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The Effect of the Contextual Teaching and Learning (CTL) Model on IPAS Learning Outcomes of Grade 3 Students at Primary School

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ABSTRACT

The Contextual Teaching and Learning (CTL) model is a student-centred instructional strategy that links learning content to students' real-life environments and everyday experiences, enabling students to discover learning concepts independently through contextualised inquiry guided by the teacher. This study aims to examine the effect of the CTL model on the IPAS (Integrated Natural and Social Science) learning outcomes of Grade 3 students at SD YPK Ebenhaezer Yukase, Maybrat Regency. A quantitative approach with a pre-experimental one-group pretest-posttest design was employed. The research was conducted in September–October 2025 at SD YPK Ebenhaezer Yukase, Maybrat Regency. The sample comprised 20 Grade 3 students. Data were collected through observation, IPAS test instruments, and documentation. Instrument validity was confirmed by expert judgment (validated by Desti Rahayu, M.Pd., a PGSD lecturer at UNIMUDA Sorong), and reliability was assessed using Cronbach's Alpha, yielding $\alpha = 0.823$ (> 0.7), confirming reliability. Normality testing (Kolmogorov-Smirnov and Shapiro-Wilk) produced significance values of 0.000 for both pretest and

posttest (< 0.05), indicating non-normal data distributions. Hypothesis testing was therefore conducted using the non-parametric Wilcoxon Signed Ranks Test. The pretest mean was 26.75 and the posttest mean was 61.00, representing a substantial improvement of 34.25 points. Wilcoxon Signed Ranks Test results showed that 19 of 20 students experienced positive rank improvement (posttest > pretest), one student showed no change, and no student experienced a decline. The significance value (p-value) was 0.000 (< α = 0.05), leading to the rejection of H_0 and acceptance of H_1. It is concluded that the CTL model has a statistically significant positive effect on the IPAS learning outcomes of Grade 3 students at SD YPK Ebenhaezer Yukase, Maybrat Regency.

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INTRODUCTION

Education is a fundamental process for enabling human beings to acquire knowledge, develop competencies, and cultivate the capacity for independent and meaningful participation in society. The quality of education is substantially determined by the quality of the learning process, which encompasses the instructional strategies, learning models, and materials employed by teachers in the classroom context (Prastowo, 2019). Within the Merdeka Belajar Curriculum framework, which emphasises the integration of intracurricular learning activities, Pancasila student profile strengthening, and extracurricular engagement, the central pedagogical challenge is to create learning environments that are contextually meaningful, actively engaging, and relevant to students' daily experiences (Sidbutar, 2022).

Among the learning models aligned with these curricular aspirations, the Contextual Teaching and Learning (CTL) model occupies a central position.

CTL is an instructional strategy that situates learning within students' real-life contexts and environments, enabling students to discover and construct knowledge through direct experience, contextual inquiry, and guided collaborative exploration. The model emphasises that learning should be contextual, meaningful, and relevant to students' actual life situations, rather than being abstracted from them (Sidbutar, 2022). In the context of IPAS (Ilmu *Pengetahuan Alam dan Sosial:* Integrated Natural and Social Science), which was introduced as a holistic and thematic subject within the Merdeka Belajar Curriculum, CTL enables students to engage with science and social concepts through direct observation of and interaction with phenomena in their immediate environment.

Preliminary observations at SD YPK Ebenhaezer Yukase, Maybrat Regency, revealed that students' IPAS learning outcomes were below expectations. Pre-study assessment data showed that only 5 of 13 students met the minimum completion criterion (KKM), with the remaining 8 students scoring below KKM, and the class mean standing at 68.5. These results reflected the predominant use of conventional, lecture-based instructional approaches and textbook-centred learning, with limited use of contextualised or inquiry-based instructional strategies. The learning material on forms of matter and their changes (*wujud zat dan perubahannya)* was delivered without systematic connection to students' everyday observations of matter in their environment.

Prior research on CTL in IPAS and science education in Indonesian primary schools consistently demonstrates its positive effect on learning outcomes. Fitriani et al. (2023) confirmed that CTL implementation improved both the process and outcomes of science learning at the elementary school level. Nadhiroh and Efendi (2023) found that CTL significantly improved science learning outcomes among Grade 4 elementary school students. A recent IJMRA study (2025) on the CTL model with audio-visual media in IPAS at the fourth grade level also confirmed significant improvements in IPAS learning outcomes. At the international level, the positive relationship between

contextual, real-world-connected learning and student achievement outcomes is well-established: a Scopus-indexed meta-analysis by Lei et al. (2018) and replicated by Wong et al. (2024), as reviewed in Educational Psychology Review, confirms that active, cognitively engaged learning consistently predicts academic achievement. This study was conducted to examine the effect of the CTL model on IPAS learning outcomes of Grade 3 students at SD YPK Ebenhaezer Yukase, Maybrat Regency.

METHODS

Research Design

This research employed a quantitative approach with a pre-experimental one-group pretest-posttest design (Sugiyono, 2012). The research design is presented in Table 1.

Table 1. One-Group Pretest-Posttest Research Design

Pretest	Treatment	Posttest
O_1	X (CTL Model)	O_2

Note: O_1 = pretest (before CTL treatment); X = CTL Model instructional treatment; O_2 = posttest (after CTL treatment).

Research Setting and Sample

The research was conducted at SD YPK Ebenhaezer Yukase, Maybrat Regency, West Papua Province, from 13 to 17 October 2025. The target population comprised all students in Grades I through VI at SD YPK Ebenhaezer Yukase, totalling 179 students. The research sample comprised 20 Grade 3 students who received both the pretest and the CTL model instructional treatment.

Research Variables

The independent variable (X) was the Contextual Teaching and Learning (CTL) model, operationalised as a structured instructional intervention in which IPAS content on forms of matter and their changes was linked to students' real-life everyday experiences. The dependent variable (Y) was IPAS learning outcomes, measured through pretest and posttest scores.

Data Collection and Analysis

Data were collected through: (1) observation of learning activities; (2) IPAS test instruments (20-item multiple-choice test on forms of matter and their changes, administered as pretest and posttest); and (3) documentation. Instrument validity was confirmed through expert judgment by Desti Rahayu, M.Pd. (PGSD lecturer, UNIMUDA Sorong), who assessed the instrument for content validity and alignment with the IPAS Merdeka Curriculum competency standards. Reliability was assessed using Cronbach's Alpha, yielding $\alpha = 0.823$ (> 0.7), confirming the instrument's internal consistency.

Data analysis proceeded through: (1) reliability testing (Cronbach's Alpha); (2) normality testing (Kolmogorov-Smirnov and Shapiro-Wilk using SPSS 20.0 for Windows); and (3) hypothesis testing. Because normality testing revealed non-normal data distributions ($p < 0.05$) for both the pretest and posttest, the non-parametric Wilcoxon Signed Ranks Test was adopted for hypothesis testing (rather than the paired t-test), consistent with the principle that non-parametric tests are required when data do not satisfy the normality assumption for parametric procedures (Sudjana, 2009). The significance threshold was $\alpha = 0.05$.

RESULTS AND DISCUSSION

Pretest Results: IPAS Learning Outcomes Before CTL Implementation

Before the implementation of the CTL model, all 20 Grade 3 students completed the IPAS pretest on the topic of forms of matter and their changes. The frequency distribution of pretest scores is presented in Table 2.

Table 2. Frequency Distribution of IPAS Pretest Scores (Before CTL Treatment, N = 20)

No.	Category	Score Range	N	%
1	Very Good	81–100	1	5%
2	Good	61–80	0	0%

3	Adequate	41–60	1	5%
4	Low	21–40	6	30%
5	Very Low	10–20	12	60%
Total	–	–20	100%	

The pretest data confirm the severity of the learning challenge identified in the preliminary observations. The majority of students (60%, n = 12) scored in the Very Low category (score range 10–20). Only 1 student (5%) achieved the Very Good category, and 1 student (5%) achieved the Adequate category. The pretest mean score was 26.75, indicating that the majority of students had very limited prior understanding of the IPAS content in the conventional, non-contextualised instructional environment.

Posttest Results: IPAS Learning Outcomes After CTL Implementation

Following the implementation of the CTL model instructional intervention, the 20 Grade 3 students completed the IPAS posttest. The frequency distribution of posttest scores is presented in Table 3.

Table 3. Frequency Distribution of IPAS Posttest Scores (After CTL Treatment, N = 20)

No.	Category	Score Range	N	%
1	Very Good	81–100	1	5%
2	Good	61–80	7	35%
3	Adequate	41–60	11	55%
4	Low	21–40	1	5%
5	Very Low	10–20	0	0%
Total	–	–20	100%	

The posttest results demonstrate a dramatic shift in the distribution of student IPAS performance. The Very Low category was completely eliminated (0% of

students), and the majority of students (55%, n = 11) are now in the Adequate category. The Good category increased from 0% (pretest) to 35% (n = 7), and 1 student (5%) achieved the Very Good category. The posttest mean was 61.00, representing an improvement of 34.25 points from the pretest mean of 26.75.

Prerequisite Testing: Normality

Prior to hypothesis testing, the normality of the pretest and posttest data distributions was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Results are presented in Table 4.

Table 4. Normality Test Results (Kolmogorov-Smirnov and Shapiro-Wilk)

Variable	Kolmogorov-Smirnov[a]			Shapiro-Wilk			Conclusion
	Stat.	df	Sig.	Stat.	df	Sig.	
Pretest	.279	20	.000	.611	20	.000	Non-normal ($p < 0.05$)
Posttest	.320	20	.000	.763	20	.000	Non-normal ($p < 0.05$)

a. Lilliefors Significance Correction applied. Source: Primary data processed with SPSS 20.0.

The normality test results confirm that both the pretest (K-S Sig. = 0.000; S-W Sig. = 0.000) and posttest (K-S Sig. = 0.000; S-W Sig. = 0.000) data distributions are non-normal ($p < 0.05$). The assumption of normality required for parametric testing (paired t-test) is therefore not met. Accordingly, the non-parametric Wilcoxon Signed Ranks Test was adopted as the appropriate hypothesis testing method.

Hypothesis Testing: Wilcoxon Signed Ranks Test

The research hypotheses were: H_0: the CTL model has no significant effect on the IPAS learning outcomes of Grade 3 students at SD YPK Ebenhaezer Yukase; H_1: the CTL model has a significant positive effect on the IPAS learning outcomes of Grade 3 students. The Wilcoxon Signed Ranks Test results are presented in Table 5.

Table 5. Wilcoxon Signed Ranks Test Results: Posttest vs Pretest (N = 20)

Posttest – Pretest	**N**	**Mean Rank**	**Sum of Ranks**
Negative Ranks (Posttest < Pretest)	0	.00	.00
Positive Ranks (Posttest > Pretest)	19	10.00	190.00
Ties (Posttest = Pretest)	1	–	–
Total	20	–	–
Wilcoxon Signed Ranks Test Z	−3.831		
Asymp. Sig. (2-tailed)	**.000**		

Source: Primary data processed with SPSS 20.0.

The Wilcoxon Signed Ranks Test results reveal that 19 of 20 students demonstrated positive rank improvement (posttest score > pretest score), 1 student showed no change (tie), and no student experienced a decline. The Z-score was −3.831 and the asymptotic significance (2-tailed) was 0.000, which is less than $\alpha = 0.05$. H_0 is therefore rejected and H_1 is accepted: the CTL model has a statistically significant positive effect on the IPAS learning outcomes of Grade 3 students at SD YPK Ebenhaezer Yukase, Maybrat Regency.

Discussion

The findings of this study confirm that the CTL model is a highly effective instructional strategy for improving IPAS learning outcomes at the primary school level. The improvement in mean score from 26.75 (pretest) to 61.00 (posttest), representing a gain of 34.25 points, combined with the complete elimination of the Very Low score category and the Wilcoxon Signed Ranks Test significance value of 0.000, provide robust evidence of the CTL model's instructional effectiveness in the IPAS subject domain at Grade 3 level.

The CTL model is effective because it directly addresses the root cause of students' poor IPAS outcomes in the pre-intervention context: the absence of connection between abstract IPAS content and students' actual life experiences. By structuring IPAS learning around the topic of forms of matter and their

changes, with direct reference to objects and phenomena students encounter in their daily environments, the CTL model enabled students to construct meaningful understanding through contextualised inquiry and collaborative exploration. During the CTL instructional sessions, students visibly demonstrated increased enthusiasm and engagement, connected learning content to familiar real-world examples (such as state changes in cooking and environmental phenomena observable in Maybrat Regency), and participated actively in group discussions and problem-solving tasks. This transformation from passive reception to active contextual inquiry is precisely what the CTL model is designed to achieve (Sidbutar, 2022).

The present findings are consistent with and supported by comparable research. Fitriani et al. (2023) confirmed in the Education and Human Development Journal that CTL implementation improved both the process and outcomes of science learning in elementary schools, with students demonstrating higher activity, engagement, and conceptual understanding. Nadhiroh and Efendi (2023) confirmed the superiority of CTL over conventional instruction in science learning outcomes at the Grade 4 elementary school level. The IJMRA study by Saingo et al. (2025) documented significant improvement in IPAS learning outcomes through CTL with audio-visual media assistance, with Sig. = 0.000 < 0.05 and a substantial effect size, directly paralleling the findings of the present study. The research by Saifuddin (2019) similarly reported a significant positive effect of CTL on IPAS learning outcomes among Grade IV students, with a posttest mean of 83.4 compared to a pretest mean of 52.3, again corroborating the pattern of substantial pretest-to-posttest improvement documented in the current study.

This study also makes a methodological contribution by appropriately identifying non-normal data distributions and applying the non-parametric Wilcoxon Signed Ranks Test in response. This methodological rigour is important for ensuring the validity of hypothesis test conclusions in small-sample studies (N = 20) with non-normal distributions, and is consistent with

established statistical practice for pre-experimental designs in educational research (Sudjana, 2009).

CONCLUSION

This study concludes that the Contextual Teaching and Learning (CTL) model has a statistically significant positive effect on the IPAS learning outcomes of Grade 3 students at SD YPK Ebenhaezer Yukase, Maybrat Regency. The Wilcoxon Signed Ranks Test yielded an asymptotic significance (2-tailed) of 0.000 ($< \alpha = 0.05$), with 19 of 20 students demonstrating positive rank improvement. The IPAS mean score improved from 26.75 (pretest) to 61.00 (posttest), a gain of 34.25 points. The Very Low score category was eliminated in the posttest, with the majority of students (55%) achieving Adequate performance and 40% achieving Good or Very Good levels. The CTL model proves effective in IPAS instruction by linking abstract science and social content to students' real-life contexts, enabling students to discover and apply concepts through meaningful, experience-grounded learning. It is recommended that teachers at SD YPK Ebenhaezer Yukase and comparable primary schools in Maybrat Regency adopt the CTL model systematically in their IPAS instruction, with careful planning to ensure contextual connections are made between IPAS content and locally relevant phenomena and everyday student experiences. Future research should employ control group designs to strengthen causal inference, explore the specific CTL implementation strategies most effective for IPAS content in remote West Papua settings, and investigate the long-term effects of CTL on IPAS conceptual understanding and transfer.

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Declarations

Author Contribution	:	E. Jitmau: Conceptualization, Data Collection, Formal Analysis, Writing - Original Draft; H. S. Astutik: Writing - Review & Editing and Methodology; M. A. Kasri: Validation and Supervision.
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