consisted of uniform textbook exercises completed individually under teacher verbal direction

3.1.4 Synthesis of Identified Learning Needs and ROLL-PAJA Media Design

The triangulation of observational data, teacher interview findings, and student written work documentation reveals a consistent and multi-dimensional pattern of learning needs that together constitute the empirical basis for the design specifications of an instructional medium. Across all three data sources, five distinct but interrelated needs were confirmed: the need for concrete and physically manipulable learning media; the need for a structured visual scaffold for SPO positional logic; the need for kinesthetic and game-based engagement mechanisms; the need for contextually grounded learning materials relevant to students' coastal environment; and the need for a differentiated exercise system responsive to varying student readiness levels. The correspondence between documented learning problems, identified needs, and the media components required to address them is summarized in Table 5.

Table 5. Correspondence Between Learning Problems, Identified Needs, and Required Media Components

Aspect	Findings	Identified Needs	Media Component Needed
Learning Method	Teachers predominantly used lecture methods, and students only copied examples without physical activities.	Learning should shift from passive participation to active engagement.	[Rolling Ball] A kinetic, game-based mechanism for determining turns or learning challenges that encourages physical participation.
Sentence Structure Visualization	Students had difficulty distinguishing Subject, Predicate, and Object positions because explanations were delivered verbally.	A clear visual representation of sentence structure is required.	[SPO Board] A structured visual-spatial board with designated slots for arranging word cards according to the SPO pattern, including movable word cards for direct manipulation.
Learning Media Availability	Learning relied heavily on textbooks, and no manipulative teaching aids were available.	Students need concrete and hands-on learning media.	[SPO Board + Word Cards] A set of physically manipulable components, including movable word cards, that provide direct manipulation experiences integrated within the SPO Board.

Aspect	Findings	Identified Needs	Media Component Needed
Student Engagement	Students appeared bored, frequently looked outside the classroom, and lost concentration during sentence-construction activities.	Learning media should contain game-based elements to maintain attention and motivation.	[Rolling Ball] A game-based mechanism that creates a playful learning atmosphere and increases student participation through kinetic turn-taking.
Physical Interactivity	Students preferred activities involving movement and direct participation.	Media should involve kinesthetic learning experiences.	[Rolling Ball] A kinetic component that combines physical movement with learning activities through a rolling mechanism that physically determines each student's turn.
Contextual Learning	Learning resources were not closely connected to students' daily experiences in the coastal environment.	Learning media should use familiar elements from children's daily lives.	[Fictional Snacks] A contextually themed packaging element shaped as fictional coastal snack containers, drawn from students' daily environment, to make learning materials feel familiar and attractive.
Differentiated Learning	Students demonstrated different levels of cognitive readiness and learning speed.	Media should facilitate differentiated instruction.	[Color System + Fictional Snacks] A tiered exercise system that categorizes tasks into easy (Yellow), medium (Green), and difficult (Red) levels, delivered inside Fictional Snacks containers.
Psychological Comfort	Students often perceived exercises as formal academic tasks that reduced enthusiasm.	Learning activities should reduce anxiety and increase enjoyment.	[Fictional Snacks] A non-test-like task format that presents exercises inside fictional snack packaging in a playful rather than test-oriented manner, reducing academic anxiety.
Challenge Management	Teachers required an efficient way to organize different difficulty levels without labeling students.	A practical differentiation system is needed.	[Color System] A color-coded differentiation system (Yellow = easy, Green = medium, Red = difficult) that allows teachers to assign appropriate challenge levels without publicly labeling student ability.
Classroom Practicality	Teachers needed media that could be moved easily and used in various classroom situations.	Media should be portable, durable, and flexible.	[All Components] A lightweight, movable, and classroom-friendly integrated design suitable for individual and group activities.

Based on the triangulated findings presented in Table 3, the researcher designed the ROLL-PAJA learning media (Rolling Ball, SPO Board, and Fictional Snacks) as a manipulative instructional medium to address students' difficulties in constructing Subject–Predicate–Object (SPO) sentences. The term “Fictional Snacks” refers to fictional snack-shaped packaging containers — not actual food — used as a gamification element to hold tiered exercise cards in an engaging and playful format. The theoretical rationale for each design decision and the technical description of each component are presented in the Discussion section (3.2). The conceptual model connecting learning problems, identified needs, ROLL-

PAJA components, and expected outcomes is presented in Figure 1, while the physical design of the media is presented in Figure 2.

3.2 Discussion

The results of this needs analysis reveal five interconnected layers of problems that systematically explain the persistent SPO learning difficulties at SDN 3 Sedayulawas Grade II and that together define the design requirements for an effective instructional medium. Each layer follows a data-first interpretive structure: the specific empirical finding from the results section is stated first, followed by the theoretical framework that explains it, and concluded with the design implication for ROLL-PAJA. This sequencing ensures that theoretical claims are grounded in field evidence rather than applied deductively, and that the design specifications derived are traceable to concrete classroom observations and interview data.

The first layer of interpretation concerns the developmental mismatch between instructional modality and learner cognitive stage. The central field finding is that all ten students demonstrated adequate oral vocabulary yet consistently failed to organize those same words into correct written SPO sequences — confirmed across both observation sessions and student written work samples. This dissociation is directly interpretable through Piaget’s concrete operational framework: because Grade II students remain dependent on physical manipulation to construct logical understanding of abstract structures, verbal-only SPO instruction without any concrete mediating artifact is theoretically insufficient at this developmental stage. Hayat et al. (2024) affirm that children aged 7–11 are developmentally dependent on direct physical manipulation of objects to construct logical understanding of abstract structural concepts. Concrete and physically manipulable media for SPO learning are therefore expected to resolve this developmental mismatch by providing the enactive structural experience that symbolic instruction alone cannot offer.

The second layer concerns the scaffolding gap at the level of individual student performance. The observation finding that the teacher’s sole corrective strategy across both sessions was verbal re-explanation — which demonstrably failed to improve student outputs within the same session — points to a structural absence of mediating scaffolding artifacts. Applied through Vygotsky’s ZPD framework, this finding indicates that the gap between students’ independent performance and target SPO competency is currently being bridged only by verbal instruction, which observation data confirmed to be insufficient. Lei and Bakar (2025) affirm that meaningful learning requires a structured mediating artifact to bridge this gap. A physical mediating artifact with graduated structural cues for SPO arrangement is therefore expected to externalize the scaffolding function that verbal re-explanation alone has failed to provide in this classroom.

The third layer concerns the representational sequencing of SPO instruction. The documentation of student written work samples revealed four recurring error types — positional transposition, object omission, predicate omission, and single-word responses — all of which represent failures at the symbolic production stage. Critically, observation data confirmed that students were required to produce these symbolic written outputs without having first passed through any enactive or iconic learning stage: no physical manipulation of sentence elements occurred, and no visual representation of SPO structure was ever

displayed. Arsyad et al. (2024) prescribe, based on Bruner's enactive-iconic-symbolic framework, that this sequence — from physical action through visual representation to abstract symbol — is the required order for durable conceptual understanding. The observation finding that students were required to produce symbolic written SPO outputs without first passing through enactive or iconic stages represents a direct inversion of this sequence, and directly explains the error patterns documented in student written work. A medium that restores this enactive-to-symbolic progression is expected to produce more durable structural understanding than the current approach.

The fourth layer concerns the cognitive architecture of current SPO instruction. Both observation sessions confirmed that the teacher's delivery relied exclusively on the verbal channel: oral explanation of sentence patterns supplemented only by writing sentence examples on the board, which students then copied. The visual-spatial channel — through which positional, color-coded, or structural cues would be processed — was entirely unengaged throughout both sessions. This single-channel instructional architecture directly predicts the pattern of positional errors documented in student written work. Mayer (2024) demonstrates that single-channel instruction systematically increases extraneous cognitive load and fails to achieve the dual-channel integration necessary for meaningful structural learning. The verbal-only instruction documented in both observation sessions of this study is therefore a direct structural explanation for the positional transposition and omission errors found in student written work. A medium that activates the visual-spatial channel concurrently — through color-coded SPO slots and movable word cards — addresses precisely this cognitive gap.

The fifth layer concerns the absence of differentiated instructional support. The teacher interview finding constitutes the primary empirical basis for this layer: the participant explicitly identified that students in her classroom demonstrate meaningfully different levels of cognitive readiness for SPO construction, yet the documentation review confirmed that all recorded instructional activities consisted of uniform textbook exercises completed individually under the same conditions, with no differentiation in task complexity, format, or support. This direct mismatch between observed learner variability and uniform instructional provision is interpretable through Tomlinson's Differentiated Instruction framework. Gibbs (2025), extending Tomlinson's framework, confirms that uniform instruction systematically fails students across the readiness spectrum. The teacher interview finding in this study — that students demonstrate meaningfully different cognitive readiness levels yet receive identical textbook exercises — is a direct field confirmation of this gap. A tiered, color-coded exercise system delivered within ROLL-PAJA is designed to resolve this mismatch by enabling differentiated task assignment without publicly labeling student ability.

Finally, the gamification dimension of ROLL-PAJA is further supported by Barz et al. (2024), whose meta-analysis of digital game-based learning interventions in school contexts demonstrated that DGBL consistently produces significant positive effects on affective-motivational outcomes — including intrinsic motivation, engagement, and enjoyment — particularly when game mechanics are coherently integrated with instructional objectives. This theoretical support aligns with the field finding that students' engagement levels are substantially higher during learning activities involving physical movement and game

elements compared to textbook-based instruction, as consistently reported by the teacher and corroborated through behavioral observation.

Taken together, the five theoretical layers converge on a unified design rationale: an effective instructional medium for SPO learning at the lower-grade elementary level must simultaneously provide concrete physical manipulation, visual-spatial structural scaffolding, an enactive-to-symbolic representational sequence, dual-channel cognitive engagement, and a tiered differentiation system. These five requirements, derived empirically from field data and grounded theoretically in the frameworks established in the introduction, constitute the design specifications that the ROLL-PAJA media is intended to operationalize. It must be emphasized that the present study is a needs analysis and not an effectiveness trial. All claims presented in this discussion are framed as theoretically grounded design rationales and expected potential outcomes pending empirical verification through subsequent development, expert validation, and experimental research phases. The operationalization of these five design specifications into the ROLL-PAJA media components is presented below.

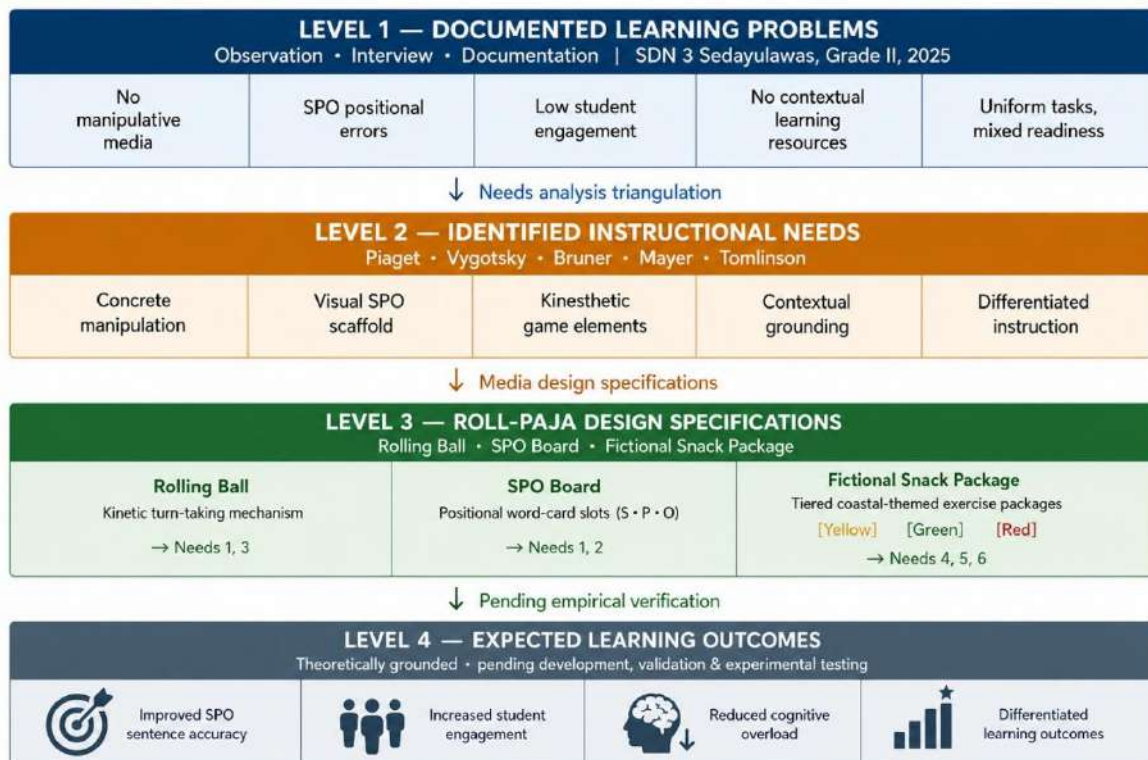


Figure 1. Conceptual Model of ROLL-PAJA Media: From Learning Problems to Expected Outcomes

The physical design of the ROLL-PAJA media is presented in Figure 2. The front view illustrates the arrangement of the Rolling Ball pathway, SPO Board, and fictional snack compartments. In contrast, the rear view presents the supporting structure and storage arrangement that facilitate portability and classroom implementation. The Rolling Ball component functions as a kinetic learning element that encourages students' active participation through game-based activities. The SPO Board serves as a structural-visual aid that helps students organize words into appropriate Subject, Predicate, and Object positions through clearly defined slots. Fictional snacks function as a contextual and motivational

component in which tiered exercise cards (yellow for easy, green for medium, red for difficult) are packaged in fictional snack containers, enabling differentiated learning within a psychologically safe and playful format. The operational procedure of ROLL-PAJA is designed to be straightforward and executable within a standard learning session of approximately 35–40 minutes with a full class of up to 30 students. In the preparation phase (5 minutes), the teacher places the SPO Board on a flat surface, positions the Rolling Ball track alongside it, and distributes the Fictional Snacks containers to designated table groups, each pre-filled with color-coded exercise cards matched to the readiness level of the students at that group. In the main activity phase (25–30 minutes), students take turns rolling the ball; the student whose position the ball reaches selects a word card from the SPO Board and places it in the correct Subject, Predicate, or Object slot, guided by the color-coded labels. After each placement, the group discusses whether the sentence element is correctly positioned before the next student takes a turn. When a complete SPO sentence is formed on the board, all students in the group copy the sentence onto their individual worksheets and retrieve one exercise card from their Fictional Snacks container to independently complete a differentiated written task. In the closing phase (5 minutes), the teacher facilitates a brief whole-class review of selected sentences from the board, inviting students to identify any positional errors and reconstruct the correct SPO sequence collaboratively.



Figure 2. Design and Components of ROLL-PAJA Learning Media

Taken together, the conceptual model and physical design presented in Figure 2 illustrate how the design rationale developed in this study is operationalized into a concrete instructional medium. It is important to reiterate that this study was conducted as a needs analysis aimed at identifying and theoretically grounding the design requirements for SPO learning media at SDN 3 Sedayulawas Grade II, and not as a trial of the medium's instructional effectiveness. The resulting ROLL-PAJA design therefore represents a theoretically and empirically informed design proposal whose actual impact on student learning outcomes remains to be established through subsequent expert validation and experimental research.

4. CONCLUSION

This study identified the specific media needs for developing ROLL-PAJA to support SPO sentence writing in Grade II at SDN 3 Sedayulawas. Triangulated findings from observation, interview, and documentation consistently revealed a gap between students' adequate oral vocabulary and their inability to produce correct written SPO structures — a gap compounded by teacher-centered instruction, exclusive reliance on textbooks, and the absence of any concrete or visual learning aid. The school's coastal socioeconomic context further underscored the need for contextually grounded media that bridges students' everyday language experience with formal written sentence construction. The identified strategic needs encompass three interrelated dimensions: (1) kinetic interactivity so that students are physically engaged in learning and not merely passive observers; (2) contextual elements familiar to children's world to enhance motivation and reduce learning anxiety; and (3) a system supporting differentiated learning to accommodate differences in students' cognitive speed without creating ability stigma.

The resulting ROLL-PAJA design integrates four functionally interrelated components: Rolling Ball as a kinetic turn-taking mechanism; the SPO Board as a visual-spatial structural scaffold; Fictional Snacks as a playful, non-test-like exercise format; and a Color System (Yellow, Green, Red) enabling differentiated task assignment without ability stigma. Together, these components operationalize the Merdeka Curriculum's vision of active, enjoyable, and student-centered learning. As noted in the Methods section, the scope of this study was bounded by design to a single Grade II classroom at one coastal elementary school; the findings therefore reflect the specific contextual conditions of SDN 3 Sedayulawas and may not be directly generalizable to other educational settings. Further research in the form of ROLL-PAJA media testing and effectiveness evaluation on students' learning processes and outcomes is strongly recommended as the next stage of this development.

5. AUTHORS' NOTE

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6. REFERENCES

- Ahmad, F., & Mustika, D. (2021). Problematika guru dalam menerapkan media pada pembelajaran kelas rendah di sekolah dasar. *Jurnal Basicedu*, 5(4), 2008–2014. <https://doi.org/10.31004/basicedu.v5i4.1056>
- Alotaibi, M. S. (2024). Game-based learning in early childhood education: A systematic review and meta-analysis. *Frontiers in Psychology*, 15, Article 1307881. <https://doi.org/10.3389/fpsyg.2024.1307881>
- Angga, Hernawan, A. H., & Mulyati, T. (2023). Implementasi Kurikulum Merdeka (IKM) di sekolah dasar dalam mengembangkan profil pelajar Pancasila. *Jurnal Elementaria Edukasia*, 6(3), 1290–1299. <https://doi.org/10.31949/jee.v6i3.6107>
- Arsyad, S. N., Tangkin, W. P., Sumartono, & Astuti, B. (2024). Implications of Bruner's cognitive theory on elementary school education in the 21st century. *Klasikal: Journal of Education, Language Teaching and Science*, 6(3), 697–710. <https://doi.org/10.56326/klskl.v6i3.1225>

- Azami, B., Dessolina, D., Kristina, E., Pratiwi, M., Handayani, N., Freticilia, S. G., & Leonard, L. (2021). *Pengembangan media pembelajaran rolling ball untuk materi fungsi dan invers. Journal of Instructional Development Research*, 2(2), 69–80. <https://doi.org/10.61193/jidr.v2i2.15>
- Barz, N., Benick, M., Dörrenbächer-Ulrich, L., & Perels, F. (2024). The effect of digital game-based learning interventions on cognitive, metacognitive, and affective-motivational learning outcomes in school: A meta-analysis. *Review of Educational Research*, 94(2), 193–227. <https://doi.org/10.3102/00346543231167795>
- Chand, S. P. (2025). Methods of data collection in qualitative research: Interviews, focus groups, observations, and document analysis. *Advances in Educational Research and Evaluation*, 6(1), 303–317. <https://doi.org/10.25082/aere.2025.01.001>
- Dahal, N., Neupane, B. P., Pant, B. P., Dhakal, R. K., Giri, D. R., Ghimire, P. R., & Bhandari, L. P. (2024). Participant selection procedures in qualitative research: Experiences and some points for consideration. *Frontiers in Research Metrics and Analytics*, 9, Article 1512747. <https://doi.org/10.3389/frma.2024.1512747>
- Gibbs, K. (2025). School leaders' approaches to supporting differentiated instruction. *Educational Research*, 67(3), 367–384. <https://doi.org/10.1080/00131881.2025.2530613>
- Hafizha, N., & Rakhmania, R. (2024). Dampak program penguatan literasi pada hasil asesmen kompetensi minimum di sekolah dasar. *Jurnal Basicedu*, 8(1), 171–179. <https://doi.org/10.31004/basicedu.v8i1.6907>
- Hanisah, Sutomo, M., & Saihan. (2024). Needs analysis in developing digital flashcards for Indonesian language learning in elementary school. *Jurnal Ilmiah Pendidikan Guru Madrasah Ibtidaiyah*, 14(1), 31–42. <https://doi.org/10.18952/aladzkapgmi.v14i1.12924>
- Hayat, F., Khan, M., Ahmad, S., Kamran, M., & Maleeha. (2024). Exploring the characteristics of concrete operational stage among primary school students. *Qlantic Journal of Social Sciences and Humanities*, 5(1), 124–132. <https://doi.org/10.55737/qjssh.786349315>
- Hutasoit, S. A. (2021). Pembelajaran Teacher Centered Learning (TCL) dan Project Based Learning (PBL) dalam pengembangan kinerja ilmiah dan peninjauan karakter siswa. *Jurnal Pendidikan Indonesia (Japendi)*, 2(10). <https://doi.org/10.59141/japendi.v2i10.294>
- Khairiyah, U., Mariati, P., Faizah, S. N., Silvia, K. C., & Sasmita, F. E. (2026). Qualitative case study research in education: A systematic review of methodological approaches and analytical practices. *ELSE (Elementary School Education Journal)*, 10(1). <https://doi.org/10.30651/else.v10i1.24168>
- Lei, W., & Bakar, K. A. (2025). Language scaffolding strategies based on Vygotsky's Zone of Proximal Development in early reading education: A cross-cultural comparison. *Forum for Linguistic Studies*, 7(6), 967–984. <https://doi.org/10.30564/fls.v7i6.9624>
- Maharani, B., & Wahidin, W. (2022). Analisis kemampuan literasi peserta didik sekolah dasar dalam menyelesaikan soal asesmen kompetensi minimum. *Jurnal Basicedu*, 6(4), 5656–5663. <https://doi.org/10.31004/basicedu.v6i4.3097>

- Manouilidou, E., Papadopoulou, E. A., & Chatzikiriakou, I. (2024). Teacher evaluation: A triangulation study of data sources. *European Journal of Contemporary Education and E-Learning*, 2(3), 54–73. [https://doi.org/10.59324/ejceel.2024.2\(3\).06](https://doi.org/10.59324/ejceel.2024.2(3).06)
- Marinda, L. (2020). Teori perkembangan kognitif Jean Piaget dan problematikanya pada anak usia sekolah dasar. *An-Nisa': Jurnal Kajian Perempuan dan Keislaman*, 13(1), 116–152.
- Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review*, 36, Article 8. <https://doi.org/10.1007/s10648-023-09842-1>
- Moquerio, W. R., Agravante, Z. R., Victor, H. A., & Fernandez, E. J. (2025). Interactive sentence-building games as an effective tool for enhancing sentence construction skills among Grade 7 learners. *European Journal of Literature, Language and Linguistics Studies*, 9(1). <https://doi.org/10.46827/ejll.v9i1.602>
- Nurmalasari, W. (2023). Problematika dan strategi pembelajaran bahasa Indonesia di sekolah dasar. *Jurnal Basicedu*, 7(5), 2912–2919. <https://doi.org/10.31004/basicedu.v7i5.6101>
- Puspawati, Y. D., Slamet, S. Y., & Surya, A. (2022). Analisis kesalahan struktur kalimat dasar pada keterampilan menulis teks wawancara peserta didik kelas IV sekolah dasar. *Jurnal Penelitian Ilmu Pendidikan Universitas Negeri Surabaya*, 8(4). <https://doi.org/10.20961/jpiuns.v8i4.76671>
- Quane, K. (2024). The confluence of attitudes towards mathematics and pedagogical practice: Evaluating the use of mathematical manipulatives. *Mathematics Education Research Journal*, 37(2), 369–398. <https://doi.org/10.1007/s13394-024-00494-0>
- Ruslin, Mashuri, S., Rasak, M. S. A., Alhabsyi, F., & Syam, H. (2022). Semi-structured interview: A methodological reflection on the development of a qualitative research instrument in educational studies. *IOSR Journal of Research & Method in Education*, 12(1), 22–29. <https://doi.org/10.9790/7388-1201052229>
- Samiha, Y. T., Zakiyah, A. N., Anisah, N., Riyani, R., Putri, S. P., & Siti, A. J. (2023). Penerapan konsep dasar bahasa Indonesia di sekolah dasar dalam Kurikulum Merdeka. *JIMR: Journal of International Multidisciplinary Research*, 2(1). <https://doi.org/10.62668/jimr.v2i01.634>
- Sari, D. P., Karma, N., & Tahir, M. (2021). Pengaruh penggunaan media pembelajaran manipulatif terhadap motivasi belajar siswa kelas 5 SDN 3 Gunungsari tahun pelajaran. *Jurnal Literasi dan Pembelajaran Indonesia*, 1(1), 19–24.
- Singgaravi, P., & Ahmad, H. Y. (2022). The effectiveness of gamification to improve writing simple S-V-O sentence among Year 2 pupils. *International Journal of Academic Research in Business and Social Sciences*, 12(2). <https://doi.org/10.6007/ijarbss/v12-i2/12069>



Research Trends in Elementary School Digital Literacy: A Bibliometric Analysis

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ABSTRACT

Digital literacy has become an essential competency for primary school teachers in responding to the rapid digital transformation of education. However, studies that comprehensively map the development of research on primary school teachers' digital literacy remain limited. This study aims to analyze the growth of publications, scientific influence, collaboration patterns, and thematic developments in this field. Using a quantitative bibliometric approach, 313 publications indexed in the Scopus database between 2005 and 2025 were analyzed and visualized using VOSviewer and Biblioshiny. The findings indicate that research on primary school teachers' digital literacy has grown significantly and has followed three developmental phases: embryonic, growth, and acceleration, reaching its highest productivity in 2025, with 53 publications. The United States dominated scientific production and citation impact, accounting for 200 publications and 1,140 citations, highlighting the concentration of scientific influence within developed countries. Keyword co-occurrence analysis identified digital literacy as the central theme linked to teacher education, pedagogical competence, digital technologies, and professional development. Furthermore, emerging topics such as artificial intelligence and critical literacy indicate an ongoing shift from technology-oriented research toward broader pedagogical and professional concerns. These findings demonstrate that research on primary school teachers' digital literacy has evolved into a more interdisciplinary field, yet disparities in global scientific influence persist.

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1. INTRODUCTION

The rapid development of information and communication technology has brought significant changes to education, including at the primary school level. Teachers no longer merely act as conveyors of information but also as learning facilitators capable of utilising technology effectively. In this context, digital literacy has become a vital competence for primary school teachers, enabling them to select, use, and evaluate digital learning resources critically, creatively, and responsibly. Digital literacy is not only about the technical skills of using digital devices but also encompasses critical thinking, media ethics, and an understanding of the social impact of technology on the learning process. This is in line with the findings of Tinmaz et al. (2022), who state that digital literacy is a multidimensional concept encompassing technological, cognitive, and social skills for the effective and responsible use of digital media.

In practice, the digital literacy skills of primary school teachers in the field still vary considerably. Some teachers have been able to utilise digital technology to design interactive lessons, access online learning resources, and use digital media creatively. However, a significant number of teachers still face challenges in integrating technology into their teaching. This may be due to limited digital skills, inadequate facilities, or a lack of ongoing training support. This situation has prompted increased attention from researchers towards the issue of primary school teachers' digital literacy. This is reflected in the growing number of scientific publications in recent years. To better understand the development of this research, a bibliometric analysis is required. It can help map publication patterns, research topic trends, author collaboration networks, and the evolving focus of research. Through this approach, the research can provide a comprehensive overview of the dynamics and trends in research on primary school teachers' digital literacy in the digital age. Using bibliometric analysis, the contents of reference lists and articles published in scientific journals and other journals can be examined.

Research on publications using bibliometric analysis has been widely conducted across various fields of science, including bibliometrics in medicine (Kokol P. et al., 2021), bibliometrics in higher education (López-Chila, R. et al., 2023), bibliometrics in tourism and hospitality (Ulker et al., 2023), bibliometrics in green hydrogen (Raman, R. et al., 2022), bibliometrics in nanomaterials for the remediation of environmental pollutants (Asghar, N. et al., 2024), bibliometrics in social sciences (Prieto-Gutierrez, J. J. et al., 2023), bibliometrics in global science and national comparisons (Marginson, S., 2022), bibliometrics in climate change and sustainable development (Baidya & Saha, 2024), bibliometrics on artificial intelligence and multimodal data fusion for smart healthcare (Chen, X. et al., 2024), bibliometrics of Artificial Intelligence Marketing (AIM) (Anayat, S. et al., 2024).

Although research on digital literacy continues to advance and has been widely studied across various educational contexts, most studies still focus on students, higher education, or digital competencies in general. On the other hand, elementary school teachers have distinct characteristics, pedagogical needs, and technology implementation challenges compared with teachers at other levels of education. Therefore, a comprehensive mapping of research on elementary school teachers' digital literacy is crucial for understanding publication trends, intellectual structures, collaboration patterns, and the direction of research in this field. Understanding the intellectual structure and thematic evolution of this field is important for identifying research gaps, guiding future investigations, and supporting evidence-based policies to strengthen teachers' digital competencies in primary education.

However, no research has yet been conducted on the analysis of publications regarding primary school teachers' digital literacy using bibliometric computation, particularly regarding publications on primary school teachers' digital literacy over the last 20 years, namely between 2005 and 2025. This study contributes by comprehensively mapping the development of digital literacy research on elementary school teachers during 2005–2025, based on Scopus data. The analysis not only examines publication trends but also includes source productivity, countries, collaboration networks, intellectual structures, and the development of research themes using Biblioshiny and VOSviewer. Therefore, this study was conducted to analyse Scopus-indexed articles using bibliometric computation with the assistance of the VOSviewer and Biblioshiny software. This study was conducted in the hope that it may serve as a reference for other researchers to identify research themes, particularly those related to digital literacy.

2. METHODS

This study uses a quantitative bibliometric approach to analyze research on elementary school teachers' digital literacy published in Scopus. The data set includes 313 digital literacy articles from Scopus. Scopus was chosen for its wide range of reputable, peer-reviewed scientific articles, ensuring quality and relevance to digital literacy research. Selecting the data source was crucial to ensure the quality and accuracy of the analysis. Sweileh (2018) and Yas et al. (2020) note that Scopus, developed by Elsevier since 2004, contains over 77.8 million documents dating from 1969. It covers thousands of peer-reviewed journals, trade publications, book series, and global scientific activities. This broad scope allows Scopus to represent global research trends. Scopus also features bibliometric tools, such as multi-criteria filters, allowing users to filter data by journal, document type, year, author, affiliation, and citation count.

The research was conducted in several stages, namely:

1. Codification of research data using articles from the Scopus database;
2. Data processing using Microsoft Excel;
3. Computational mapping analysis of bibliometric publication data using the VOSviewer and RStudio Biblioshiny applications (Aria & Cuccurullo, 2017, Aria & Cuccurullo, 2026);
4. Analysis of the results of the computational mapping analysis (al Husaeni & Nandiyanto, 2022).

A search of the Scopus database was conducted to filter publications using the search string TITLE-ABS-KEY ("digital literacy" AND ("elementary teacher" OR "primary teacher")). The articles used were published between 2005 and 2025. Data obtained from the Scopus database were exported as CSV and analyzed using Biblioshiny and VOSviewer. The analysis was conducted to identify publication trends, source productivity, country productivity, network collaboration, keyword co-occurrence, and the intellectual structure of research on elementary school teachers' digital literacy. All data were retrieved in February 2026. The articles collected that met the criteria for this research analysis were then exported into three file types: Research Information System (.ris), Comma Separated Values (*.csv), and Bibliography and TeX (.bib). In addition, VOSviewer was used to visualise and analyse the data with bibliometric maps, producing three types of publication mapping: network visualisation, density visualisation, and overlay visualisation based on co-citation networks among existing items.

3. RESULTS AND DISCUSSION

This section presents the detailed results of the bibliometric analysis. The presentation begins by describing the state of digital literacy among elementary school teachers, followed by a keyword analysis to identify the primary research focus related to elementary school teachers' digital literacy.

Table 3. Type of retrieved documents

Type of document	Frequency	Propotision(%)
Conference paper	53	17
Article	209	66.7
Review	6	2
Book Chapter	45	14.3
Total	313	100.0

Based on the data collection and processing results, the types of documents obtained in this study fall into several categories. Articles were the most dominant document type, comprising 209 publications. This was followed by conference papers (53), book chapters (45), and reviews (6). Overall, the total number of documents analyzed in this study was 313 publications.

Bibliometric analysis in this study was used as a quantitative approach to examine a large volume of scientific data in the form of research publications. This method aims to provide an overview of the main areas of research and to assist in predicting the future direction of a topic's development (Zupic, I., & Čater, T., 2015). Nevertheless, the value of bibliometric analysis lies not only in the results of data analysis but also in its visualisation capabilities, which facilitate the understanding of patterns and relationships between the generated data (Van Eck, N. J., & Waltman, L., 2010).

In this study, the VOSviewer software was used as an analytical tool. VOSviewer is software developed to map and visualise scientific data networks, such as relationships between authors, keywords, and publications (Meng, L., Liu, Y., & Zhou, X., 2019). Through this tool, researchers can identify connections between research elements, such as co-authorship, co-occurrence, citations, and co-citation.

Another advantage of VOSviewer is its ability to process data from various scientific databases, such as Scopus and Web of Science, as well as reference management files such as RIS and EndNote (Van Eck, N. J., & Waltman, L., 2010). This enables analysis to be conducted more comprehensively and accurately.

1.1 Current Status of Digital Literacy Among Primary School Teachers

1.1.1 Annual Publication Trends

An analysis of annual publication trends was conducted to identify changes in the number of publications related to elementary school teachers' digital literacy each year. The results of this analysis show the growth and development of research in this field over time. The annual publication trends are shown in Figure 1 below.

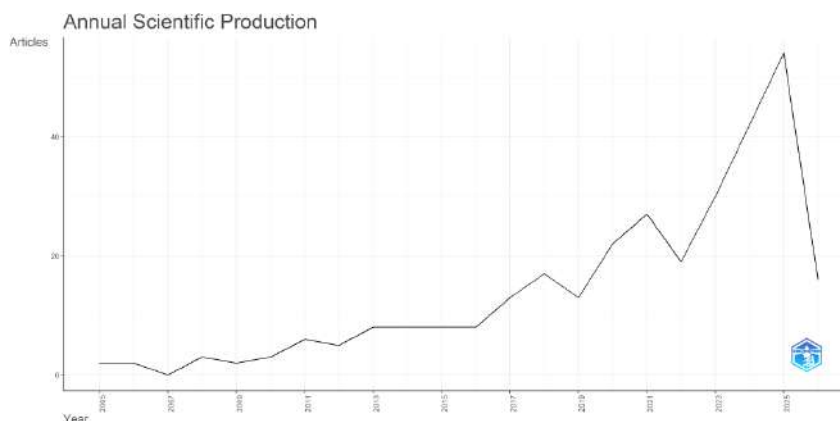


Figure 1. Annual Scientific Production Chart

Based on Fig 1, the Annual Scientific Production graph shows that research on primary school teachers' digital literacy in the digital age has increased year on year. In the early period, from around 2005 to 2010, the number of publications remained relatively low and fluctuated. From 2011 to 2016, the number of studies began to increase more steadily, though not yet significantly.

Since 2017, there has been a fairly sharp increase in the number of publications. This indicates growing attention among researchers to the importance of digital literacy for primary school teachers, in line with the rapid development of information and communication technology in education (Ng, 2012). Furthermore, teachers are required not only to possess technical skills but also pedagogical competence and critical thinking skills to utilise digital technology effectively in teaching (Falloon, 2020).

The peak in publications was observed around 2025, reflecting the high level of interest and urgency of research on this topic in the current digital era. This trend aligns with the growing need for educators to adapt to digital transformation and integrate technology into the learning process (Falloon, 2020). However, in the most recent year, a decline in the number of publications is observed, which is likely due to data limitations or an incomplete publication process for that year.

Table 2. Annual Scientific Production

Year	Articles
2005	2
2006	2
2007	0
2008	3
2009	2
2010	3
2011	6
2012	5
2013	8
2014	8
2015	8
2016	8
2017	13
2018	18
2019	13

Year	Articles
2020	22
2021	27
2022	20
2023	30
2024	43
2025	53
2026	19
Total	313
Average	14,09

The data in Table 2 present the detailed annual number of publications in numerical form, providing a clearer picture of the dynamics of publication development over time. Based on this data, it is clear that the number of publications fluctuated in the initial period, then increased consistently in subsequent years, although there were still some declines in certain periods. If classified, this development trend can be divided into three phases. First, the embryonic phase (2005–2012) was characterized by a relatively low and unstable number of publications, with figures ranging from 0 to 6 articles per year. Second, the growth phase (2013–2017) showed a more consistent increase, although still at a moderate level, with the number of publications ranging from 8 to 13 articles. Third, the acceleration phase (2018–2025) was characterized by a significant, more rapid increase, as evidenced by a surge in publications, peaking in 2025 at 53 articles. However, in 2026, there was a fairly sharp decline, which could be influenced by data limitations or the publication process not being fully completed in that year.

3.1.2 Distribution of Organizations

The distribution of organizations analysis aims to identify the most productive organizations in producing publications related to elementary school teacher digital literacy. This analysis provides an overview of the distribution of organizational productivity based on the number of publications produced, allowing for the identification of institutions that play a significant role in developing research in this field. The results of the distribution of organizations analysis are presented in Figure 2. and Table 3. below.

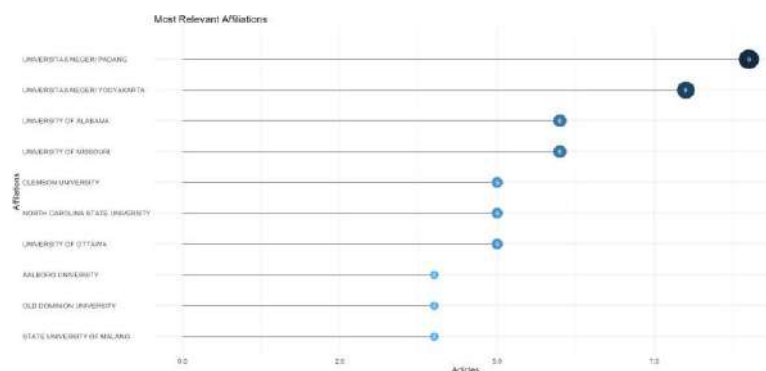


Figure 2. 10 institutions by number of publications.

Table 3. 10 institutions by number of publications.

Affiliation	Articles
Universitas Negeri Padang	9
Universitas Negeri Yogyakarta	8
University of Alabama	6
Clemson University	5
North Carolina State University	5
University of Ottawa	5
Aalborg University	4
Old Dominion University	4
State University of Malang	4
Total	56
Average	5,6

Based on the analysis of author affiliations, it was found that several institutions made the most significant contributions to the publications in this study. The data in Figure 2 and Table 3 show that 10 institutions have the highest number of publications. Padang State University ranks first as the institution with the highest number of publications, namely 9 articles, followed by Yogyakarta State University with 8 articles. This indicates that these two institutions play a dominant role in producing research in this field, particularly at the national level. Furthermore, the contribution from international institutions is also quite significant. The University of Alabama and the University of Missouri each produced 6 articles. Furthermore, Clemson University, North Carolina State University, and the University of Ottawa each contributed 5 articles. Meanwhile, Aalborg University and Old Dominion University each contributed 4 articles.

Overall, this distribution indicates that research on the topic under study is not dominated solely by domestic institutions but also includes contributions from various international institutions. This dominance is influenced by growing attention to strengthening elementary school teachers' digital literacy as a necessary competency to meet technological developments and the demands of 21st-century learning. Teacher digital literacy is a crucial factor in supporting the effectiveness of technology-based learning, thus encouraging more institutions to conduct research in this area (Teane, 2024). Furthermore, the acceleration of digital transformation in the education sector has increased the need to develop teachers' digital competencies, which in turn has led to higher publication productivity and greater research collaboration between institutions. With a total of 56 publications and an average of 5.6 articles per affiliation, this distribution reflects that the development of digital learning studies is proceeding fairly evenly, with contributions coming from various national and international institutions.

3.1.3 Distribution of Published Journals and Conference Papers

The analysis of the distribution of published journals and conference papers aims to identify the distribution of research publications on elementary school teachers' digital literacy by publication type. The results of this analysis show the proportion of articles published in journals and conference proceedings, thereby providing an overview of the

characteristics of publications in this field. The results of the analysis are shown in Figure 3 below.

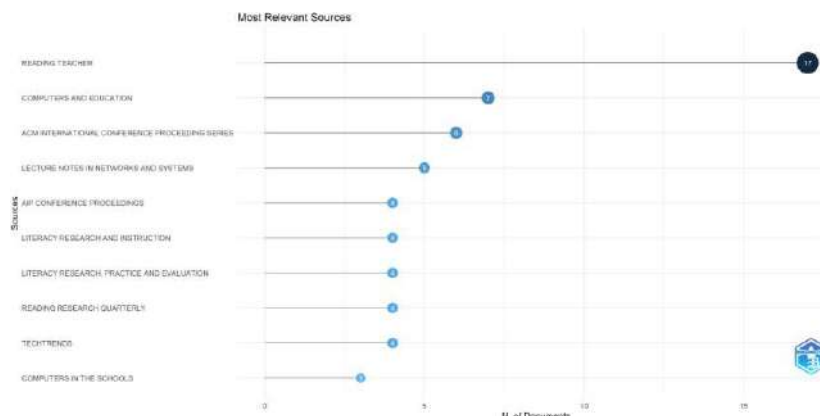


Figure 3. 10 journals by number of publications

Based on the results of the Most Relevant Sources analysis (Figure 3), it is known that publications that discuss research topics are spread across various scientific journals and conference proceedings that focus on the fields of literacy, education, educational technology, and digital learning. Analysis of publication sources is one of the important indicators in bibliometric studies because it can show the most active and influential scientific media in disseminating the development of a research field (Zupic & Čater, 2015). By identifying the dominant source of publication, researchers can understand the direction of scientific development, the academic community involved, and the tendency of research focus to develop within a study theme (Donthu et al., 2021).

The results of the analysis show that Reading Teacher is the most productive source of publications with a total of 17 articles. This number far exceeds other sources, thus showing the central position of the journal in the development of research related to the topic studied. As a journal that focuses on reading literacy and language learning practices, the dominance of Reading Teacher indicates that research in this field is mostly directed at developing students' literacy skills, reading learning strategies, and pedagogical innovations that support the improvement of literacy competence. These findings are in line with the view that literacy is the main foundation in the learning process and is an important focus in various contemporary educational research.

Furthermore, the ACM International Conference Proceeding Series (6 articles) and Lecture Notes in Networks and Systems (5 articles) occupy the next position. The presence of these two sources shows that research is not only developing in the realm of education, but also involves computer science disciplines, information systems, and digital technology. This condition reflects the multidisciplinary character of research that connects pedagogical aspects with technological innovation, as stated by Aria and Cuccurullo (2017).

Other publication sources, such as AIP Conference Proceedings, Literacy Research and Instruction, Literacy Research, Practice and Evaluation, Reading Research Quarterly, and TechTrends each contributed 4 articles, while Computers in the Schools had 3 articles. Overall, the distribution of publication sources shows that primary school teachers' digital literacy research develops through a combination of literacy, education, and technology perspectives. These findings confirm that the development of teachers' digital competencies is increasingly an important focus in supporting effective learning in the digital era.

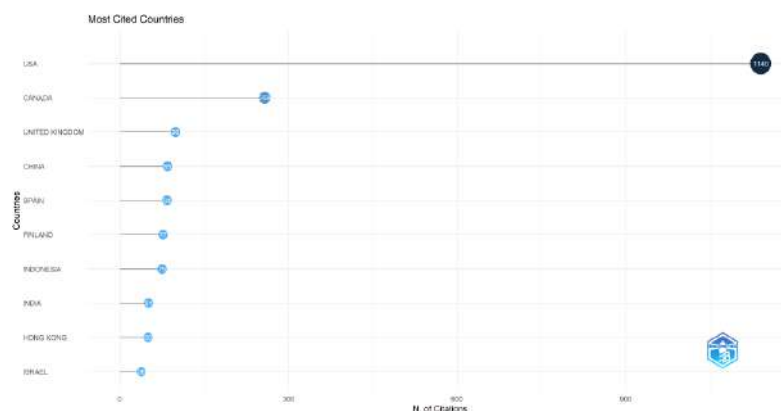
Table 4. Top 10 journals by number of publications

Sources	Articles
Reading Teacher	17
Computers And Education	7
ACM International Conference Proceeding Series	6
Lecture Notes in Networks and Systems	5
AIP Conference Proceedings	4
Literacy Research and Instruction	4
Literacy Research, Practice And Evaluation	4
Reading Research Quarterly	4
Techtrends	4
Computers in The Schools	3
Total	58

Table 4 on publication sources shows that the distribution of articles on digital learning is concentrated in several major journals and conference proceedings, with varying contributions. The Reading Teacher ranks highest with 17 articles, indicating that issues of digital learning are frequently examined within the context of literacy and primary education. The next position is held by Computers and Education with 7 articles, indicating the important role of educational technology-based journals in developing this field of study. Other sources, such as the ACM International Conference Proceedings Series (6 articles) and Lecture Notes in Networks and Systems (5 articles), show that contributions also come from conference-based scientific forums focusing on technological and systems aspects.

In addition, several journals such as AIP Conference Proceedings, Literacy Research and Instruction, Literacy Research, Practice and Evaluation, Reading Research Quarterly, and TechTrends each contributed four articles, whilst Computers in the Schools produced three articles. This pattern indicates that publication contributions do not originate from a single type of source but are distributed across scientific journals and conference proceedings with diverse focuses, ranging from literacy to educational technology. With a total of 58 publications and an average of 5.8 articles per source, this distribution reflects that digital learning is an interdisciplinary topic that is published through various academic channels. This cross-disciplinary distribution, spanning the boundaries of technology and pedagogy, confirms that digital learning studies are interdisciplinary in nature, where the evolution of knowledge is no longer confined to a single pure discipline (Bond et al., 2020).

3.1.4 Distribution of Documents and Citations by Country

**Figure 4.** Countries by number of publications

Based on the 'Most Cited Countries' chart, the distribution of research citations shows an uneven pattern and tends to be concentrated in certain countries. This disparity indicates differences in research capacity, scientific productivity, and the visibility of publications between countries within the topics under study. Consequently, the number of citations may reflect a country's level of influence on the development of scientific literature in that field.

The United States ranks first with the highest number of citations, namely 1,140 citations. According to this study, the United States leads in both the number of publications (1,547 articles) and citation impact (5,422 citations) within the topic of digital media literacy, followed by Spain, Indonesia, and Australia (Sakinah, R. A. N., et al., 2024). This dominance indicates that the publications produced have a high level of relevance and connection to other research and are therefore frequently cited in various studies. The high citation figures also reflect the strength of the research ecosystem, international collaboration, and access to reputable journals within that country.

In second place, Canada received 258 citations. Although this figure remains well below that of the United States, this achievement nonetheless demonstrates a significant contribution to the advancement of knowledge in the field under study. This suggests that publications from Canada are of a sufficiently high standard and are capable of attracting the attention of the global academic community.

Next, the United Kingdom ranked third with 99 citations, followed by China (85 citations) and Spain (84 citations). These three countries show relatively similar citation counts, suggesting they make a balanced contribution. This situation reflects a more even distribution of scientific influence among the middle-ranking countries on the list.

In the next group, Finland (77 citations) and Indonesia (75 citations) show fairly competitive contributions. The presence of these two countries in the top ten indicates that the publications they produce are beginning to gain recognition internationally, although their influence remains below that of countries with higher citation counts.

Meanwhile, India (51 citations), Hong Kong (50 citations), and Israel (38 citations) have relatively low citation counts. This suggests that the scientific contributions from these countries remain limited within the context of the research topics analysed. Nevertheless, their participation still reflects engagement within the global research network.

Overall, these findings confirm that the distribution of research citations is uneven and dominated by certain countries, particularly the United States. Nevertheless, the involvement of various countries in the list demonstrates that this study has an international scope. According to this study, developed countries such as the United States and Germany dominate scientific influence in research on the digital transformation of education, although researchers from developing countries such as Indonesia and Thailand are among the most productive in publishing (Nguyen et al., 2024). Therefore, improving the quality of publications, strengthening research collaboration, and expanding access to reputable journals are key factors in enhancing a country's visibility and scientific impact.

Table 5. The 10 Countries with the Most Publication

TC	Country	Average Article Citations
1140	USA	16,10
258	Canada	21,50
99	United Kingdom	19,80
85	China	10,60

TC	Country	Average Article Citations
84	Spain	16,80
77	Finland	77,00
75	Indonesia	2,90
51	India	12,80
50	Hong Kong	25,00
38	Israel	12,70

Table 5 shows the distribution of the citation impact of digital learning publications by country, measured by total citations (TC) and average citations per article. The United States ranks first, with a very high total of citations (1,140) and an average of 16.10 citations per article, indicating dominance in both productivity and academic influence. Nevertheless, several other countries exhibit higher average citations, such as Finland with an average of 77.00 and Hong Kong with 25.00, indicating that publications from these countries have a strong impact despite their total citation counts not being as high as those of the United States. Research (Wen, X., & Li, Y., 2024) analysed 479 articles from the Scopus database (2020–2023) and examined citation distribution patterns, the most productive institutions, and the characteristics of journals and countries contributing to digital literacy research, including differences in total citation counts and average impact per article across countries.

Countries such as Canada (21.50), the United Kingdom (19.80) and Spain (16.80) demonstrate a balance between the number of citations and the quality of the publications' impact. Meanwhile, China (10.60), India (12.80), and Israel (12.70) are at an intermediate level in average citations. Indonesia has a total of 75 citations with an average of 2.90, indicating that the contribution of its publications is evident, yet their impact remains relatively lower compared to other countries. Overall, this data reveals variations between the number of citations and the average citation count, reflecting differences in the influence and visibility of publications across countries in the field of digital learning.

3.1.5 Distribution of Countries

One indicator for assessing the development of a research field is the distribution of publications by country. Therefore, a Country Scientific Production analysis was conducted to identify the countries contributing to research in digital learning. The results of the publication distribution visualisation are shown in Fig 5, whilst the ten countries with the highest number of publications are presented in Table 6.



Figure 5. Country Scientific production

Table 6. Top 10 Countries by Scientific Production

Country	Freq
USA	200
Indonesia	102
Canada	31
Brazil	28
Spain	21
China	18
South Korea	15
UK	13
Portugal	11
Chile	10
Total	449
Average	44,9

Based on the results of Biblioshiny's analysis presented in Fig 5 and Table 6, it is clear that scientific production on digital learning has grown globally and involves contributions from various countries. However, the distribution of these publications still shows a fairly high concentration in certain countries. The United States ranks first with 200 publications, followed by Indonesia with 102 publications. Furthermore, Canada (31 publications), Brazil (28 publications), Spain (21 publications), China (18 publications), South Korea (15 publications), the United Kingdom (13 publications), Portugal (11 publications), and Chile (10 publications) also contribute to the development of digital learning research. The distribution of publications on the map indicates that the study of digital learning has attracted researchers' attention across the world. This finding is supported by Vičić Krabonja et al. (2024), who stated that digital transformation in education encourages the formation of increasingly broad and collaborative research networks between countries.

The high number of publications produced by the United States underscores the country's position as a leading hub for digital learning research. This dominance can be attributed to strong research capacity, funding support, and high levels of technology adoption in education. This finding aligns with Wang et al. (2024), who revealed that developed countries tend to be the primary drivers of educational technology research due to their mature research ecosystems and high levels of technology adoption. Additionally, Maral (2024) emphasizes that a country's scientific publication productivity is significantly influenced by the strength of its higher education institutions, research funding support, and a sustainable academic culture. These results also align with Ozyurt and Ayaz (2022), who demonstrated that advancements in educational technology research tend to be concentrated in countries with robust research infrastructure. On the other hand, Indonesia ranks second with a notably high number of publications compared to other nations, indicating that research on digital learning is also actively developing in developing countries and gaining increasing attention within the academic community. The high number of publications produced by the United States demonstrates its position as a hub for digital learning research and development.

This dominance can be attributed to its strong research capacity, funding support, and high level of technology utilization in education. This finding aligns with Wang et al. (2024), who stated that developed countries tend to be the primary drivers of educational technology

keyword is also closely linked to several other themes, including "students," "teaching," "teacher education," "elementary education," and "education." This relationship indicates that research on digital literacy is largely linked to the learning process, teacher competency, and educational development in elementary schools. This finding aligns with research by Ng et al. (2024), which asserts that digital literacy has become an essential competency for teachers in designing, implementing, and evaluating learning in an increasingly digitalized educational environment.

Furthermore, the network visualization demonstrates the interrelationships among digital literacy and other themes, including artificial intelligence, digital technologies, critical literacy, instructional strategies, professional development, and writing. The emergence of these keywords indicates that research in this field is not solely focused on the utilization of digital technology but is also beginning to shift toward developing innovative learning strategies, enhancing teachers' professional competence, and strengthening students' literacy skills to face the challenges of 21st-century learning. This finding aligns with research by Holmes et al. (2022), which states that the development of artificial intelligence in education is driving the emergence of new learning approaches that require continuous improvement in the digital competence of teachers and students. The emergence of keywords such as artificial intelligence, professional development, and digital technology indicates a trend toward more complex research issues. These findings suggest that research on elementary school teachers' digital literacy is no longer solely focused on basic technological mastery but is also beginning to address teacher preparedness for new technological developments and the transformation of digital education. The emergence of artificial intelligence and critical literacy also reflects growing concerns about the ethical use of technology, the evaluation of information, and teachers' readiness to integrate emerging digital tools into classroom practice. These themes are likely to become important research directions in the coming years.

The diversity of clusters seen in the visualization also indicates that research on elementary school teachers' digital literacy is developing in various interrelated areas. This indicates that digital literacy has become a crucial element in educational transformation in the digital era, particularly in supporting learning innovation, utilizing educational technology, and improving the quality of elementary school teachers' competencies. These findings are supported by Falloon (2022), who emphasized that digital literacy is no longer viewed solely as a technical skill but as a multidimensional competency that plays a crucial role in supporting effective learning practices relevant to the needs of the 21st century.

3.3 Co-authorship Analysis on AR and VR Research

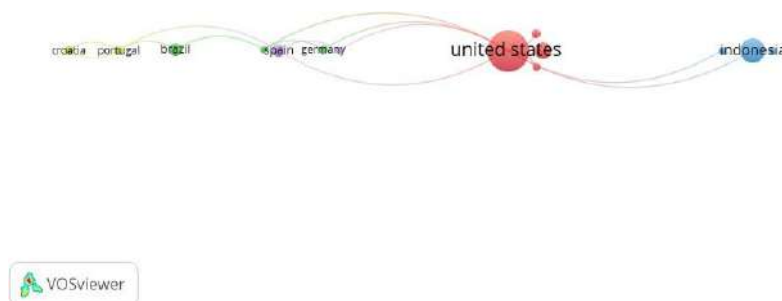


Figure 7. Co-authorship network between countries in publications related to primary school teachers' digital literacy.

Figure 7. shows the inter-country co-authorship network for publications on primary school teachers' digital literacy. This visualization, generated using VOSviewer, demonstrates

patterns of international collaboration, the level of country contribution, and the intensity of research relationships among countries involved in the study of primary school teachers' digital literacy. In the map, node sizes represent a country's contribution level based on the number of publications, while connecting lines indicate collaborative relationships between countries. The larger the node size and the stronger the interconnectedness among countries, the greater the role of that country in the development of research on primary school teachers' digital literacy. According to van Eck and Waltman (2020), network visualization in VOSviewer enables clearer identification of collaborative relationships and the structure of interrelationships among research actors.

Based on this visualization, the United States appears to be the most dominant country in the collaborative network. This is evident from its larger node size compared to other countries, indicating a high contribution to publications and its role as a research network hub. Its position in the network indicates its role as a hub connecting several countries, including Indonesia, Germany, and Spain. According to Tomczyk (2024), teachers' digital competence has become a global issue, prompting the involvement of many countries in the development of technology-based education. Thus, the United States' dominance in this network demonstrates its strategic role in guiding international research on teacher digital literacy.

Indonesia has emerged as one of the countries with direct collaborative relationships with the United States. Although Indonesia's node size is relatively small, its presence in the network indicates that research on elementary school teachers' digital literacy in Indonesia is beginning to be integrated into global academic discourse. This relationship is reflected in co-authored publications, demonstrating the involvement of Indonesian researchers in international research networks. This finding aligns with research by Khoerunnisa and Fathurochman (2025), which shows that research on teachers' digital skills continues to advance through cross-national collaboration. Therefore, Indonesia's position in this network indicates an increasing contribution and visibility of national research on teachers' digital literacy at the global level.

Furthermore, European countries such as Spain, Germany, Portugal, and Croatia have formed interconnected collaborative networks. Spain and Germany appear to occupy relatively strategic positions, serving as links between other European countries and the United States. On the other hand, Brazil maintains collaborative relationships with Portugal and Spain, reflecting a pattern of regional cooperation in research on teachers' digital literacy. According to Kiryakova and Kozhuharova (2024), the growing attention to teachers' digital competence across countries underscores the importance of developing educators' digital capabilities to meet the demands of 21st-century learning. These findings suggest that research on teacher digital literacy is driven not only by dominant countries but also by increasingly active regional collaborative networks.

Overall, this co-authorship map shows that research on elementary school teachers' digital literacy is still dominated by countries with strong research capacity and academic networks. The United States serves as a major hub for global collaboration, while Indonesia, Spain, Germany, Portugal, and Brazil help expand research networks through various forms of academic collaboration. This dominance may be attributed to stronger research funding systems, advanced digital infrastructure, and long-term investment in educational technology research. As a result, developed countries continue to play a central role in shaping global research agendas related to teachers' digital literacy. These results also demonstrate that cross-border collaboration is a crucial factor in accelerating knowledge exchange and the development of digital education innovations. Consistent with the findings of Gökdaş et al.

(2024), the development of research on teachers' digital competencies is increasingly supported by the growth of international collaborative networks post-pandemic. Therefore, cross-border collaboration is crucial to strengthening the quality and sustainability of research on elementary school teachers' digital literacy in the future.

3.4 Co Citation Analysis

A co-citation analysis was conducted to identify articles with high scientific impact in the field of study. A high number of citations indicates that these articles are frequently cited by other researchers and contribute to the development of theoretical foundations and the direction of research. The five articles with the highest number of citations are listed in Table 7.

Table 7. Top 5 papers citations

Title	Journal	Authors	Years	Citation
Effects of text messaging using digital Pinyin input on literacy skills of elementary school Chinese immersion learners	Language Teaching Research	Harvey R.E.; Brooks P.J.	2025	173
Using a multicomponent multimedia shared story intervention with an iPad to teach content picture vocabulary to students with developmental disabilities	Education and Treatment of Children	Rivera C.J.; Hudson M.E.; Weiss S.L.; Zambone A.	2017	142
The digital economy: A case study of designing for classrooms	ACM International Conference Proceeding Series	Cramer M.; Hayes G.R.	2013	89
Preinanku: A Virtual Reality Game as an Innovative Media for Javanese Language Learning	Proceedings of ICITDA 2025 - 10th International Conference on Information Technology and Digital Application	Cahya J.A.; Hartono S.	2025	82
Digital storytelling in teacher professional development	Proceedings of the European Conference on e-Learning, ECEL	Henningsen B.; Orngreen R.	2018	81

Based on Table 7, the article "Effects of Text Messaging Using Digital Pinyin Input on Literacy Skills of Elementary School Chinese Immersion Learners" by Harvey and Brooks (2025) has the highest number of citations, with 173. This high number of citations indicates that the study has made a significant contribution to explaining the relationship between digital technology use and the development of elementary school students' literacy skills. This

study is an important reference because it discusses how digital media can be used to improve literacy skills in the context of language learning.

The second publication with a high number of citations is an article entitled "Using a multicomponent multimedia shared story intervention with an iPad to teach content picture vocabulary to students with developmental disabilities" by Rivera et al. (2017), which discusses the use of iPad-based multimedia to help students with developmental disabilities learn visual vocabulary. This article received 142 citations, indicating that interactive multimedia technology is an important focus in the development of inclusive digital learning. The high number of citations in this study also shows that the use of digital devices not only supports general learning but also has great potential in special education.

Furthermore, the article titled "The digital economy: A case study of designing for classrooms" by Cramer and Hayes (2013) received 89 citations. This study highlights the importance of technology design in the classroom environment. The presence of this article in the list of most cited publications shows that technology integration in learning requires design planning that suits the needs of teachers and students. Furthermore, the article titled "The digital economy: A case study of designing for classrooms" by Cramer and Hayes (2013) received 89 citations. This study highlights the importance of technology design in the classroom environment. The presence of this article in the list of the most-cited publications shows that technology integration in learning requires design planning that meets the needs of teachers and students.

Next up is a study on virtual reality in Javanese language learning, titled "Preinanku: A Virtual Reality Game as an Innovative Media for Javanese Language Learning" by Cahya and Hartono (2025), with 82 citations. These findings indicate that recent research is beginning to shift toward the use of immersive technologies, such as virtual reality, as innovative learning media. This indicates a shift in research trends from simply using basic digital media to more interactive and contextual learning technologies.

Meanwhile, Henningsen and Orngreen's (2018) article, "Digital Storytelling in Teacher Professional Development," received 81 citations. This study confirms that teacher professional development through a digital storytelling approach is a crucial strategy for improving educators' digital competence. The presence of this research in the co-citation network demonstrates that teachers' digital literacy is not only related to technical skills but also to pedagogical skills and creativity in delivering learning.

Overall, the co-citation analysis table shows that research on elementary school teachers' digital literacy is advancing in various directions, ranging from developing students' literacy skills, using interactive multimedia, and digital learning design to utilizing virtual reality and teacher professional development. The high number of citations in these publications indicates that these works have a significant influence and serve as a primary foundation for the development of digital literacy research in elementary education.

3.4.1 Reference Co Citation Analysis

Reference co-citation analysis was used to map the intellectual relationships among references that form the basis for research on digital literacy among elementary school teachers. The resulting co-citation network provides an overview of groups of thematically related references that are frequently cited together by researchers. The results of the reference co-citation analysis are shown in Figure 8.

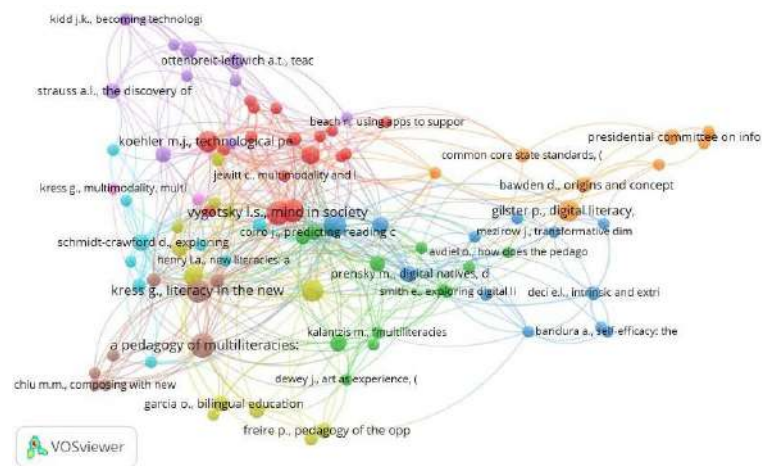


Figure 8. Co-citation network of references to publications related to digital literacy of elementary school teachers

Figure 8. is a Reference Co-citation Network Map generated with VOSviewer to visualize the relationships among frequently cited references in digital learning research. The node size indicates the strength of a reference's co-citation, while the connecting lines (edges) indicate the intensity of the relationships between references. Based on this visualization, Vygotsky's work *Mind in Society* appears to be the most dominant node, indicating that sociocultural constructivism is one of the main theoretical foundations in digital learning research. In addition, works such as Koehler (TPACK), Kress (*Literacy in the New Media Age*), Prensky (*Digital Natives*), and *A Pedagogy of Multiliteracies* also have relatively large node sizes. These findings indicate that digital learning studies evolve through the integration of multiple perspectives, including educational technology, digital literacy, multimodality, and pedagogy, as explained by Makda (2025), who notes that digital education research is multidisciplinary and encompasses interrelated conceptual approaches. Thus, the references that occupy central positions in the co-citation network can be considered the intellectual foundation that shapes the direction of development in digital learning research.

Structurally, the co-citation network is divided into several clusters representing specific groups of thought. The red cluster focuses on the integration of technology and pedagogy; the yellow-orange cluster relates to digital literacy; the green cluster addresses digital natives and new literacies; the blue cluster highlights the psychological aspects of learning; and the purple and dark brown-green clusters relate to sociocultural theory and critical pedagogy. These groupings demonstrate the complex and interconnected intellectual structure of digital learning research. According to Santoveña-Casal and López (2024), cluster patterns in co-citation analysis reflect the body of knowledge that underpins the development of a research field. Thus, this visualization demonstrates that digital learning is evolving as a field of study supported by diverse, complementary theories and approaches.

Analytically, the presence of Freire and Dewey in this network is quite significant because it shows that the discourse of digital learning is not merely technical-instrumentalist but also rooted in emancipatory traditions and experiences as a knowledge base. Furthermore, several nodes function as bridges between clusters, such as Kress, who connects multimodality with new literacies, and Koehler, who bridges the TPACK framework with pedagogical practices. The existence of these connecting nodes confirms a dynamic intellectual structure in which scientific thinking develops through cross-disciplinary integration rather than being isolated within rigid theoretical boundaries (Van Eck &

Waltman, 2014). This phenomenon indicates a strong interdisciplinarity in the field of digital learning.

Critically, it is worth noting that this network is dominated by Western and Anglo-Saxon literature. The lack of references from the Global South, including Southeast Asia, indicates a geographic bias in the analyzed corpus. This aligns with global criticism that digital learning discourse is often trapped in "Western epistemological hegemony," which tends to ignore the realities of infrastructure, local culture, and digital inequality faced by developing countries (Czerniewicz et al., 2020). This represents a relevant research gap to be addressed in a bibliometric paper, given that the context of digital learning implementation is heavily influenced by cultural factors, local policies, and unequal access to technology, which vary across regions. Thus, this visualization not only maps the intellectual structure of the digital learning field but also implicitly reveals the epistemological boundaries of the corpus of literature that has dominated global discourse.

3.4.2 Journal co citation analysis

Journal co-citation analysis is essential for understanding the general overview of research on elementary school teachers' digital literacy. This analysis can identify the most influential journals, the intellectual relationships between publications, and the development of the research themes that are the focus of the study. The analysis also helps map the theoretical foundation and direction of research development, providing a more comprehensive picture of the trends and dynamics of elementary school teachers' digital literacy studies. The results of the journal co-citation analysis are presented in the following figures and tables.

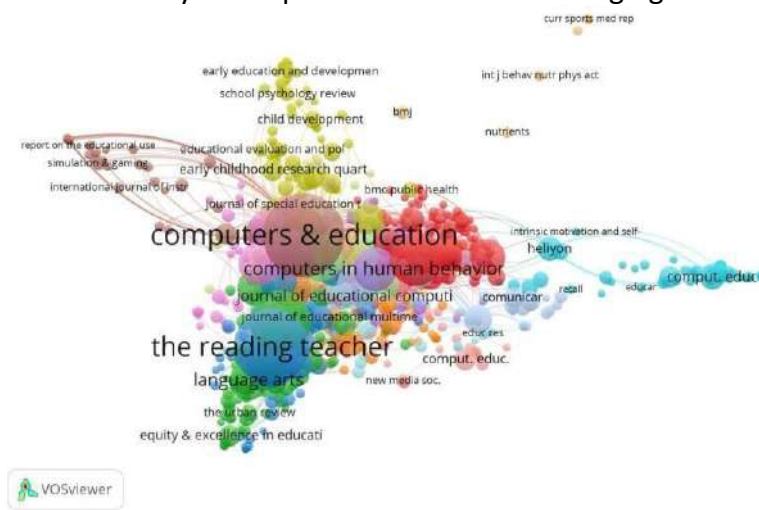


Figure 9. Journal citation network of elementary school teachers' digital literacy

Figure 9 shows that the Computers & Education journal has the largest node size and is centrally positioned in the co-citation network. This indicates that the journal is a primary reference for research on elementary school teachers' digital literacy. Furthermore, The Reading Teacher, Computers in Human Behavior, Journal of Educational Computing Research, and Education and Information Technologies also appear to have strong connections with other journals. The presence of several clusters with different colors indicates the grouping of interrelated research themes, such as educational technology, reading literacy, technology use behavior, and digital learning. The following table lists the five most cited journals.

Table 8. Top 5 Journal citation network of elementary school teachers' digital literacy

Journal	Subject	Citation
Computers and Education	Social Sciences: Education; Computer Science: General Computer Science	212
Reading Teacher	Arts and Humanities: Language and Linguistics Social Sciences: Linguistics and Language Medicine: Pharmacology (medical) Pharmacology, Toxicology and Pharmaceutics: Pharmacology	176
Reading Research Quarterly	Social Sciences: Education Psychology: Developmental and Educational Psychology	116
Education and Information Technology	Social Sciences: Education Computer Science: Computer Science Applications	88
Computers in human behavior (Computers in Human Behavior Reports)	Neuroscience: Neuroscience (miscellaneous) Neuroscience: Cognitive Neuroscience Psychology: Applied Psychology Computer Science: Computer Science Applications Computer Science: Artificial Intelligence Computer Science: Human-Computer Interaction	59

Table 8. lists the five journals with the highest co-citation scores. Computers and Education ranked first with 212 citations. This high number of citations indicates that research on elementary school teachers' digital literacy is closely related to the integration of computer technology in education. The Reading Teacher, with 176 citations, follows, indicating that digital literacy issues are inseparable from elementary school students' reading, language, and basic literacy development. This confirms that digital technology is used not only as a learning tool but also to strengthen teachers' literacy skills (Fallon, 2020). Next, Reading Research Quarterly, with 116 citations, focuses on education and developmental and educational psychology. The existence of this journal indicates that digital literacy research is also closely related to aspects of students' cognitive and psychological development. Then there is Education and Information Technology with 88 citations, which focuses on education and computer science applications. As well as Computers in Human Behavior, with 59 citations, and a multidisciplinary scope spanning applied psychology, human-computer interaction, artificial intelligence, and cognitive neuroscience.

These findings indicate that research on elementary school teachers' digital literacy largely focuses on studies on educational technology, reading literacy, and the use of technology in the learning process. This aligns with Reyna et al.'s (2018) findings, which suggest that digital literacy is not solely related to mastery of information and communication technology, but also to the ability to think, communicate, and collaborate. This means that research on elementary school teachers' digital literacy focuses not only on how to use digital devices but also on how teachers and students interact with technology in the learning environment to create a comfortable learning space. Therefore, these journals can be considered primary sources of reference that shape the development of research in this field.

Discussion of the Result

The purpose of this study is to conduct a bibliometric analysis of publications related to the digital literacy of elementary school teachers in the digital era. Although publications on the topic of "digital literacy" in the context of elementary school educators have begun to appear since 2005, it is clear that until 2012 (the embryonic phase), the growth in the number of papers published on this new competency approach based on digital technology was not significant, with the number ranging from 0 to 6 articles per year. From 2013 to 2017 (the growth phase), there was a more consistent increase in the number of publications at a moderate level; however, it was not until 2018 (the acceleration phase) that the topic of "digital literacy of elementary school teachers" began to gain significant attention in the scientific community worldwide, which then triggered exponential growth until it peaked in 2025 with a total of 53 articles published in a year.

The United States, Indonesia, and Canada are the top three countries with the most papers published on elementary school teachers' digital literacy. "Reading Teacher" and "Computers and Education" are the top two journals with the most papers published globally. As for papers published in conference proceedings, the most important proceedings on this topic (based on the number of papers published) are "ACM International Conference Proceedings Series," "Lecture Notes in Networks and Systems," and "AIP Conference Proceedings." At the national institutional level, Padang State University and Yogyakarta State University lead in active research publication contributions.

An analysis of the number of citations (citations) shows an unequal distribution of scientific influence, with the United States, Canada, and the United Kingdom among the top three most cited countries worldwide. However, an analysis of impact using average citations reveals an interesting phenomenon: Finland and Hong Kong have the highest average citation impact per article. Meanwhile, Indonesia's position demonstrates a substantial contribution to scientific output (ranked second globally with 102 publications), although its accumulated citation impact remains relatively low, averaging 2.90 citations per article.

One of the most relevant components of a research paper is the set of keywords that classify it. Therefore, by analyzing the collection of papers sampled in this study, it is known that "digital literacy" is the main hub in the research network with the most dominant node size, followed by other important keywords such as "students", "teaching", "teacher education", and "elementary education".

Given that articles tend to have many keywords, analyzing the strength of the relationships among them is relevant. The results revealed that the strongest keyword relationships were between "digital literacy" and "students," "digital literacy" and "teaching," and "digital literacy" and "teacher education." Furthermore, the network analysis captured a recent trend of renewed research focus, as evidenced by the close association between digital literacy and cutting-edge themes such as "artificial intelligence," "digital technologies," and "critical literacy" in supporting 21st-century learning innovations.

Regarding citation impact and international collaboration networks, the United States has solidified its role as a major global hub, directly connected to other productive countries, including Indonesia, Germany, and Spain. Although the number of publications from developing countries like Indonesia has increased sharply in recent years—primarily driven by the need for post-pandemic learning transformation—the distribution of high citation impact has historically remained firmly anchored by global collaboration networks led by the United States and several Western European countries.

Based on further analysis of the study sample, journals and primary publication sources that publish papers related to elementary school teachers' digital literacy can be classified

into three main groups or clusters. The first cluster focuses on Literacy and Basic Education and is dominated by journals such as *Reading Teacher*, *Literacy Research and Instruction*, and *Reading Research Quarterly*. The second cluster focuses more on publications from the fields of Educational Technology and Computer Science, such as *Computers & Education*, *ACM scientific proceedings*, and *Lecture Notes*. Meanwhile, the third cluster consists of journals on teacher professional development and instructional strategies for elementary schools, including *TechTrends* and *Computers in the Schools*.

The findings of this study highlight the importance of designing digital competency development strategies for policymakers, educational institutions, and teacher training program providers that better align with the needs of 21st-century education. Furthermore, the mapping results can serve as a reference for researchers in identifying research topics with potential for further development.

4. CONCLUSIONS

This study provides a comprehensive overview of the development of digital literacy research on elementary school teachers during 2005–2025, using a bibliometric approach. By describing publications, citations, collaborative networks, and the resulting intellectual structures, this study not only illustrates the growth of literature in this field but also reveals the dynamics of knowledge development that shape the direction of digital literacy research on elementary school teachers in the context of digital education. The research findings indicate that the period 2005–2025 represents a phase of learning for elementary school teachers' digital literacy, characterized by increased publication productivity, broader international scientific collaborations, and the development of increasingly diverse and complex research themes.

The results indicate that elementary school teachers' digital literacy has evolved from studies focused on technology use skills to a more multidimensional field of research. This evolution highlights the growing importance of integrating technological, pedagogical, and professional dimensions to understand and develop teachers' digital literacy in the digital era. This development is reflected in the increasingly strong links among digital literacy, pedagogical aspects, teacher professional development, critical literacy, and the use of digital technology to support the learning process. This shift in research focus demonstrates that digital literacy is no longer understood solely as a technical skill but as a competency that plays a crucial role in helping teachers design, manage, and develop learning relevant to the needs of 21st-century education. The emergence of themes such as artificial intelligence, critical literacy, and professional development further emphasizes that research developments align with evolving educational needs and ongoing technological transformations.

From an intellectual structure perspective, this study demonstrates that the study of elementary school teachers' digital literacy is grounded in integrating multiple scientific perspectives, particularly educational technology, pedagogy, literacy, and educational psychology. The strong connections among the main concepts, the theories underlying the research, and the dominant reference sources indicate that this field of study has a growing theoretical foundation. This situation indicates that the development of teachers' digital literacy cannot be understood solely through a technological approach but must be viewed as the result of interactions among pedagogical competence, the learning context, student development, and changes in an increasingly digitalized educational environment.

Furthermore, the research findings demonstrate that research on the development of elementary school teachers' digital literacy is supported by an expanding international collaborative network. The United States remains the primary center of global scientific production and influence, both in terms of publications, citations, and research collaborations. However, Indonesia has emerged as a significant contributor to publication productivity, indicating growing attention to developing teachers' digital competence in elementary education. Although the contribution of developing countries continues to increase, the resulting publication and citation structures still demonstrate inequities in the distribution of scientific influence. This condition indicates that the construction of knowledge on the digital literacy of elementary school teachers is still heavily influenced by the academic perspectives of developed countries, so that the diversity of social, cultural, and educational contexts in developing countries has not been fully accommodated in international literature.

Overall, this research confirms that elementary school teachers' digital literacy has become an increasingly mature, multidisciplinary, and strategic area of study in contemporary educational research. The consistent growth of publications, the expanding network of scientific collaborations, and the expanding focus of research toward more complex issues indicate that this field continues to undergo significant conceptual evolution. Thus, research on elementary school teachers' digital literacy not only reflects the development of technology use in education but also illustrates the transformation of teachers' roles, the shifting of learning paradigms, and the evolution of competencies required in education systems in the digital era. From a practical perspective, these findings suggest that teacher professional development programs should place greater emphasis on advanced digital competencies, including digital pedagogical competence, artificial intelligence literacy, and critical digital literacy. Strengthening these competencies is essential for preparing teachers to respond effectively to ongoing educational transformation.

5. REFERENCES

- Agarwal, A., Durairajanayagam, D., Tatagari, S., Esteves, S. C., Harlev, A., Henkel, R., Roychoudhury, S., Homa, S., Puchalt, N. G., & Ramasamy, R. (2016). Bibliometrics: Tracking research impact by selecting the appropriate metrics. *Asian Journal of Andrology*, 18(2), 296. <https://doi.org/10.4103/1008-682X.171582>
- Akpan, I. J., Offodile, O. F., Akpanobong, A. C., & Kobara, Y. M. (2024, July). A comparative analysis of virtual education technology, e-learning systems research advances, and digital divide in the Global South. *In Informatics*, 11(3), 53. <https://doi.org/10.3390/informatics11030053>
- Anayat, S., & Rasool, G. (2024). Artificial intelligence marketing (AIM): Connecting-the-dots using bibliometrics. *Journal of Marketing Theory and Practice*, 32(1), 114–135. <https://doi.org/10.1080/10696679.2022.2103435>
- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Aria, M., & Cuccurullo, C. (2026). *Science Mapping Analysis - A primer with Biblioshiny*. McGraw-Hill, ISBN: 978-88-386-2297-7.
- Asghar, N., Hussain, A., Nguyen, D. A., Ali, S., Hussain, I., Junejo, A., & Ali, A. (2024). Advancement in nanomaterials for environmental pollutants remediation: A systematic review on bibliometrics analysis, material types, synthesis pathways, and related

- mechanisms. *Journal of Nanobiotechnology*, 22(1), 26.
<https://doi.org/10.1186/s12951-023-02151-3>
- Baidya, A., & Saha, A. K. (2024). Exploring the research trends in climate change and sustainable development: A bibliometric study. *Cleaner Engineering and Technology*, 18, 100720. <https://doi.org/10.1016/j.clet.2023.100720>
- Bond, M., Marín, V. I., Lesko, I., & Bedenlier, S. (2020). Mapping higher education research on digital technologies: A meta-analysis and bibliometric study. *International Journal of Educational Technology in Higher Education*, 17(1), 1-23.
<https://doi.org/10.1186/s41239-020-00176-x>
- Chen, X., Xie, H., Tao, X., Wang, F. L., Leng, M., & Lei, B. (2024). Artificial intelligence and multimodal data fusion for smart healthcare: Topic modeling and bibliometrics. *Artificial Intelligence Review*, 57(4), 91. <https://doi.org/10.1007/s10462-024-10712-7>
- Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., & Wissing, G. (2020). A wake-up call for data justice in higher education: Sustaining alternative futures. *Critical Studies in Education*, 61(5), 577-595.
<https://doi.org/10.1080/17508487.2020.1806041>
- Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., & Wissing, G. (2020). A wake-up call: Equity, inequality and Covid-19 emergency remote teaching and learning. *Postdigital science and education*, 2(3), 946-967.
<https://doi.org/10.1007/s42438-020-00187-4>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of business research*, 133, 285-296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Elsevier. (2020). *Scopus content coverage guide*.
https://www.elsevier.com/_data/assets/pdf_file/0007/69451/Scopus_ContentCoverage_Guide_WEB.pdf
- Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, 68, 2449–2472.
<https://doi.org/10.1007/s11423-020-09767-4>
- Gökdaş, İ., Karacaoğlu, Ö. C., & Özkaya, A. (2024). COVID-19 and teachers' digital competencies: a comprehensive bibliometric and topic modeling analysis. *Humanities and Social Sciences Communications*, 11(1), 1740. <https://doi.org/10.1057/s41599-024-04335-0>
- Holmes, Wayne, Ana Mouta, Velislava Hillman, Daniel Schiff, Kristjan-Julius Laak, Javiera Atenas, Emanuele Bardone et al. "Critical studies of artificial intelligence and education: putting a stake in the ground." (2025).
- Khoerunnisa, I., & Fathurochman, A. (2025). Teachers' Digital Skills Research Trends: A Scopus Bibliometric Study (2020–2025). *IQRO: Journal of Islamic Education*, 8(3), 1321-1340.
<https://doi.org/10.24256/iqro.v8i3.8894>
- Kiryakova, G., & Kozhuharova, D. (2024). The digital competences necessary for the successful pedagogical practice of teachers in the digital age. *Education Sciences*, 14(5), 507.
<https://doi.org/10.3390/educsci14050507>

- Kokol, P., Blažun Vošner, H., & Završnik, J. (2021). Application of bibliometrics in medicine: A historical bibliometrics analysis. *Health Information & Libraries Journal*, 38(2), 125–138. <https://doi.org/10.1111/hir.12295>
- López-Chila, R., Llerena-Izquierdo, J., Sumba-Nacipucha, N., & Cueva-Estrada, J. (2023). Artificial intelligence in higher education: An analysis of existing bibliometrics. *Education Sciences*, 14(1), 47. <https://doi.org/10.3390/educsci14010047>
- Makda, F. (2025). Digital education: Mapping the landscape of virtual teaching in higher education—a bibliometric review. *Education and Information Technologies*, 30(2), 2547–2575. <https://doi.org/10.1007/s10639-024-12899-2>
- Maral, M. (2024). Research performance of higher education in OECD countries: A hybrid multi-criteria decision-making approach. *Sage Open*, 14(2), 21582440241257753. <https://doi.org/10.1177/21582440241257753>
- Marginson, S. (2022). Global science and national comparisons: Beyond bibliometrics and scientometrics. *Comparative Education*, 58(2), 125–146. <https://doi.org/10.1080/03050068.2021.1981725>
- Meng, L., Liu, Y., & Zhou, X. (2019). Mapping the global research trends of bibliometric analysis: A bibliometric study. *Journal of Informetrics*, 13(1), 1–15.
- Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, 2, 100041. <https://doi.org/10.1016/j.caeai.2021.100041>
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078.
- Nguyen, T. T., et al. (2024). Digital Transformation in Education: A Bibliometric Analysis Using Scopus. *Computers & Education*, 195, 104714. <https://doi.org/10.1016/j.compedu.2023.104714>
- Ozyurt, O., & Ayaz, A. (2022). Twenty-five years of education and information technologies: Insights from a topic modeling based bibliometric analysis. *Education and Information Technologies*, 27(8), 11025–11054. <https://doi.org/10.1007/s10639-022-11071-y>
- Prieto-Gutierrez, J. J., Segado-Boj, F., & França, F. D. S. (2023). Artificial intelligence in social science: A study based on bibliometrics analysis. *arXiv preprint arXiv:2312.10077*. <https://doi.org/10.48550/arXiv.2312.10077>
- Raman, R., Nair, V. K., Prakash, V., Patwardhan, A., & Nedungadi, P. (2022). Green-hydrogen research: What have we achieved, and where are we going? *Bibliometrics analysis. Energy Reports*, 8, 9242–9260. <https://doi.org/10.1016/j.egyr.2022.07.058>
- Reyna, J., Hanham, J., & Meier, P. C. (2018). A framework for digital media literacies for teaching and learning in higher education. *Media and Communication*, 15(4), 92–101. <https://doi.org/10.1177/2042753018784952>
- Sakinah, R. A. N., et al. (2024). Digital Media Literacy in Scholarly Discourse: A Bibliometric Analysis of Scopus-Indexed Publications. *Khazanah al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi, dan Kearsipan*, 12(2). <https://doi.org/10.24252/kah.v12i2>

- Santoveña-Casal, S., & López, S. R. (2024). Mapping of digital pedagogies in higher education. *Education and Information Technologies*, 29(2), 2437-2458. <https://doi.org/10.1007/s10639-023-11888-1>
- Sweileh, W. M. (2018). Research trends on human trafficking: A bibliometric analysis using Scopus database. *Globalization and Health*, 14(1), 1–12. <https://doi.org/10.1186/s12992-018-0427-9>
- Teane, F. M. (2024). Technological literacy and its influence on teachers' adoption of a blended learning approach. *Reading & Writing-Journal of the Reading Association of South Africa*, 15(1), 426.
- Tinmaz, H., Lee, Y. T., Fanea-Ivanovici, M., & Baber, H. (2022). A systematic review on digital literacy. *Smart Learning Environments*, 9(1), 21. <https://doi.org/10.1186/s40561-022-00204-y>
- Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., Wang, H., Denden, M., Bozkurt, A., Lee, L.-H., Beyoglu, D., Altinay, F., Sharma, R. C., Altinay, Z., Li, Z., Liu, J., Ahmad, F., Hu, Y., Salha, S., Abed, M., & Burgos, D. (2022). Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis. *Smart Learning Environments*, 9(1), 24. <https://doi.org/10.1186/s40561-022-00205-x>
- Tomczyk, Ł. (2024). Digital competence among pre-service teachers: A global perspective on curriculum change as viewed by experts from 33 countries. *Evaluation and Program Planning*, 105, 102449. <https://doi.org/10.1016/j.evalprogplan.2024.102449>
- Ülker, P., Ülker, M., & Karamustafa, K. (2023). Bibliometric analysis of bibliometric studies in the field of tourism and hospitality. *Journal of Hospitality and Tourism Insights*, 6(2), 797–818. <https://doi.org/10.1108/JHTI-10-2021-0291>
- Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>.
- Van Eck, N. J., & Waltman, L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact: Methods and practice* (pp. 285-320). Springer, Cham. https://doi.org/10.1007/978-3-319-10377-8_13
- Van Eck, N. J., & Waltman, L. (2020). VOSviewer manual: Manual for VOSviewer version 1.6. 15. *Leiden: Centre for Science and Technology Studies (CWTS) of Leiden University*.
- Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *scientometrics*, 84(2), 523-538. <https://doi.org/10.1007/s11192-009-0146-3>
- Vičić Krabonja, M., Kustec, S., Skrbinjek, V., Aberšek, B., & Flogie, A. (2024). Innovative professional learning communities and sustainable education practices through digital transformation. *Sustainability*, 16(14), 6250. <https://doi.org/10.3390/su16146250>
- Wang, C., Chen, X., Yu, T., Liu, Y., & Jing, Y. (2024). Education reform and change driven by digital technology: A bibliometric study from a global perspective. *Humanities and Social Sciences Communications*, 11(1), 1-17.
- Wen, X., & Li, Y. (2024). A Bibliometric Analysis of Scholarly Literature Related to Digital Literacy in Higher Education during the Pandemic Period. *Cogent Education*, 11(1), 2341587. <https://doi.org/10.1080/2331186X.2024.2341587>

- Yas, H., Jusoh, A., Abbas, A. F., Mardani, A., & Nor, K. M. (2020). A review and bibliometric analysis of service quality and customer satisfaction by using Scopus database. *International Journal of Management (IJM)*, 11(8), 459–470.
- Yuliana, E., Nirmala, S. D., & Ardiasih, L. S. (2023). Pengaruh literasi digital guru dan lingkungan belajar terhadap hasil belajar siswa sekolah dasar. *Jurnal Basicedu*, 7(1), 463–472. <https://doi.org/10.31004/basicedu.v7i1.4196>
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>