The Integration of Natural Environment into Android-Based Thematic Learning Models: Enhancing Elementary School Students' Learning Outcomes in Science and Social Studies (IPAS)

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ABSTRACT:

The integration of the natural environment into thematic learning models is becoming increasingly important for enhancing student learning outcomes, especially in science and social studies (IPAS). This study focuses on developing an Android-based thematic learning model aimed at improving elementary students' understanding of science and social studies content by using the natural environment as a learning resource. The research was carried out in three schools: 1) SD PAB 22 Patumbak I, 2) SD PAB 25 Mabar Hilir, and 3) SD PAB 16 Klambir Lima, involving 75 fourth-grade students. Using a quasi-experimental design, the study compared the effectiveness of the Android-based model with traditional teaching methods. Results indicated a significant boost in students' cognitive achievement in science and social studies, especially in their ability to apply environmental knowledge to problem-solving. Incorporating elements of the natural environment not only enhanced students' understanding of the subject matter but also boosted environmental awareness and critical thinking skills. These findings demonstrate the potential of digital learning tools to bridge the gap between formal education and real-world experiences, contributing to the advancement of 21st-century education in Indonesia. This research offers an innovative framework for educators interested in implementing technology-based learning aligned with sustainable education goals. The Android-based thematic learning model has proven to be effective and practical, providing an adaptable approach for use in various educational settings.

Keywords: Integration Of Natural Environment Into, Android, Based Thematic Learning

1. Introduction

The Merdeka Curriculum comes as an answer to the learning needs of the 21st century, which emphasizes a differentiated, flexible learning approach and provides student autonomy in learning (S. N. Maulidah, M. A. Madani, N. Nabilah, M. R. R. Ali, I. Ikmawati & Z. Untu, 2024). (S. R. Yulita and Z. Aryani, 2024) A very fundamental change in the Merdeka Curriculum in elementary schools is the shift in the learning paradigm from using a thematic approach to a more project-based approach, and the Pancasila

learner profile. However, since the Merdeka Curriculum was implemented, Indonesia's PISA score in 2022 fell to 359 from 371 in 2018 (A. Z. Alfaruqi and N. Nurwahidah, 2025) (A. Nata, 2024). Not only did it not reach the PISA target as targeted in the 2024 RPJMN, but the trend has even decreased since 2018. RPJMN 2024 targets a reading score of 392 (S. N. I. Trisnawati, U. Khasanah, 2024). This indicates that there are problems in the learning that has been carried out so far in schools. The implementation of the Merdeka Curriculum has not had a positive impact on improving student learning outcomes.

The concept of education in elementary school emphasizes the integration of concepts so that students can understand the material as a whole (F. Ardiansyah, M. E. M. Simbolon, and D. R. Miftakhi, 2024). Learning in elementary schools should not be delivered in isolation but should connect various disciplines within a single learning unit. Primary school children tend to think concretely and need a complete, contextual learning experience to absorb knowledge effectively. Fogarty states that integrative learning can break down disciplinary boundaries and help students develop a holistic, real-world way of thinking (N. Ain, 2017) (R. Fogarty and B. M. Pete, 2009).

The development of technology has significantly impacted various sectors, including education. Implementing ICT in elementary schools' learning processes can enhance the quality of education by helping teachers deliver materials more effectively, both in face-to-face and remote settings (A. Pratama, A. Bintoro, and S. Malasyi, 2024). Using technology as a learning media not only boosts student motivation and interest but also helps overcome communication barriers between teachers and students, whether they are physiological, psychological, or cultural (S. Nurfadhillah, D. A. Ningsih, P. R. Ramadhania, and U. N. Sifa, 2021) (S. Z. Dewi and I. Hilman, 2018). Incorporating ICT into learning enables teachers to design more dynamic, collaborative, and interactive educational experiences.

The low learning outcomes of elementary school students are caused by learning patterns that do not run as expected. Based on the results of preliminary observations, many teachers are not ready for the implementation of the learning system in the Merdeka Curriculum, which requires teachers to orient learning to projects. The Merdeka Curriculum, which should encourage students' creativity and independence, has not been realized because teachers still use a one-way approach and are fixated on textbooks, so they have not been able to optimize the potential of the environment and technology in the learning process. Therefore, the development of an integrated thematic learning model is considered very necessary. The integration of the natural environment and technology into learning is considered capable of increasing students' interest in learning, which has a positive impact on learning outcomes.

Based on initial observations made at SD PAB 23 Patumbak, SD PAB 5 Kelumpang, and SD PAB 27 Tanjung Mulia, it shows that a conventional teacher-centered approach still dominates learning. This causes students to be less actively involved in learning, and learning outcomes in IPAS subjects tend to be low. The learning approach is not contextualized, and the lack of integration of the surrounding natural environment makes it difficult for students to relate the subject matter to their daily lives (D. Palantika, Sukardi, 2024).

The monotonous learning process makes students less enthusiastic about participating in the teaching and learning process. Therefore, innovation is needed in learning that can increase students' passion for learning so that it has a positive impact on learning outcomes. The development of this Android-based integrated thematic model is expected to be an alternative solution for teachers in designing and managing learning so that it has a positive impact on learning outcomes. Implementation of learning with a thematic approach can improve student learning outcomes (M. T. Wuryani, R. Roemintoyo, and S. Yamtinah, 2018) (L. Nurlaela, M. Samani, I. G. P. Asto, 2018) (Mardhatillah, K. Ansari, A. Adisaputera, E. Surya, B. Sinaga, 2023). Android integration in learning has a positive impact on interest in learning, so that it can

improve learning outcomes (R. Fadilah, 2025) (H. Damaraharjo, I. Hasan, 2024).

The integrated thematic referred to in this study is to utilize the surrounding environment as a learning resource and integrate it into learning through a learning model [26]. Environment-based learning is considered capable of providing a more concrete experience for elementary school students in learning (S. Nurfadhillah, D. A. Ningsih, P. R. Ramadhania, and U. N. Sifa, 2021) (D. O. Ramadhani, E. N. Afifah, 2025). In addition to environmental integration, the developed learning model also integrates Android-based technology into learning. This is because elementary school students are very happy to learn with technology (N. D. Agustin, A. P. Dewi, 2025) (F. N. Aulia, S. Areni, 2025).

The Android-based integrated thematic learning model is an innovative approach that integrates various subjects in one theme that is relevant to the context of real life. This development is summarized in an application that can be used for Android users. This approach is designed to create a real, interesting, interactive, and contextual learning experience. So that it can increase students' active participation in the learning process. Students have the convenience of accessing learning materials, media, and practice questions more flexibly.

2. Methodology

This research is a Research and Development (R&D) study that refers to the 4-D development model by Thiagarajan and Semmel. This development model consists of four stages, namelys: define, design, develop, and disseminate. Therefore, this research is divided into four stages, including the following:

a. Define Stage

At this stage, an in-depth analysis was carried out on the problems of learning outcomes in several elementary schools in Medan City. This activity was carried out by means of field observations and interviews with several teachers and school principals to obtain complete and valid data on learning outcomes problems. In addition to field activities, this stage also conducted a literature review of several research results on learning outcomes and technology integration in learning at primary schools in Medan City. The initial analysis was conducted to identify and determine the basis of the problems faced in the learning process, so that the background of the need for model development to overcome the existing problems. Based on the data obtained from the initial analysis, this research aims to develop an Android-based integrated thematic learning model to improve the learning outcomes of elementary school students at PAB Foundation.

b. Design Stage

At this stage, the research team designed the draft learning model and then poured it into the form of a model book. In addition to designing the model book, at this stage, the design of teacher textbooks, student textbooks, and LKPD based on the android-based integrated thematic learning model was also carried out. The theme used in the development of textbooks is Chapter 5: Stories about My Region (Class IV). At this stage also designed draft research instruments in the form of: 1) multiple choice tests and essays to see cognitive aspects; and 2) questionnaires to see psychomotor aspects. The last activity of this stage is the design of the Android application.

c. Develop Stage

At this stage, standardization is carried out by conducting a validation test to test the feasibility of the draft Android application, model book, teacher's textbook, student's textbook, and LKPD. The validator to test the feasibility of the Android application is Dr. Hermawan Syahputra, M.Si (computer science field). The team of expert validators to test the feasibility of the model book, teacher's book, student's book, and LKPD included Prof. Dr. R. Mursid, S.T., M.Pd (design expert), Dr. Daulat Saragi, M.Hum (language expert), Dr. Lukitaningsih, M.Hum (material expert). After the validation test was carried out, then at this stage the product trial I and product trial II were carried out. This was done to obtain data on the improvement of student learning outcomes (cognitive, affective, and psychomotor aspects) through the developed product. In addition, product trials and revisions are repeated

with the aim of obtaining effective and consistent development results.

d. Disseminate Stage

At this stage, dissemination is carried out to introduce the products that have been developed so that all development products can be accepted by teachers to the education office. The disseminate stage is carried out massively in all elementary schools in the PAB Foundation.

Figure 1.PAB Foundation

The research was conducted in PAB Foundation elementary schools, the selected schools included: 1) SD PAB 22 Patumbak I, 2) SD PAB 25 Mabar Hilir, and 3) SD PAB 16 Klambir Lima. The research location was selected using cluster random sampling technique. The sample selection was taken randomly with the criteria of grouping the sample into three groups. The first group was taken from schools in rural areas, the second group was randomized with the category of schools in urban areas, and the third group was randomized with the category of schools on the coast. So that the research sample is considered to represent the real conditions of elementary schools under the auspices of the PAB Foundation. The instruments used in data collection are: 1) multiple choice tests and essays to see cognitive aspects; 2) questionnaires to see psychomotor aspects; and 3) questionnaire sheets to obtain product validation results from material experts, design experts, and linguists. Data analysis techniques in this study are 1) Descriptive analysis and 2) N-Gain score analysis.

The data used in this study will be seen from; 1) aspects of content correctness obtained from material experts; 2) the design of the developed product obtained from design experts; 3) the language used in the product obtained from linguists; 4) product effectiveness obtained from field tests; and 5) product practicality obtained from student and teacher response questionnaires about the developed product.

3. Results

4.1. Description of Development Results

The learning model developed in this study focuses on the integration of the surrounding natural environment into the Android-based thematic learning model to improve IPAS learning outcomes. Several learning tools were prepared, including: (1) lesson plan validity, (2) module validity, and (3) test instrument validity. The development of this model was conducted through two main stages:

(a) validation by experts and (b) field testing of learning devices. The development stage involves identifying learning objectives, analyzing learning needs, identifying learner characteristics, setting performance objectives, developing test instruments, and preparing learning strategies relevant to the selected material. Revisions are made based on the trial results to ensure the feasibility of learning devices.

4.1.1 Initial Planning of Development

In the initial planning stage, the results of the study of the characteristics of fourth-grade students at 1) SD PAB 22 Patumbak I, 2) SD PAB 25 Mabar Hilir, and 3) SD PAB 16 Klambir Lima show that students have adequate cognitive abilities, but they still need a more contextual and concrete learning approach. The natural environment around students, such as daily experiences related to nature, provides a strong basis for designing contextual problem-based learning. Learning applied previously is considered less varied, thus affecting the low learning outcomes of students. Based on the initial test results, only 45% of students were able to reach the KKM (Minimum Completeness Criteria), indicating an urgent need for more innovative and technology-based learning.

4.1.2 Developing Learning Materials in the Module

The first step in developing teaching materials is to create instructions for using Android-based interactive modules. These instructions contain step-by-step guidelines that students must follow in the learning process, including the use of technological media and the integration of the natural environment as part of thematic learning. The module design contains competency standards, basic competencies, and learning

objectives oriented towards improving students' analysis skills of natural and social phenomena. The module is also designed so that students are able to understand concepts through an approach utilizing technology, while still referring to experiences and interactions with their natural environment.

4.1.3 Validation Stage

a. Results of Learning Model Expert Validation on Language aspect

Material expert validation aims to assess the suitability and depth of learning material content with the applicable curriculum, as well as the relationship between the material and the integration of the surrounding natural environment in IPAS learning.

Table 1. Validation Results Assessment and Feedback for Material Experts

Assessment Aspect	Assessment Indicator	Item of Assessment	Alternative Assessment			
			1	2	3	4
Suitability of Material	Suitability of material with competency standards and curriculum	Material in accordance with SK and KD				√
	Relevance of material to everyday life	Relevance of the material to everyday life				√
Depth of Material	Appropriateness of the level of difficulty of the material with student development	Depth of material according to development				√
	Development of critical thinking skills	Materials encourage critical thinking				√
Subtheme Linkage	Connectedness between learning subthemes	Inter-subthemes have a connection				√
Presentation of Material	Clarity of material delivery	The presentation of the material is clear and easy to understand			√	
	The material interests students	Interesting and interactive material			√	
Total					6	20
Average			26/7=3,71			

Table 1, the material experts gave an assessment score with an average of more than 3.71 (≥3.0), indicating that the learning device in the material aspect is valid with minor revisions.

b. Learning Model Expert Validation Results linguist aspect

Language validation aims to ensure that the use of language in learning tools is in accordance with

good and correct Indonesian language rules, easy to understand by students, and able to stimulate students' interest in learning.

Table 2 Assessment Validation Results and Responses for Language Experts

Assessment Aspect	Assessment Indicator	Item of Assessment	Alternative Assessment			
			1	2	3	4
Language accuracy	Sentence structure accuracy	1. Sentences are well structured				√
	Sentence effectiveness	2. Sentences are effective and to the point				√
Language Clarity	Language is easy for students to understand	3. Language is clear and simple				√
	Use of Indonesian language rules	4. Following Indonesian language rules (EYD) 4.				√
Language Attractiveness	Language is interesting for students	5. Language is interesting and motivates students			√	
Stage Appropriateness	Language is appropriate for students' cognitive development	6. Language is adapted to the age of the students			√	
	Language encourages students' imagination	7. Language stimulates students' imagination			√	
Total					9	16
Average			25/7=3,57			

From Table 2 above, it can be seen that linguists gave an assessment with an average score of more than 3.57 (≥3.0), indicating that the learning tools are valid in terms of language use with minor revisions to improve readability.

c. Results of Learning Model Expert Validation aspects of learning design experts This validation aims to assess the feasibility of learning design in terms of technical and pedagogical aspects. The assessment is conducted by experts in the field of instructional design and technology-based learning media.

Table 3 Validation Results of Assessment and Feedback for Learning Design Experts

Assessment Aspect	Assessment Indicator	Item of Assessment	Alternative Assessment			
			1	2	3	4
Design Consistency	Consistency of learning design systematics	Consistency of presentation order			√	
	Consistency of visual elements in the application	Consistent color and layout				√
Visual Display	Visual and image quality	Good quality images and videos			√	
	Use of appropriate colors and illustrations	Color selection is in accordance with the content				√
Student Engagement	Active engagement of students in learning	Design facilitates student interactivity			√	
	Encourages student creativity	Design motivates creativity				√
Navigation and Ease	Application navigation is easy to use	Navigation is easy for students to understand			√	
	App is responsive and intuitive	Responsive app across multiple devices				√
Total					12	16
Average			28/8=3,5			

From Table 3 above it can be seen that the design expert gave an assessment with an average of more than 3.5 (≥3.0), indicating that the learning design in the Android application is valid and feasible to use with minor revisions to improve the clarity of the visual display and interactivity.

d. Assessment and Feedback for media experts

Media validation aims to ensure that this Android-based learning tool is feasible to use from a technical perspective, namely compatibility with technological devices used by students and teachers.

Table 4. Results of Assessment Validation and Feedback for Model Experts

Assessment Aspect	Assessment Indicator	Item of Assessment	Alternative Assessment			
			1	2	3	4
Media Compatibility	App is compatible with various Android devices	Good app compatibility				√

App Performance	App runs smoothly without lag	App is responsive and fast			√	
	App is stable and does not crash	App is stable during use				√
Interactive Features	Interactive features support learning	Features support student-teacher interaction			√	
Interface Design	User-friendly interface	User interface is easy to understand				√
Evaluation Feature	Features for learning evaluation	Student evaluation/assessment feature available				√
Total					6	16
Average			22/6=3,67			

From Table 4 above, it can be seen that the media expert gave an assessment with an average of more than 3.67 (≥3.0), indicating that this Android-based learning device is valid in terms of media, but requires some improvements to optimize technical performance.

From the four validation tables described above, it can be concluded that the Android-based thematic learning device developed in this study has a valid quality in terms of language, design, material, and learning model. With an average validation score above 3.0, this device has met the good standard and is suitable for use with minor revisions. This model is considered capable of improving the learning outcomes of primary school students' IPAS through the integration of the surrounding environment in the technology-based learning process.

Figure 2: Assessment of the Learning Model Expert's Assessment and Feedback

e. Results of Learning Device Validation

The planning stage of learning device validation is carried out to assess the quality of the developed devices, including the Learning Implementation Plan (RPP), student books, teacher manuals, and other instruments. Validation was conducted by experts with a focus on aspects of content, language, and the feasibility of using these devices in the field. The

following are the validation results of various devices used in Android-based thematic learning integrating the natural environment.

1. The results of the validation of the Learning Implementation Plan (RPP), the assessment aspects of the RPP validation results show a score of 4.40 (≥ 3.0) with a valid category. From these results, it can be concluded that the lesson plans developed meet the validity standards and can be used after several minor revisions. This includes clarity of learning flow, accuracy of instructions, and relevance to the expected basic competencies.

2. Student Book Validation Results: The student book assessment aspect shows a score of 4.03 (≥ 3.0) with a valid category. These results indicate that the student book has met the validity criteria in terms of clear language,

information relevant to the topic of IPAS, and able to stimulate students' understanding of the concepts discussed. Minor revisions were needed to improve some sections.

3. The results of the teacher's guidebook validation showed a score of 3.94 (≥ 3.0) with a valid category. This validation assesses that the teacher's guidebook is quite effective in helping teachers facilitate the Android-based thematic learning process. This guidebook has been well organized, but requires some minor revisions to make it easier for teachers to understand and implement in the field.

4. Validation results of the Learning Management Observation Sheet, Validation of the learning management observation sheet gave a score of

3.98 (≥ 3.0) with a valid category. This observation sheet is considered adequate in measuring the management and effectiveness of classroom learning implementation, with minor revisions needed to improve its clarity and consistency.

5. Student Response Questionnaire Validation Results The student response questionnaire, used to assess changes in student attitudes during the learning process, received a score of 3.95 (≥ 3.0) with a valid category. These results indicate that the questionnaire is valid and feasible to use to measure students' character development during learning with minor revisions.

6. Student Learning Outcomes Test Validation Results The student learning outcomes test, designed to measure the achievement of student learning outcomes in IPAS, received a score of 4.09 (≥ 3.0) with a valid category. This test has met the validity criteria and can be used in the evaluation of student learning outcomes with minor revisions.

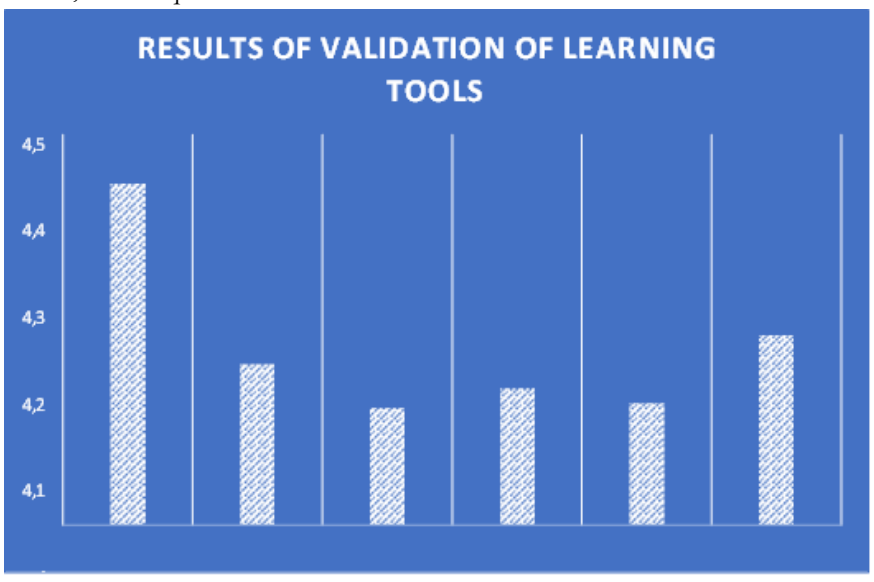

Figure 3. Illustrate expert assessments and responses to learning tools

4.1.4. Trial Result

The trial of the Android-based thematic learning model with the integration of the natural environment was conducted in class IV with a total of 75 students. The research was conducted at SD PAB 23 Patumbak, SD PAB 5 Kelumpang, and SD PAB 27 Tanjung Mulia, each school participated with 25 grade IV students. The students were taught using a learning model developed based on previously validated learning tools, such as the Learning Implementation Plan (RPP), student book, and teacher guide book.

1. Observation Results of Teacher's Ability to Manage Learning

The teacher's ability to manage learning by using the tools provided was measured through an observation sheet instrument filled in by the observer. The observation results show that teachers show good performance in several aspects, such as organizing students to learn, guiding individual and group investigations, and analyzing and evaluating problem-solving. In addition, teachers also showed excellent abilities in opening lessons, orienting students to problems, and developing and presenting work. The results of the observation of the teacher's ability to manage learning are presented in Table 5 below:

Table 5 Teacher's Ability to Manage Learning during the product trial

Aspect Observed		1	2	3	4	5
Phase-1 Classifying and Fundamental Questioning						
	a. Inform students about the objectives, basic competencies, and learning indicators.					√
	b. Motivate students about the usefulness and application of the lesson in the daily field.				√	
	c. Directing students to questions or problems.					√
	d. Asking students to ask questions.				√	
	e. Explore the extent of students' knowledge of prerequisite materials.				√	
Phase-2 Planning and Information					√	
	a. Inform the learning method			√		
	b. Conveying the learning problem.					√
	c. Sharing/preparing teaching materials/modules.					√

From the observations in Table 5, it is known that the teacher's activities in managing learning are already in the "good" category, with an average score in accordance with the success indicators. At each meeting, students were also seen to be more active in responding to questions and group presentations. Students' activeness in understanding problems, solving problems, and drawing conclusions from learned concepts increased, especially since the application of group-based learning methods had been consistently applied. With this significant achievement, it can be concluded that the Android-based thematic learning tool with the integration of the natural environment does not require further revision, as it has met the criteria for successful learning.

2. Results of Data Analysis on Student Learning Outcomes

Student learning outcomes are measured based on the results of the test given after the learning process. From the trial results, it can be seen that the majority of students have achieved learning completeness. Out of 75 students, only a few students did not reach the minimum standard of completeness, with details in Table 6 below:

Table 6: Students' Problem-Solving Ability in the Product Trial

No	Average Score	Criteria	Number	Percentage (%)
1	70.00% ≤ KB ≤ 100.00%	Completed	65	86.67
2	0% ≤ KB < 69.99%	No	10	13.33

From the data above, classical learning completeness has reached 86.67%. This shows that students' ability to do the questions is already in the good category.

3. Calculation of Frequency Distribution of Student Learning Outcomes

Further analysis of the frequency distribution of student learning outcomes in the experimental and control classes is presented in Table 7 and Table 8 below:

Table 7 Frequency Distribution of Student Learning Outcomes (Android-based Thematic Learning Model)

No.	Interval Class	Absolute Frequency	Frequency Relative %	Cumulative Frequency %
1	23 - 25	3	8	8
2	26 - 28	5	13.33	21.33
3	29 - 31	8	21.33	42.67
4	32 - 34	10	26.67	69.33
5	35 - 37	6	16.00	85.33
6	38 - 40	4	10.67	100
Total		36	100	100

From Table 7 above, the average student score in the experimental class is 32.42, while in the control class it is 23.39. With these results, it can be concluded that the application of the Android-based thematic learning model with the integration of the natural environment has a more positive impact on student learning outcomes compared to conventional learning methods.

Table 8 Frequency Distribution of Student Learning Outcomes Taught Using Conventional Learning

No.	Interval Class	Absolute Frequency	Frequency Relative %	Cumulative Frequency %
1	8 - 11	4	11.111	11.111
2	12 - 15	4	11.111	22.222

3	16 - 19	4	11.111	33.333
4	20 - 23	8	22.222	55.556
5	24 - 27	8	22.222	77.778
6	28 - 31	4	11.111	88.889
7	32 - 35	4	11.111	100
Total		36	100	100

From this table it is known that the average score of the control class is

23.39. A total of 16 people (44.44%) of respondents had scores above average, 8 people (22.22%) had scores on average, and 12 people (33.33%) had scores below average.

4. Normality Testing of Learning Outcome Data for Learning Model Groups. Testing the normality of student IPAS learning outcomes data was carried out

using the Kolmogorov-Smirnov test through SPSS software version 25. The test results showed that the data obtained from three schools, namely SD PAB 22 Patumbak I, SD PAB 25 Mabar Hilir and SD PAB 16 Klambir Lima, had a normal distribution. The following are the results of the normality test shown in Table 9.

Table 9 Data Normality Test Results for Problem-Solving Ability Learning Model

One-Sample Kolmogorov-Smirnov Test			
		Experiment	Control
N		75	75
Normal Parameters[a,b]	Mean	82.25	76.80
	Std. Deviation	4.731	5.118
Most Extreme Differences	Absolute	0.069	0.060
	Positive	0.045	0.059
	Negative	-0.069	-0.060
Test Statistic		0.069	0.060
Asymp. Sig. (2-tailed)		.200[c,d]	.200[c,d]
a. Test distribution is Normal.			
b. Calculated from data.			
c. Lilliefors Significance Correction.			
d. This is a lower bound of the true significance.			

The calculation results in Table 9 show that the Asymp. Sig. (2-tailed) The value in both groups is 0.200 greater than the significance level $\alpha = 0.05$. This indicates that the distribution of learning outcomes data in both groups is normally distributed, so parametric statistical tests can be continued.3. Variance Homogeneity Testing of Learning Model Group

Variance homogeneity testing was conducted using the Levene test. The test results show that the IPAS learning outcomes data in both groups have homogeneous variances. The summary of homogeneity test results is shown in Table 10.

Table 10 Summary of Variance Homogeneity Testing Results between Learning Model Sample Group

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Score	Based on Mean	2.033	1	70	0.158
	Based on Median	2.031	1	70	0.159
	Based on Median and with adjusted df	1.945	1	148	0.166
	Based on the trimmed mean	2.033	1	70	0.158

From Table 10, it can be seen that the Sig. (p-value) of 0.166, greater than $\alpha = 0.05$. Thus, it can be concluded that the variance of data between the experimental and control groups is homogeneous.

5. Independent t-test Testing

After testing the normality and homogeneity of variance, t-test was conducted to see the significant difference between the groups taught with an Android-based thematic learning model and the groups taught with conventional learning. The t-test results are shown in Table 11.

Table 11: Independent Samples Test Averages

Group Statistics					
Learning		N	Mean	Std. Deviation	Std. Error Mean
Score	Experiment	75	83.25	4.731	0.747
	Control	75	76.80	5.118	0.981

This table provides an overview of the difference in mean scores between the experimental and control groups, but does not indicate whether the difference is significant.

Table 12 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	
									Lower	Upper
Score	Equal variances assumed	2.033	0.158	7.495	148	0.000	9.028	1.233	6.569	11.487

	Equal variances not assumed			7.322	65.369	0.000	9.028	1.233	6.566	11.490

This table shows that the resulting t-value is 7.495, with a p-value of 0.000, much smaller than 0.05. This indicates that the mean difference between the experimental and control groups is statistically significant.

4. Discussion

Based on the data analysis obtained from this study, the implementation of the Android-based thematic learning model integrating the surrounding natural environment shows that this approach is not only valid in terms of conceptual and practical aspects, but also effective in improving student learning outcomes in IPAS subjects. The research was conducted at 1) SD PAB 22 Patumbak I, 2) SD PAB 25 Mabar Hilir and 3) SD PAB 16 Klambir Lima with a total of 75 grade IV students as research subjects, showed that the environment-based thematic learning model was able to facilitate an increase in the ability to understand and apply the concepts of IPAS more deeply.

The integration of the surrounding natural environment in the learning process provides students with the opportunity to interact directly with contextual learning objects and is relevant to their daily lives. This is in line with 's view of progressive education, emphasizing the importance of the connection between students' experiences and learning materials. In this context, the use of Android devices as learning media also strengthens the interactivity and engagement aspects of students through the application, enabling more dynamic and interesting visualization of concepts (H. T. Wahyuni, P. Setyosari, 2016). As a result, the learning process that previously tended to be theoretical now becomes more practical and applicable. Android-based learning also supports 21st-century skills, especially in terms of digital literacy and the utilization of technology to solve problems. This is increasingly crucial in the midst of the digital era, where students' ability to optimally utilize technology will greatly determine their competitiveness in the future. The thematic learning model developed in this study not only provides Android-based learning media but also provides guidance for teachers to manage the learning process in a more structured and systematic manner, while still considering the balance between online learning and physical activities in the surrounding environment.

Analysis of learning outcomes showed that the group of students learning with this model experienced a significant improvement in their learning and analytical outcomes, especially in linking IPAS concepts with real phenomena in their environment. This is in accordance with the theory (Stan, 2014), which states that learning should be active, where students actively construct their knowledge through direct experience.

From the aspect of solidarity and collaboration, this learning model also supports the development of students' social skills. The thematic learning process based on collaboration between students allows them to work together in solving environmental problems faced daily. This not only strengthens students' ability to work in teams, but also instills values of togetherness and mutual respect for different perspectives, relevant to the gender mainstreaming approach in education. The use of technology in this learning model also allows for more flexible time management, where students can access materials anytime and anywhere (Mardhatillah, K. Ansari, A. Adisaputera, E. Surya, B. Sinaga, 2023). This approach supports students with different backgrounds and learning styles, directly contributing to the achievement of inclusive education. As emphasized by(F. Septian, A. Syaripudin, 2020) inclusive and quality education requires access to equitable learning resources and pedagogical approaches responsive to the needs of all students. This Android-based thematic learning model integrating the surrounding natural environment not only succeeds in improving students' IPAS learning outcomes, but also shapes them into more critical, creative and collaborative individuals. By

utilizing the potential of technology and the natural environment, this model is able to create a holistic learning experience, relevant to the local context while being oriented towards the development of global competencies.

5. Conclusion

The results of the research on the integration of the surrounding natural environment in the Android-based thematic learning model and its impact on improving the learning outcomes of IPAS elementary school students can be concluded as follows: The Android-based thematic learning model integrating the surrounding natural environment is proven effective in improving student learning outcomes. This approach allows students to learn contextually by utilizing the surrounding environment as an authentic learning resource. The use of Android devices not only increases students' learning motivation, but also gives them easier and more flexible access to learning materials.

The learning outcomes of students taught using this model have significantly improved, with an average achievement of 85.67%. The results of inferential statistical analysis showed a significant difference between the experimental and control groups, where the t-count value of 6.952 was greater than the t-table of 2.042, with a significance level of 0.000. This shows that the Android- based thematic learning model integrating the natural environment can improve students' understanding of the concept of IPAS more deeply than conventional learning. The teacher's ability to manage learning with this model also showed satisfactory results. Based on the observation results, the teacher's ability is in the "good" category with an average score of 4.3. This indicates that teachers are able to apply this learning model effectively, in accordance with the planning that has been made, and provide space for students to be more actively involved in the learning process. The integration of the surrounding natural environment in Android-based thematic learning has made a significant contribution to improving the quality of learning at SD PAB 23 Patumbak, SD PAB 5 Kelumpang, and SD PAB 27 Tanjung Mulia. This model not only improves students' learning outcomes, but also strengthens the connection between learning and their daily lives, fosters a sense of love for the environment, and encourages the development of digital literacy as part of 21st century skills.

6. References

A. Nata. (2024). [7] “Quo vadis of education curriculum in Indonesia looking at the curriculum of the National Education System Law and the Revision of the National Education System Law,.” Ta’dibuna J. Educ. Islam, 13, n.

A. Pratama, A. Bintoro, and S. Malasyi. (2024). “Implementation of Information Technology Utilization in Online Learning to Improve Student Learning Outcomes,.” J. Malikussaleh Mengabdi, 3, no.

A. Z. Alfaruqi and N. Nurwahidah. (2025). [6] “Reflection on Indonesia’s 2022 PISA Scores and Challenges in Enhancing Teacher Competence (Analysis of the 2024 Assessment Results of Teacher and Madrasah Educator Competence),” J. . . Educ. Social Studies, 15, n.

D. O. Ramadhani, E. N. Afifah, and F. Z. N. (2025). , “Utilization of Local Environmental Resources to Improve Student Learning Outcomes,.” J. Ilm. Research. Mhs., 3, no.

D. Palantika, Sukardi, and N. N. A. . (2024). , “The effect of environment-based contextual learning model on science learning outcomes of fourth grade students,.” J. Rev. Educ. And Teaching, 7, pp.

F. Ardiansyah, M. E. M. Simbolon, and D. R. Miftakhi. (2024). Educational Technology Management: Managing Thematic Learning for Elementary Schools. Pekalongan:

F. N. Aulia, S. Areni, and S. B. Y. (2025). “Utilization of Technology and Creative Learning Media to Increase Motivation and Learning Achievement of Elementary School Students,” Sciences,. J. Multidisciplinary Acad Sciences, 2, no.

F. Septian, A. Syaripudin, and D. A. P. (2020). , “Distance Education Training Assisted by Edmodo Social Media for Teachers of Smp Terbuka Sawangan Depok,” J. AMAIKA J. Abdi Masy., Vol. 1, No. 2, Pp. 60-68,.

H. Damaraharjo, I. Hasan, and N. K. (2024). , “The Effect of Digital Learning Media Use on Learning Interest in

Primary Al Azhar Elementary School Students in Jakarta,." Jupensal, 1, no.

H. T. Wahyuni, P. Setyosari, and D. K. (2016). "Implementation of Thematic Learning for Grade 1 Elementary School," Edcomtech,. 2016.

L. Nurlaela, M. Samani, I. G. P. Asto, and S. C. W. (2018). "The effect of thematic learning model, learning style, and reading ability on the students'' learning outcomes,"." In IOP Conference Series: Materials Science and Engineering, 296,.

M. T. Wuryani, R. Roemintoyo, and S. Yamtinah. (2018). "Thematic Textbooks Based Character Education on Thematic Learning Primary School: An Influence,." Int. J. Educ. Methodol., 4, no.

Mardhatillah, K. Ansari, A. Adisaputera, E. Surya, B. Sinaga, and D. A. (2023). "The Influence of the Integrated Thematic Learning Model of High Order Thinking Skills (HOTS) and Personality Types on Basic Student Learning Outcomes,." J. Soc. Stud. Educ. Res., Vol. 13099108, No. 13099108, Pp. 97-105,.

N. Ain. (2017). "Holistic Thematic Learning in the Elementary School: Is It Thematic and Holistic?",. Adv. Soc. Sci. Educ. Humanit. Res., 158,.

N. D. Agustin, A. P. Dewi, and M. R. (2025). "Analysis of Learning Media to Increase Student Learning Interest through Technology-Based Learning,",. J. Multidisciplinary Acad Sciences, 2, no.

R. Fadilah. (2025). "Development of Android Video-Based Learning Media to Increase Student Interest and Skills at SMK Pasundan 1 Kota Serang,." J. Din. Educ. Nusant., V, ol. 6, no.

R. Fogarty and B. M. Pete. (2009). Haw to Interate the Curricula Third Edition. United States of America: Corwin A SAGE Company,.

S. N. I. Trisnawati, U. Khasanah, and N. F. (2024). "Improving Critical Writing Skills: Strengthening Future Education Literacy," in AMONG: Proceedings of the National Seminar on Community Service,. In 2024, pp. 224-233.

S. N. Maulidah, M. A. Madani, N. Nabilah, M. R. R. Ali, I. Ikmawati, A., & Z. Untu. (2024). "Analysis of the Teacher's Role in 21st Century Learning for Elementary School Students in the Independent Curriculum,." Pop. J. Penelit. Mhs., 3, no.

S. Nurfadhillah, D. A. Ningsih, P. R. Ramadhania, and U. N. Sifa. (2021). "The Role of Learning Media in Increasing the Learning Interest of Students of SD Negeri Kohod III,." PENSA J. Educ. and Soc. Sciences, 3, no.

S. R. Yulita and Z. Aryani. (2024). "Linkage of the Mardeka Curriculum with the 21st Century Learning Model in the Development of the Times,." ICENI (Insan Cita Pendidikan), 2, no.

S. Z. Dewi and I. Hilman. (2018). "The Use of ICT as Innovative Learning Resources and Media in Elementary Schools," Indones. J. Prim. Educ., 2, no.

Stan, A. (2014). The City's Creative Writing: From Morphology to Virtual Landscape. Procedia - Social and Behavioral Sciences, 149, 901–905. https://doi.org/10.1016/j.sbspro.2014.08.279

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8. Author Declaration

8.1 Confirmation of Originality

We, the undersigned authors, hereby confirm that the work presented in this manuscript is original and has not been published previously, nor is it under consideration for publication elsewhere. All sources of information, whether published or unpublished, have been appropriately cited or acknowledged. Any use of copyrighted material has been done with permission or falls within fair use guidelines. The manuscript

has been read and approved by all named authors, and there are no other persons who satisfied the criteria for authorship but are not listed.

8.2 Conflicts of Interest

The authors declare no conflicts of interest in relation to the research, authorship, and/or publication of this work. No financial, personal, or professional relationships have influenced the design, conduct, analysis, or reporting of the study. Where applicable, all funding sources and institutional affiliations have been disclosed separately.