UNCOVERING THE SCIENCE MULTILITERACY MODEL AND ITS RELATIONSHIP TO STUDENTS' CRITICAL THINKING SKILLS IN ELEMENTARY SCHOOL

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ABSTRACT

This study aims to reveal the role of the multiliteracy model and its influence on critical thinking skills for fifth-grade elementary school students. This study is an experimental study with a research design used in this study, namely Pretest Posttest Control Group Design. The data analysis technique in this study is the T-test. The study results showed that based on the difference test with the independent samples test, it is known that the Sig. (2-tailed) value of 0.00 is smaller than 0.05, thus it can be concluded that there is a significant difference between the average critical thinking skills of students in the experimental class and the group of students in the control class. The results of this study can be a recommendation for elementary school teachers in improving the quality of learning including enhancing their students' critical reasoning.

Keywords: Multiliteracy Model; Critical Thinking Skills, Science

ABSTRAK

Penelitian ini bertujuan untuk mengungkap peranan model multiliterasi dan pengaruhnya terhadap keterampilan berpikir kritis bagi siswa kelas V sekolah dasar. Penelitian ini merupakan penelitian eksperimen dengan desain penelitian yang digunakan dalam penelitian ini yaitu Pretest Posttest Control Group Design. Teknik analisis data dalam penelitian ini adalah uji T. Hasil penelitian menunjukkan bahwa berdasarkan Berdasarkan hasil uji beda dengan indepedent samples test, diketahui nilai Sig.(2- tailed) sebesar 0,00 lebih kecil dari 0,05 dengan demikian dapat disimpulkan bahwa terdapat perbedaan yang signifikan atara rata-rata keterampilan berpikir kritis siswa pada kelas eksperimen dengan kelompok siswa di kelas kontrol. Hasil penelitian ini dapat menjadi rekomendasi bagi guru sekolah dasar dalam meningkatkan kualitas pembelajaran termasuk meningkatkan penalaran kritis siswanya.

Kata kunci : Model Multiliterasi; Keterampilan Berpikir Kritis, Sains

A. Introduction

Critical thinking is one of the skills that every child needs to practice. Children who have effective critical thinking are curious about a variety of topics and generally have broad interests.(Liu, 2019). Curiosity can help children gain a deeper

understanding, not only of the world around them but of things that are important in the child's experience of this world (Duchovičová et al., 2020; Sutoyo et al., 2023). He maintains curiosity about the world and people and has an understanding and appreciation of the cultures, beliefs, and views that are shared qualities of humanity (Hasanah et al., 2021, 2022; Usman et al., 2024). In addition, critical thinking makes children lifelong learners. Because critical thinkers are curious by nature, opportunities to apply their skills are all around them at all times. They are always open to opportunities to apply their habits of thinking in any situation. There is no doubt that effective critical thinkers are, for the most part, creative thinkers. Creative children question assumptions about many things (Hasanah et al., 2019).

Children who think critically tend to be instinctual problem solvers. This is the most important skill that you can help your child develop from an early age (Orhan, 2023). Today's children are tomorrow's leaders and will face complex challenges that require them to use their critical thinking skills to engineer imaginative solutions. Critical thinking is essentially the ability to critically evaluate something based on what assumptions underlie it, and what perspectives those assumptions are based on. Critical thinking is defined as a way of thinking that helps make decisions because it is based on real, self-corrective, and substantive standards in context. Critical thinking skills are more likely to develop and grow if there is a sense of curiosity that continues throughout the problem-solving process.(Hasanah, Uswatun, Edwita, 2023).

However, in reality, the results of pretests on several elementary schools in the Setiabudi District, South Jakarta showed that 68% of students did not have critical thinking skills. This is evidenced by their average score which is below the standard reference score. In addition, the results of observations on the learning process and interviews with class teachers showed that students find it difficult to understand abstract material and are not used to being trained in solving a problem. For example, on the material on blood circulation. When given a case about blood circulation that is analytical, they tend to be lazy to do it and ask the teacher more questions about the clarity of the case. If this is

allowed to continue, it will have fatal consequences (Hasanah, Uswatun, Astra, 2023). Moreover, the demands of 21st-century skills and the independent curriculum emphasize critical thinking skills. Critical thinking skills do not exist by themselves but must be trained so that the learning process applied must also stimulate students' reasoning (Elder & Paul, 2020; Ohito, 2019).

Many learning models can stimulate students' critical thinking, one of which is the multiliteracy learning model. Multiliteracy is the skill of using various ways to express and understand ideas and information using conventional text forms as well as innovative texts, symbols, and multimedia (Al-Shaye, 2021; Valverde-berrocoso et al., 2022). Multiliteracy learning is one of the learning designs used in the context of the 2013 curriculum and the independent curriculum. The concept of multiliteracy is designed to answer the need for skills needed in the 21st century. Multiliteracy learning is designed to be able to connect four multiliteracy skills (reading, writing, oral language, and digital literacy) with ten learning competencies specifically for the 21st century (Ally, 2019; Aslan, 2022; Chu et al., 2021). The ten competencies are creativity and innovation, critical thinking, problem-solving, and decision-making, metacognition, communication, collaboration, information literacy, information and communication technology literacy, citizenship attitudes, life and career, and personal and social responsibility, including awareness of competence and culture (Kim, 2023; Michelson, 2019).

Multiliteracy learning is a challenging learning so that students can study and apply practical literacy, this has a role as a link to learn various concepts across the curriculum (Delacruz, 2018; Hendriani, 2021; Michelson, 2019). Multiliteracy concept learning is a manifestation of scientific learning processes that optimize literacy skills, namely in reading, writing, speaking, and mastery of information and communication media. Thus, multiliteracy learning is learning that uses abilities or various literacies to form a whole and challenging unity. A person is literate if he can communicate information that he gets based on a clear line of thought, namely not accepting or believing information raw. In processing

information from various disciplines, logical thinking is needed, for example by criticizing, analyzing, or evaluating. The strategy that teachers can apply in developing students' abilities in this regard is by applying various teaching skills, especially teaching skills in asking follow-up questions. The concept of multiliteracy that has been integrated with 21st-century skills certainly provides a different learning condition than before. In the practice of learning, students must now get used to doing simple research, observations, experiments, observations, or data collection activities from various sources by conducting interviews or other supporting activities (Ally, 2019; Aslan, 2022; Urbani et al., 2017). Multiliteracy learning involves many models and learning strategies so it always involves students to be active in asking questions or making their conclusions. Through challenging multiliteracy learning, it is hoped that students will be able to have self-confidence, be intelligent, communicative, brave, and have character (Kim, 2023; Pozas et al., 2021).

Through the description above, the researcher wants to examine in more depth the influence of the science multiliteracy learning model on the critical thinking skills of fifth-grade elementary school students.

B. Method

This study aims to prove the effectiveness of the multiliteracy model on the critical thinking skills of fifth-grade elementary school students. The research method used is the quasi-experimental method. For this study, a non-comparable control group design was used. Two groups (2 experimental groups and 2 control groups) were randomly selected and then given a pretest to determine whether there was a difference between the experimental group and the control group in the initial state. The schools that will be used as research locations are Elementary Schools located in the Setiabudi District, including SDN Karet 04 and SDN Karet Kuningan 1. Each Elementary School used as a research location has different characteristics so researchers are interested in conducting research.

Related to the test instruments used in the study, a research instrument was prepared to measure the level of students' critical thinking

skills. The instruments used by the researcher were (1) student worksheets, 2) critical thinking skills tests using rubric scoring as a means of assessment (3) field notes as a tool for collecting observation data, (4) Interview guidelines to determine students' responses to the effectiveness of using the Multiliteracy learning model. The tests were made based on critical thinking indicators, namely interpretation, analysis, evaluation, and inference.

Based on the data obtained in this study, namely qualitative and quantitative data, the technique that will be used to analyze qualitative data is descriptive analysis. This descriptive analysis is used to determine and obtain an overview of the effectiveness of the Multiliteracy learning model in terms of the learning process. Furthermore, quantitative data analysis techniques are used to determine and answer research hypotheses related to differences in ability between learning using the Multiliteracy learning model and direct teaching. The stages of quantitative data analysis will use statistical methods, namely the difference test (t).

C. Finding and Discussion

Based on the results of statistical tests that researchers have conducted, it can be described as follows: The data analyzed in this study are the pretest, posttest, and n-gain scores of critical thinking skills of control class students and experimental class students. The pretest score shows the score before treatment and the posttest score shows the score after treatment. The description of the pretest, posttest, and n-gain scores of critical thinking skills are presented in the following table:

Table 1 Description of pretest and posttest data for experimental and control classes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Experimental Class Pretest	31	52	75	64.63	5.83
Experimental Class Posttest	31	73	95	86.40	5.79
Control Class Pretest	31	43	77	58.06	8.98
Control Class Posttest	31	57	86	73.19	8.17
Valid N (Litswise)	31				

Based on the table above, in critical thinking skills, it is known that

students' abilities before treatment (pretest) are the same in both the experimental and control classes, namely the average class of 64.63 and 58.06. However, after the treatment of using the multiliteracy learning model in the experimental class, the average changed. The average posttest of the experimental class reached 86.40 while the control class was only 73.19. Before conducting a hypothesis test, it is necessary to first conduct a data prerequisite test on the research variables of critical thinking skills. Data prerequisite tests include normality tests and homogeneity tests carried out on pretest and posttest data in both the experimental and control classes. The results of the normality test of critical thinking skills data are presented in the following table:

Table 2 Results of the N-Gain Normality Test

Tests of Normality

Class		Kolmogorov-Smirnova			Shapiro Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
Score N-Gain Percent	Pre-Experiment	.119	31	.200*	.952	31	.079
	Post-Experiment	.095	33	.200*	.942	33	.289
	Pre-Control	.079	32	.200*	.986	32	.183
	Pest-Control	.109	31	.200*	.960	31	.935

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

a.   Lilliefors Significance Correction

Based on the table above, shows that the N-Gain of critical thinking skills of the experimental and control classes has a significant value of 0.200 > 0.05, so the hypothesis is accepted. This shows that the N-Gain of critical thinking skills of the experimental and control classes is normally distributed. The results of the homogeneity test of the pretest data of critical thinking skills can be seen in the following table:

Table 3 Results of the Pretest Score Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistics	df1	df2	Sig.
N-Gain_Percent	Based on Mean	2,090	1	62	.153
	Based on Median	1,685	1	62	.199
	Based on the Median and with adjusted df	1,685	1	53,077	.200
	Based on trimmed mean	2,064	1	62	.156

Based on the table above, a significant value (P Value) > 0.05 is obtained, so it can be concluded that the distribution of N-Gain critical

thinking skills in the pretest data of the experimental and control classes is homogeneous. The results of the homogeneity test of the posttest data of critical thinking skills can be seen in the following table.

Table 4 Results of the Posttest Score Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistics	df1	df2	Sig.
N-Gain_Percent	Based on Mean	0.775	1	61	0.382
	Based on Median	0.5	1	61	0.482
	Based on the Median and with adjusted df	0.5	1	59,024	0.482
	Based on trimmed mean	0.803	1	61	0.374

Based on the results of the statistical calculation of the significance (Sig) of the posttest data of critical thinking skills between the experimental class and the control class is 0.374 or greater than 0.05 so that the data is declared homogeneous. The next step is to conduct a difference test (comparative) using the Independent Samples T Test Analysis. The results of the t-test of the pretest data of critical thinking skills are shown in the table below:

Table 5 Results of the test of differences in the average data of the N-Gain pretest for Critical Thinking skills

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
N-Gain_Percent	Equal variances assumed	2.206	.143	8,448	62	.000	26,048	3,083	19,884	32.212
	Equal variances not assumed			8,356	53,326	.000	26,048	3.117	19,796	32,300

Based on the table above, the values are known, Sig. (2-tailed) is 0.000 < 0.05. This shows that there is a significant difference in the average between the experimental class and the control class. Thus, it can be concluded that the multiliteracy model is proven to be effective in improving the critical thinking skills of fifth-grade elementary school students. The results of the t-test of the post-test data on critical thinking skills are shown in the table below.

Table 6 Results of the N-Gain Average Difference Test for Critical Thinking Skills

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
N-Gain_Percent	Equal variances assumed	2.206	.143	8,448	62	.000	26,048	3,083	19,884	32,212
	Equal variances not assumed			8,356	53,326	.000	26,048	3.117	19,796	32,300

Furthermore, based on the results of the independent sample test, it is known that the sig. (2-tailed) value is 0.000, which is smaller than 0.05, thus it can be concluded that there is a very significant difference in critical thinking skills between students who learn using the multiliteracy learning model and conventional learning to improve critical thinking skills of elementary school students. The following is a summary table of the N-Gain test results:

Tabel 7 N-Gain Summary Table

	N-gain	Conclusion
Experiment	0.65	Tall
Control	0.19	Low

Based on the results of the N-Gain test, shows that the significance value in the experimental class is 0.65, while the N-Gain value in the control class is 0.19. In general, it can be concluded that the multi-literacy learning model is very effective in improving critical thinking skills in elementary schools.

Based on the research findings, show that the multiliteracy model can improve the critical thinking skills of fifth-grade elementary school students. Especially in science learning. Here the teacher uses various multimodal media to facilitate student learning. In this case, the teacher uses interactive multimedia to explain some abstract science materials, one of which is about blood circulation.

The characteristics of the multiliteracy model, namely: a. multi-form, multi-creation, and multifunctional. b. rich, namely able to reflect all authentic literacy models that exist in everyday life. c. child-friendly, namely by the child's authentic experience and by various other characteristics of the child. d. elaborative, namely concerning all types of literacy. e. comprehensive, namely the model concerns various fields of science (Condliffe et al., 2017; Meloy & Schachner, 2019; Sutiani, 2021; Townsend, 2015).

Several studies on multiliteracy learning have proven that multiliteracy learning models include generating understanding or knowledge that children already have, guiding the process of acquiring knowledge that children already have, enhancing students' concrete understanding of the knowledge and skills they have learned, becoming the main means for channeling, demonstrating, and showing understanding and skills obtained from learning activities, and becoming a procedure for creating proactive, motivating, and creative learning.

In multiliteracy learning, teachers connect the material being learned with what students already know and involve students to always be actively involved in asking questions, analyzing contemporary issues, and making their conclusions (student countered). This learning model can provide many opportunities to study learning materials in depth while storing the understanding gained in long-term memory. With students actively involved in the learning process, it will stimulate their critical thinking skills. The students' activities in multiliteracy learning are understanding the problems that have

been shown by writing down what is known and asked correctly and properly, identifying the relationship between statements and questions, and concepts given in a problem by creating a model correctly and providing an explanation correctly and appropriately, and being able to solve a problem using a correct strategy and inference is a conclusion that can be drawn with proper investigation (Heard et al., 2020; Jannah et al., 2020; Shavkatovna, 2021; Wu & Wu, 2020).

Through these activities, it can improve the ability of interpretation, analysis, inference, and evaluation, where these four aspects are indicators of critical thinking skills. Students who have critical thinking skills can analyze and respond in managing the information obtained during learning and can provide alternative solutions to existing problems. Thus, the multiliteracy model has been proven to be very effective in improving the critical thinking skills of fifth-grade elementary school students.

D. Conclusion

Based on the results of the research and the discussion that has

been presented, it can be concluded that the multiliteracy model has proven to be very effective in improving the critical thinking skills of fifth-grade elementary school students. The results of this study can be a recommendation for all elementary school teachers to actively explore the latest innovative learning models, one of which is the multiliteracy model in improving the quality of learning. Critical thinking skills must always be trained and honed from an early age so that the learning model used must also be appropriate and able to stimulate student reasoning through inquiry learning activities.

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