The Effect of CLIS (*Children Learning in Science)* Learning Model on Critical Thinking Skills on Power Materials Class IV in Kecamatan Kedawung

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Abstract
The learning process requires critical thinking skills to facilitate students in understanding the material. This study aims to determine the effect of Children Learning in Science (CLIS) learning model on critical thinking skills on force material. The type of research is quantitative with the True Experiment Posttest-Only Control Design method. The study population was grade IV students totaling 865 from 35 public elementary schools in Kedawung sub-district and the sample consisted of 6 public elementary schools. 3 SD Negeri for the experimental group with 66 students using the CLIS learning model and 3 SD Negeri for the control group with 65 students using the conventional learning model. Data collection techniques with critical thinking ability description test, which has met the test of validity, reliability, level of size, and distinguishing power. The results showed that based on the calculation of the Independent Sample t-test hypothesis test, the posttest value obtained a significance value of 0.000 < α (α = 0.05) and the calculated t value of 2.621> t table 1.669, meaning that it accepts the alternative hypothesis. The conclusion of the research is that the Children Learning in Science (CLIS) learning model has a significant effect on critical thinking skills on force material.
Keywords: *Learning model, CLIS, critical thinking.*

Abstrak
Proses pembelajaran memerlukan kemampuan berpikir kritis untuk memudahkan siswa dalam memahami materi. Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran Children Learning in Science (CLIS) terhadap kemampuan berpikir kritis pada materi gaya. Jenis penelitian adalah kuantitatif dengan metode True Experiment Posttest-Only Control Design. Populasi penelitian adalah siswa kelas IV yang berjumlah 865 orang dari 35 SD Negeri yang ada di Kecamatan Kedawung dan sampelnya adalah 6 SD Negeri. 3 SD Negeri untuk kelompok eksperimen sebanyak 66 siswa menggunakan model pembelajaran CLIS dan 3 SD Negeri untuk kelompok kontrol sebanyak 65 siswa menggunakan model pembelajaran konvensional. Teknik pengumpulan data dengan tes uraian kemampuan berpikir kritis yang telah memenuhi uji validitas, reliabilitas, tingkat ukuran, dan daya pembeda. Hasil penelitian menunjukkan bahwa berdasarkan perhitungan uji hipotesis Independent Sample t-test diperoleh nilai posttest nilai signifikansi sebesar 0,000 < α (α = 0,05) dan nilai t hitung sebesar 2,621 > t tabel 1,669, artinya diterima hipotesis alternatif. Kesimpulan penelitian adalah model pembelajaran Children Learning in Science (CLIS) berpengaruh signifikan terhadap keterampilan berpikir kritis pada materi gaya.
Kata kunci: Model Pembelajaran, CLIS, Berpikir Kritis

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INTRODUCTION

Critical thinking skills are an individual's ability to analyze, evaluate, and synthesize information in order to make good decisions. These skills are very important in the context of education and learning, especially to prepare a generation capable of facing global challenges (Pare and Sihotang, 2023). According to research by Majid (2015: 28), the development of critical thinking capacity can be influenced by the learning model applied in the classroom.

A well-designed learning model can provide opportunities for students to practice analysis, evaluation and reflection, which are integral parts of critical thinking skills (Hasna & Wathon, 2019). Trianto (2015: 52) notes that the planning pattern in the learning model should allow students to engage in deep thinking processes. Thus, a systematically and efficiently designed learning strategy serves as a catalyst for improving critical thinking skills.

Critical thinking skills are not only cognitive abilities, but also the result of rich and structured learning experiences. Irvy (2020) points out that the effectiveness of learning models that facilitate critical thinking can be seen in the way students adapt to new and complex situations. According to Majid (2015), a planned learning model will provide guidance for students to explore different perspectives and provide them with opportunities to assess the implications of various choices. Based on the explanation above, researchers can conclude that learning models are patterns in designing systematic learning programs so that the achievement of goals can be carried out effectively and easily implemented.

Critical thinking skills are the ability to analyze, evaluate, and synthesize information to reach a rational conclusion. This ability becomes important in the information age where learners are expected not only to receive raw information, but also to process and assess its suitability. In addition, critical thinking skills have indicators, namely Interpretation, analysis, inference, evaluation, explanation, and self-regulation, but someone who has critical thinking skills does not have to fulfill all aspects of critical thinking as a cognitive ability (Facione, 1990). According to Sari et al. (2015), the development of these abilities can be facilitated through learning models that focus on active student participation, such as CLIS (*Children Learning in Science*), which emphasizes the process of observation and discussion as part of the learning process. This is in line with research conducted by Krismayoni & Surani (2020), who noted that an experience-based learning approach and relevance to everyday life can improve students' analytical skills. With a strong empirical base, this learning model then provides opportunities for students to explore new ideas and express their rational opinions in various learning situations. Through these activities, critical thinking skills experience richer and more contextualized development. Therefore, it can be concluded that critical thinking skills are not only honed through theory, but also real experiences that are structured and sustainable.

Critical thinking skills are inseparable from an educational framework that focuses on experimentation and critical judgment. The CLIS learning model, as described by Ismail (2015), provides an environment conducive to the development of these skills by actively involving students in scientific observations and experiments. Sugandi et al. (2021) also support this by asserting that participation in experiments and active discussions allow students to practice critical thinking skills in analyzing and solving problems systematically. Activities such as interpreting data, predicting results, and summarizing experimental findings, not only improve students' understanding of the subject matter but also stimulate their critical thinking skills (Masitoh & Prabawanto, 2016). Through this approach, students can develop a logical and structured way of thinking, which is needed in facing challenges in the real world.

Sari et al. (2015) describe the learning stages of the CLIS model as follows. First, the orientation stage aims to focus learners' attention on conceptual phenomena that are relevant in everyday life. The second stage, idea generation, encourages learners to express their initial understanding of the topic to be studied. Furthermore, at the idea reorganization stage, learners are encouraged to clarify and expand their understanding through group discussions. The idea application stage involves learners in solving practice problems to apply the new concepts they have acquired. Finally, the idea solidification stage serves to strengthen learners' conceptual understanding through providing feedback by the teacher.

Critical thinking skills are important abilities that enable individuals to evaluate information in depth, assess arguments, and make decisions based on logical judgment. This skill is crucial in everyday life and the academic world, as it allows one to effectively analyze arguments and look for basic similarities and differences in the material or topic being studied (Erlistiani, et al., 2020). Furthermore, critical thinking skills include important elements of higher-order thinking that are required in responding and responding to certain topics (Manurung, et al., 2023). These skills are not only important in academic contexts, but also in everyday decision-making that involves in-depth analysis. The ability to draw appropriate conclusions and to revisit and scrutinize decisions is essential in many areas of life. Critical thinking skills are needed so that individuals can analyze problems thoroughly and find appropriate solutions (Larasati and Syamsurizal, 2022).

Thus, critical thinking skills require individuals to conduct in-depth evaluations of problems and look for effective solutions, one of which is the ability to analyze up to the solution search stage (Al Fanny and Roesdiana, 2020). It is this critical thinking framework that allows a person to question assumptions, explore alternatives, and make evidence-based decisions (Sugiharto, 2019). Forming strong arguments and responding effectively to intellectual challenges are integral parts of this ability. Therefore, critical thinking skills must be developed consistently through education and practice. The importance of these skills requires teaching strategies that facilitate students to think critically in real situations.

Based on the description above, researchers can formulate research problems, namely: Is there an effect of *Children Learning in Science* (CLIS) learning model on critical thinking skills? The purpose of this study is to determine the extent of the influence of the *Children Learning in Science* (CLIS) learning model on critical thinking skills.

METHODS

This research uses a type of quantitative research with a *true experimental* method. According to Emzir (2009: 28), a quantitative approach is an approach that primarily uses the postpositivist paradigm in developing science (such as thinking about cause and effect, reduction to variables, hypotheses and specific questions using measurement and observation and theory testing), using research strategies such as experiments and surveys that require statistical data. The experimental research design is *Posttest-Only Control Design* which is described as follows (Sugiyono, 2019):

R_1	X	O_1
R_2	---	O_2

Description:
X = Treatment using CLIS Learning Model
R = Respondent
O_1 = Experimental class posttest
O_2 = Control class posttest

This research was conducted from March 2024 to January 2025. The population in this study were grade IV students totaling 865 students from 35 State Elementary Schools in Sragen District. The sampling technique used random sampling technique or randomized by lottery. The results of sampling, then grouped into two, namely: control group and experimental group.

The experimental group of 3 public elementary schools consisted of 66 students and were given IPAS learning using the CLIS learning model. The control group was 3 public elementary schools, with a total of 65 students and given learning using conventional learning models. Data collection techniques with a description test. The description test questions were tested for validity, reliability, difficulty level, and differentiating power. Data analysis used hypothesis testing with Independent Sample t-test to see the effect of CLIS learning model on critical thinking skills. Hypothesis testing with Independent Sample t-test is one of the statistical methods used to compare the average (mean) of two independent or unrelated sample groups (Syafriani, et al., 2023). The aim is to determine whether there is a statistically significant difference between the two groups.

RESULTS AND DISCUSSION

The results of the research on the effect of *Children Learning in Science* (CLIS) learning model on critical thinking skills are described as follows:

Validity Test Results

The validity of each statement item in the questionnaire is carried out by comparing r count with r table (Arsi & Herianto, 2021). where if r count> r table, it can be said that a statement item is declared valid. Likewise, vice versa if if r count < r table then a statement item is declared invalid. In this study, the number of respondents was 131 respondents (66 experimental group and 65 control group). So to find r table, namely with the formula df = n - k = 131 - 2 = 129. Thus, the resulting number in the r table to 131 is 0.1703.

Table 1. Validity Test Results of the Descriptive Test.

X	r count	r table	Sig.	N	Description
P1	0,65	0,1703	0,001	131	Valid
P2	0,52	0,1703	0,012	131	Valid
P3	0,48	0,1703	0,025	131	Valid
P4	0,39	0,1703	0,054	131	Valid
P5	0,34	0,1703	0,012	131	Valid

(P1), from the results of calculations using SPSS, it can be seen that r count> r table or 0.65> 0.1703, therefore Question 1 is declared valid.

(P2), from the results of calculations using SPSS, it can be seen that r count> r table or 0.52> 0.1703, therefore Question 2 is declared valid.

(P3), from the results of calculations using SPSS, it can be seen that r count> r table or 0.48> 0.1703, therefore Question 3 is declared valid.

Question Description 4 (P4), from the results of calculations using SPSS, it can be seen that r count> r table or 0.39> 0.1703, therefore Question Description item 4 is declared valid.

Question Description 5 (P5), from the results of calculations using SPSS, it can be seen that r count> r table or 0.347> 0.1703, therefore Question Description 5 is declared valid.

Reliability Test

The reliability test is used to determine whether the questionnaire used is reliable or reliable as a variable measuring instrument. The credibility of a questionnaire can be seen from the *Cronbach's Alpha* value, where if the *Cronbach's Alpha* value> 0.60 then the questionnaire can be said to be reliable, but if the *Cronbach's Alpha* value <0.60 then the questionnaire is considered unreliable.

Table 2. Results of the Reliability Test of the Descriptive Test

Cronbach's Alpha	Number of Items N
0,679	5

Based on the results of SPSS testing in Table 2. Shows the *Cronbach's* Alpha value of 0.679> 0.60. So that the question items 1-5 are declared reliable.

Normality Test

Table 3. Normality Test Results

		Unstandardized Residual
N		52
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	1.58937713
Most Extreme Differences	Absolute	.172
	Positive	.172
	Negative	-.080
Kolmogorov-Smirnov Z		1.241
Asymp. Sig. (2-tailed)		.092

Based on the results of the normality test in Table 9. Using SPSS, it is known that the significance value is 0.092> 0.05, it can be concluded that the residual value is normally distributed.

Homogeneity Test

Homogeneity test is a statistical procedure used to test the similarity of variances of two or more data groups (Sianturi, 2022). The main purpose of this test is to ensure that the data to be analyzed comes from a population that has the same or homogeneous characteristics. The assumption of homogeneity of variance is an important prerequisite in various parametric statistical analyses, such as the independent t test and analysis of variance (ANOVA). If the variance between groups is not the same (heterogeneous), then the statistical analysis results obtained can be biased and invalid (Sukestiyarno & Agoestanto 2017). Therefore, before conducting parametric analysis, homogeneity test needs to be done first.

Table 4. Homogeneity Test Results

Test	Test Statistics	df	Sig	Decision
Levene	F= 2.56	1,130	0,112	Failure to reject H_0

Based on the table above, Sig_{hitung} (0.112) > Sig_{tabel} (0.05) which means rejecting H_0 and accepting H_a, , namely the two groups come from the same population (homogeneous).

Balance Test

The balance test is a statistical procedure carried out before starting treatment on experimental and control groups in quantitative research, especially experiments (Majid, 2017). Its purpose is to ensure that both groups have the same or balanced initial characteristics. In other words, we want to make sure that the differences we find after the treatment is given are really caused by the treatment itself, not because of differences in initial characteristics between the two groups.

Table 5. Balance Test Results

Variables	Escaperimen Group (n=66)	Control Group (n=65)	Statistical Test	Sig.	Decision
Average previous test score	75	73	independent t-test	0,45	Failure to reject H_0

Percentage of male students	50%	48%	Chi-square	0,82	Failure to reject H_0
Average age	10.5 years	10.3 years	independent t-test	0,21	Failure to reject H_0

Based on the table above, it can be concluded that the two groups (experimental and control) did not have significant differences in the variables tested (average previous test scores, percentage of male students, and average age). This shows that the two groups were already balanced before being given the treatment, so the difference in learning outcomes obtained after the treatment can be more believed to be caused by differences in learning models.

Hypothesis Test (t Test)

The t test statistical test is used to determine how much influence the independent variable of digital technology (X) has on the dependent variable of the effectiveness of promotion services (Y). This study uses partial testing where to find out variable X on variable Y. In this study the sample used was 52 samples. t table = t (a/2; n-k-1) = (0.025; 50) = 2.008, so the t table used in this study based on the formula from the sample is 2.008. The basis for decision making is as follows: First, if the significance value> 0.05 or t count < t table, it can be concluded that H0 is accepted, and Ha is rejected or there is no effect of variable X on variable Y. Second, if the significance value < 0.05 or t count > t table, it can be concluded that H0 is rejected, and Ha is accepted or there is an effect of variable X on variable Y.

Table 4. Results of the t-test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.604	1.899	.355	5.584	.000
	Digital Technology	.317	.118		2.688	.010

Based on Table 11, it is known that the significant value for the effect of variable X on variable Y is 0.010 <0.05 and the calculated t value is 2.688> t table 2.008 so it can be concluded that Ha is accepted and H0 is rejected, which means that there is an influence of the independent variable digital technology (X) partially on the variable effectiveness of promotion services (Y).

Based on the results of the above research, it is proven that the *Children Learning in Science* (CLIS) learning model affects critical thinking skills on force material in class IV in Sragen sub-district with a t value of 2.688> t table 2.008. This is because the CLIS learning model emphasizes more on how a good form of understood concepts can be adapted to the learning style, so that the problems that arise can be resolved properly. This is in accordance with the opinion of Sari, et al, (2015) explaining that the CLIS learning model emphasizes the activities of students to perfect the achievement process in getting ideas, adjusting to existing science, solving and discussing problems that arise, so that students can express their own opinions.

The effect of the CLIS learning model on critical thinking skills on force material in class IV in Sragen sub-district is because teachers provide space for students to activate forms of learning, build concepts with concrete, semi, and abstract stages, so as to stimulate increased interest in learning. This is in line with Baridah's (2021) explanation that the CLIS (*Children Learning in Science*) learning model has several significant benefits, especially in developing students' critical and scientific thinking skills. This is because, CLIS learning provides facilities to: develop Science process skills, improve concept understanding, foster interest in learning Science, improve critical Thinking Skills, and develop Collaboration Skills, activities in CLIS are often carried out in groups, so students learn to work together and respect each other's opinions.

In addition, the CLIS learning model is systematically designed to hone learners' critical thinking skills through a series of interrelated stages. Starting from the orientation stage that stimulates learners to interpret real phenomena, CLIS then encourages them to analyze their initial understanding (idea generation stage). Through group discussions (idea reorganization stage), learners practice evaluating multiple perspectives, making inferences, and constructing coherent explanations. The idea application stage requires learners to apply the concepts they have understood in various contexts, thus practicing self-regulation skills in solving problems. Finally, the idea consolidation stage facilitates learners in reflecting and evaluating their thinking process, strengthening conceptual understanding, and encouraging the continuous development of critical thinking skills. Thus, each stage in CLIS is aligned with critical thinking indicators such as interpretation, analysis, inference, evaluation, explanation, and self-regulation.

CONCLUSION

Based on the results of the analysis of this study, it can be concluded that the application of the *Children Learning in Science* (CLIS) learning model has a significant effect on improving students' critical thinking skills on force material in class IV in Sragen sub-district. This is evidenced through the Independent Sample t-test hypothesis test which shows that the significance value obtained is 0.000, smaller than $\alpha = 0.05$, as well as the calculated t value of 2.621 which is greater than t table 1.669. Thus, the alternative hypothesis is accepted, indicating that the CLIS learning model is able to improve students' critical thinking skills more effectively than the conventional learning model used in the control group. This result indicates that interactive and child-centered learning methods, such as CLIS, can be an effective strategy in developing students' critical thinking skills.

REFERENCE

Al Fanny, D., & Roesdiana, L. (2020). Analisis Kemampuan Berpikir Kritis Dalam Menyelesaikan Soal Materi Garis dan Sudut Pada Peserta didik SMP. *Prosiding Sesiomadika, 2*(1c).

Arsi, A., & Herianto, H. (2021). Langkah-langkah Uji Validitas dan Realibilitas Instrumen dengan Menggunakan SPSS. https://doi.org/10.31219/osf.io/m3qxs

Baridah, W. L. (2021). Pengaruh Model Pembelajaran CLIS (Children Learning In Science) terhadap Peningkatan Literasi Sains Siswa SD Negeri 2 Banaran Kertosono. Experiment: Journal of Science Education, 1 (1), 13-18.

Emzir. 2009. *Metodologi Penelitian Pendidikan*. Jakarta: PT. Raja Grafindo Persada.

Erlistiani, M., Syachruroji, A., & Andriana, E. (2020). Penerapan model pembelajaran SSCS (Search, Solve, Create and Share) terhadap kemampuan berpikir kritis peserta didik. *Jurnal PGSD: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar, 13*(2), 161-168.

Facione, P. A. (1990). *A Statement of Expert Consensus for Purposes of Educational Assesment and Instruction, Research Finding and Recommandations.* California: California State University, Fullerton.

Hasna, A., & Wathon, A. (2019). Membangun Teknologi Pembelajaran Melalui Kegiatan Bermain Alat Permainan Edukatif. Sistim Informasi Manajemen, 2(1), 108-135.

Irvy, I. I. (2020). Understanding the Learning Models Design for Indonesian Teacher. International Journal of Asian Education, 1(2), 95–106.

Ismail, A. (2015). Penerapan model pembelajaran *Children Learning in Science* (CLIS) berbantuan multimedia untuk meningkatkan penguasaan konsep Fisika siswa SMA. *PETIK: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi*, *1*(1), 19-25.

Krismayoni, P.A., & Suarni, N.K. (2020). Pembelajaran IPA dengan Model Pembelajaran *Children Learning in Science* Meningkatkan Hasil Belajar Ditinjau Dari Minat Belajar. *Jurnal Pedagogi Dan Pembelajaran*, *3*(2), 138–151.

Larasati, F., & Syamsurizal, S. (2022). Validitas Instrumen Tes Keterampilan Berpikir Kritis Peserta Didik Kelas XII SMA/MA tentang Materi Mutasi.

Majid, A. (2015). Strategi Pembelajaran. Bandung: PT Remaja Rosdakarya.

Majid, A. (2017). Analisis Data Penelitian Kualitatif. Penerbit Aksara Timur.

Manurung, A. S., Fahrurrozi, E. U., & Gumelar, G. (2023). Implementasi berpikir kritis dalam upaya mengembangkan kemampuan berpikir kreatif mahapeserta didik. Jurnal Papeda; Vol, 5(2).

Masitoh, I., & Prabawanto, S. (2016). Peningkatan Pemahaman Konsep Matematika dan Kemampuan Berfikir Kritis Matematis Siswa Kelas V Sekolah Dasar Melalui Pembelajaran Eksloratif. EduHumaniora| Jurnal Pendidikan Dasar Kampus Cibiru, 7(2), 186-197.

Pare, A., & Sihotang, H. (2023). Pendidikan Holistik untuk Mengembangkan Keterampilan Abad 21 dalam Menghadapi Tantangan Era Digital. Jurnal Pendidikan Tambusai, 7(3), 27778-27787.

Sari, R. R., Indrawati, Gani, A. (2015). Model Pembelajaran Clis (*Children Learning in Science*) Dengan Orientasi Melalui Observasi Gejala Fisis Dalam Pembelajaran Ipa-Fisika Di Smp. Jurnal Pendidikan Fisika, 3(4), 324 – 329.

Sugandi, D., A. Syach, and I. N. Fadilah, (2021). Model Pembelajaran Children's Learning in Science (CLIS) terhadap Kemampuan Berpikir Kreatif Siswa Pada Mata Pelajaran IPA. *Jurnal Tahsinia*, *2*(2), 107-113

Sugiharto, B. (2019). Kebudayaan dan kondisi post-tradisi: Kajian filosofis atas permasalahan budaya abad ke-21. PT Kanisius.

Sugiyono. (2019). *Metode Penelitian Kuantitatif*. Bandung: CV. ALFABETA

Sukestiyarno, Y. L., & Agoestanto, A. (2017). Batasan prasyarat uji normalitas dan uji homogenitas pada model regresi linear. Unnes Journal of Mathematics, 6(2), 168-177.

Sianturi, R. (2022). Uji homogenitas sebagai syarat pengujian analisis. Jurnal Pendidikan, Sains Sosial, Dan Agama, 8(1), 386-397.

Syafriani, D., Darmana, A., Syuhada, F. A., dan Sari, D. P. (2023). *Buku Ajar Statistik: Uji Beda Untuk Penelitian Pendidikan (Cara dan Pengolahannya dengan SPSS)*. Purbalingga: CV. EUREKA MEDIA AKSARA

Trianto. (2015). *Model Pembelajaran Terpadu*: Jakarta: PT Bumi Aksara.