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The Implementation of the Team Assited Individualization Learning Model to Improve Student's Learning Outcomes

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ABSTRACT
This study aims to examine the effect of the Team Assisted Individualization (TAI) learning model on students' learning outcomes and analytical thinking skills. The study addresses the limited development of higher-order thinking skills (HOTS), particularly analytical skills (C4), among elementary school students. Although previous studies have shown the effectiveness of the TAI model, its specific impact on analytical skills in science learning remains underexplored. This research employed a quasi-experimental method with a post-test only control group design. The sample consisted of an experimental class and a control class. Data were collected using a validated test instrument and analyzed through normality, homogeneity, and independent samples t-test. The results showed a significant difference between the groups, with a significance value of 0.020 (< 0.05), indicating that the TAI model effectively improves students' learning outcomes and analytical skills

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INTRODUCTION

Higher-order thinking skills (HOTS), particularly analytical thinking skills at the C4 level, are essential for elementary school students because science learning requires learners to identify relevant information, connect concepts, interpret data, and explain natural phenomena logically. In the context of globalization and the digital transformation of education, students are expected not only to remember scientific facts but also to apply knowledge to solve contextual problems (Dwi et al., 2022). Therefore, improving the quality of the learning process has become an important strategy for strengthening students' academic achievement and cognitive development. Learning innovation is needed to create a more effective learning environment that supports students' engagement, conceptual understanding, and learning outcomes (Wahyuni, 2023).

Teachers play a crucial role in designing meaningful learning experiences because learning is not merely a process of transferring knowledge but also a process of guiding students to construct understanding actively. An effective classroom environment should encourage interaction, collaboration, and student participation to develop both academic competence and higher-order thinking skills (Nazira et al., 2025). However, students' science achievement in Indonesia remains a

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concern. The 2022 PISA results showed that Indonesian students obtained a science score of 383, which was lower than the 2018 score of 396 (Bilad et al., 2024). This finding indicates that many students still experience difficulties in understanding scientific concepts, interpreting information, and applying reasoning skills in problem-solving activities. Similar concerns have also been reported among elementary school students in Southeast Asia, whose analytical and critical thinking skills remain relatively low (Tinungki et al., 2022).

The low level of students' analytical thinking is also reflected in classroom learning. Many students experience difficulties in categorizing information, drawing conclusions from available data, and explaining scientific concepts through empirical phenomena (Diatmika & Sudirman, 2024). Preliminary observations at SDN 77/1 Penerokan revealed similar conditions. Many students appeared unfocused during the learning process, which affected their academic performance. Based on daily assessment results, only 10 out of 22 students achieved the expected level of mastery, indicating that students' learning outcomes still need improvement.

Table 1. Student Daily Assessment Scores

No.	Name	Score
1.	AZ	80
2.	AF	75
3.	AH	65
4.	AJ	55
5.	DS	45
6.	DD	40
7.	DV	35
8.	FH	65
9.	FZ	75
10.	G	55
11.	GL	45
12.	GD	80
13.	TS	70
14.	P	85
15.	HH	80
16.	LS	80
17.	NNA	70
18.	NU	85
19.	NA	80
20.	YS	85
21.	ST	85
22.	ZA	80
	Max	85
	Min	35
	Average	68,86

Table 1 presents students' daily assessment scores, showing an average score of 68.86, with scores ranging from 35 to 85. This wide score distribution suggests that students' mastery of science concepts was uneven, and several students had not reached the expected level of competence. More

importantly, these findings indicate the need for an instructional approach that can strengthen students' analytical thinking skills and improve learning outcomes through greater student participation.

One instructional model with the potential to address this issue is Team Assisted Individualization (TAI). TAI combines cooperative learning with individual responsibility through heterogeneous grouping, peer tutoring, and individual task completion. This model encourages students to discuss ideas, clarify misconceptions, and construct understanding through social interaction while maintaining accountability for individual learning outcomes (Andari et al., 2023; Awal, 2025). Previous studies have shown that TAI contributes positively to learning outcomes, student activity, and motivation (Dwi et al., 2022; Singaraja, 2017; Rodhiyah et al., 2024).

Nevertheless, previous studies have mainly focused on general academic achievement and classroom participation, whereas the specific contribution of TAI to analytical thinking skills (C4) in elementary science learning remains underexplored. In addition, several previous studies employed descriptive or classroom action research approaches, indicating the need for stronger empirical evidence through quasi-experimental research designs.

Therefore, the novelty of this study lies in its focus on implementing the TAI learning model to improve both students' learning outcomes and analytical thinking skills in elementary science learning. Unlike previous studies, this research specifically examines how TAI supports students' ability to analyze information, organize conceptual relationships, and draw reasoned conclusions. Accordingly, this study aims to examine the effect of the Team Assisted Individualization learning model on students' learning outcomes and analytical thinking skills at SDN 77/1 Penerokan.

METHODS

This study employed a quantitative quasi-experimental method using a post-test only control group design. This design was selected because the research was conducted in an authentic school setting where students had already been organized into intact classes, making individual random assignment impractical. Two classes participated in the study: an experimental class consisting of 22 students and a control class consisting of 25 students. The experimental class was taught using the Team Assisted Individualization (TAI) learning model, whereas the control class was taught using conventional instruction.

The population of the study was students at SDN 77/1 Penerokan. The sample was determined through purposive sampling by selecting two classes with relatively comparable characteristics, including grade level, science learning topic, school schedule, and regular classroom participation. This sampling technique was used to maintain the natural classroom setting while ensuring that both groups were educationally comparable for the purpose of the experiment.

The research instrument was a post-test developed from the science learning objectives and analytical thinking indicators based on the revised Bloom's taxonomy. The instrument consisted of 20 items scored on a 0-100 scale. The items were mapped onto three main analytical indicators: differentiating relevant and irrelevant information, organizing relationships among concepts or data, and attributing or drawing reasoned conclusions from scientific phenomena. Content validity was examined through expert judgement by considering the relevance of each item to the learning objectives, the clarity of item wording, and the suitability of the items for the C4 cognitive level. Empirical validity was tested using product moment correlation, with items considered valid when

the calculated correlation coefficient exceeded the table value at the 0.05 significance level. Instrument reliability was examined using Cronbach's alpha, and the instrument was considered reliable when the alpha coefficient met the acceptable reliability criterion. After the data met the prerequisite tests, namely the Kolmogorov-Smirnov normality test and Levene's homogeneity test, the hypothesis was tested using an independent samples t-test at a significance level of 0.05 (α = 0.05).

Table 2. Post-test only group design research design

Class	*Treatment*	*Post-test*
experimental	X	O_1
Control	-	O_2

Source: (Sugiyono, 2013)

Description:

O_1 : Post-test in the experimental class

O_2 : Post-test in the control class

X : Treatment using Team Assisted Individualization (TAI)

RESULTS

Descriptive statistics and inferential analysis are used to present the study's findings. The results of the prerequisite tests show that the data satisfied the assumptions needed for additional analysis; the homogeneity test using Levene's test produced a significance value of 0.699 (> 0.05), indicating that the data were homogeneous; additionally, the normality test using the Kolmogorov-Smirnov test revealed significance values of 0.134 for the experimental class and 0.124 for the control class (both > 0.05), indicating that the data were normally distributed. The necessary tests' findings show that the data satisfied the presumptions needed for additional analysis. The data were homogeneous, according to the homogeneity test using Levene's test, which produced a significance value of 0.699 (> 0.05). Additionally, the Kolmogorov-Smirnov test for normality revealed significant values of 0.134 for the experimental class and 0.124 for the control class (both > 0.05), suggesting that the data were regularly distributed.

Table 3. Normality and Homogeneity Test Results

Class	Homogeneity	Normality
Control	0.699	0.134
Experiment		0.124

The experimental class (n = 22) had a mean score of 75.60, a standard deviation of 12.936, a maximum score of 100, and a minimum score of 50, while the control class (n = 25) had a mean score of 66.40, a standard deviation of 14.107, a maximum score of 90, and a minimum score of 40, according to descriptive statistics. The mean score for the experimental class (n = 22) was 75.60, with a standard deviation of 12.936, a maximum score of 100, and a low score of 50. In contrast, the control group (n = 25) had a minimum score of 40, a maximum score of 90, a standard deviation of 14.107, and a mean score of 66.40

Table 4. Descriptive Statistics

Class	**Average Score**	**Standard Deviation**	**Maximum Score**	**Minimum Score**

Experimen	75.60	12,936	100	50
Control	66.40	14,107	90	40

The independent samples t-test was used to test hypotheses. The findings revealed a statistically significant difference between the experimental and control groups, with a significance value of 0.020 (< 0.05).

Table 5. Hypothesis

Independent Samples Test	
T	Sig. (2-tailed)
-2.403	.020

These results indicate that there is a significant difference in learning outcomes between students in the experimental class and those in the control class.

DISCUSSION

The findings of this study indicate that the Team Assisted Individualization (TAI) learning model had a positive and significant effect on students' learning outcomes and analytical thinking skills. The experimental class achieved a higher mean score than the control class, and the independent samples t-test showed a significance value of 0.020 (< 0.05). These findings suggest that students who learned through the TAI model demonstrated better cognitive performance than those who received conventional instruction. Beyond the increase in learning outcomes, the results also indicate that students' analytical thinking skills can be strengthened through learning activities involving collaboration, peer support, and individual responsibility. This finding is important because the educational problem identified in this study was related to students' low analytical thinking abilities and limited opportunities for active engagement in science learning.

The effectiveness of the TAI model can be explained through the perspective of social constructivist theory, which emphasizes that meaningful learning occurs when students actively construct knowledge through interaction, discussion, scaffolding, and problem-solving activities (Mishra, 2023). In TAI-based learning, students are not positioned as passive recipients of information; rather, they actively discuss ideas, compare answers, clarify misconceptions, and explain concepts to peers. Such activities provide opportunities for students to differentiate relevant information, organize concepts, identify relationships among ideas, and draw logical conclusions. Therefore, TAI supports the development of analytical thinking skills because students actively process information rather than simply memorize scientific facts.

The findings of this study are also supported by previous research on cooperative learning. (Öztürk, 2023), through a second-order meta-analysis, reported that cooperative learning positively influences learning outcomes because it promotes active participation and collaborative knowledge construction. Similarly, (Hank & Huber, 2024) highlighted that peer interaction in elementary education facilitates social learning and enhances students' confidence and participation. Within the TAI model, heterogeneous grouping enables students with different ability levels to support one another, allowing stronger students to model problem-solving strategies while helping other students gain understanding through peer explanations.

Nevertheless, previous studies have mainly focused on general learning outcomes, motivation, and classroom participation, whereas the specific role of TAI in improving analytical

thinking skills at the C4 level in elementary science learning remains underexplored. Furthermore, several earlier studies employed descriptive or classroom action research approaches, providing limited empirical evidence regarding the impact of TAI on higher-order thinking skills. Therefore, a stronger quasi-experimental approach is necessary to provide more robust evidence regarding the effectiveness of TAI.

The novelty of the present study lies in its emphasis on examining the role of TAI in improving both students' learning outcomes and analytical thinking skills in elementary science learning. Unlike previous studies, this research specifically links TAI learning activities with analytical indicators such as differentiating information, organizing conceptual relationships, and drawing reasoned conclusions. The results strengthen previous findings by demonstrating that TAI contributes not only to academic achievement but also to the development of higher-order cognitive skills.

Accordingly, the findings of this study support the research objective of examining the effect of the Team Assisted Individualization learning model on students' learning outcomes and analytical thinking skills. The difference between the experimental and control classes suggests that conventional instruction may provide fewer opportunities for students to actively construct understanding and develop analytical abilities. In contrast, TAI creates a more interactive learning environment through collaborative discussion and individual accountability. Therefore, the implementation of TAI can be considered an effective instructional strategy for improving students' learning outcomes and analytical thinking skills in elementary science education. Nevertheless, future studies are recommended to involve larger samples, apply pre-test and post-test designs, and employ more comprehensive analytical thinking instruments to obtain a broader understanding of the impact of TAI on students' higher-order thinking skills.

CONCLUSIONS

The statistical analysis revealed a significant difference between the experimental and control groups, with the obtained result ($p = 0.020 < 0.05$) indicating that the implementation of the Team Assisted Individualization (TAI) learning paradigm had a statistically significant effect on students' learning outcomes. Furthermore, the experimental group achieved higher mean scores compared to the control group, demonstrating that students who participated in the TAI-based learning activities performed better academically than those who received conventional instruction. The findings suggest that the TAI learning paradigm effectively facilitates active student engagement through collaborative learning while simultaneously accommodating individual learning needs. By combining teamwork with individualized instruction, TAI enables students to exchange ideas, support one another in problem-solving activities, and develop a deeper understanding of scientific concepts. This learning environment not only promotes knowledge acquisition but also encourages meaningful interaction and peer-assisted learning, which are essential components of effective science education.

Moreover, the analysis at the cognitive level indicates that the TAI model contributes significantly to the enhancement of higher-order thinking skills, particularly at the analytical level (C4) within Bloom's Taxonomy. Students exposed to the TAI approach demonstrated improved abilities to analyze information, identify relationships among concepts, evaluate evidence, and

formulate logical conclusions. These analytical competencies are crucial for elementary students as they build the foundation for critical thinking and scientific reasoning in later educational stages. The success of the TAI model can also be attributed to its student-centered nature, which encourages learners to take responsibility for their own learning while benefiting from collaborative support. Through structured group activities and individualized assistance, students become more motivated, confident, and actively involved in the learning process. Such characteristics align with the goals of contemporary science education, which emphasize not only content mastery but also the development of 21st-century skills.

Therefore, based on the statistical evidence and observed improvements in students' cognitive achievement, it can be concluded that the Team Assisted Individualization (TAI) learning paradigm is an effective instructional strategy for improving academic performance in elementary science education. The model not only enhances overall learning outcomes but also fosters higher-order thinking skills, making it a valuable approach for educators seeking to create more engaging and effective science learning environments.

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