The Implementation of Science, Technology, Environmental and Society (STML) Learning on the Student's Creativity in Handling and Management of Waste at SD Negeri Doplang 01

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ARTICLE INFO

ABSTRACT

Independent Curriculum content is expected that elementary school students will care more about the environment. The students' characteristics at the elementary school level are still unaware of the cleanliness, the negative impact, and the dangers of waste, so SD Negeri Doplang 01 implements learning that can manage waste optimally. The study aimed to determine the impact of learning Science, Technology, Society and Environment (STML) on students' waste handling and management creativity at SD Negeri Doplang 01. The method used was an experiment using a quasi-experimental design in the form of a Time Series Design that the group used for research was selected randomly. This research design employed one group only, so it does not require a control group. The population was students of class IV semester 2 SD Negeri Doplang 01, and the sample was obtained through a saturated sample or census. Data collection techniques were tests and documentation. The test method was a creativity questionnaire by a Likert scale to measure students' creativity. This study utilized a t-test analysis method assisted by SPSS 25. From the results of data analysis, the average pretest value was 309.7 and the average posttest value was 354.25. The results of statistical analysis using the t-test through SPSS 25 obtained Sig (2-tailed) 0.000 with a significance level of $\alpha=0.05$. The study's conclusion states that there are differences in learning using Science, Technology, Society, and the Environment (STML) on the creativity of handling and managing waste in grade IV students at SD Negeri Doplang 01.

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1. INTRODUCTION

One of the ways to create quality human resources is through education. Education covers all aspects, both education in the family, community, and at school. Flashback to Ki Hajar Dewantara's understanding in (Mery, M., Martono, M., Halidjah, S., & Hartoyo, A.: 2022), "Education as a civilizing process is not only oriented towards developing good individuals but also a good society". Referring to this understanding that education must be oriented dually, namely, students can understand themselves and their surroundings. Today, the education system in Indonesia is transforming.

The Government of the Republic of Indonesia changed national education by establishing the character as the foundation. Besides being intellectually visualized in the competence, with strong and high character and

competence students can overcome problems, challenges and needs (Suma. K, Pujiani, & Yunithasari: 2022). The presence of the latest curriculum, or the independent curriculum, is considered a prototype curriculum. The prototype curriculum is one of the first steps in supporting national education goals, or educating the nation's life (Rachmawati, N., Marini, A., Nafiah, M., & Nurasiah, I.: 2022).

Learning through the independent curriculum is currently one of the contents of the independent curriculum which is included in project-based co-curricular activities. According to the Pancasila Student Profile based on SKL (Graduate Competency Standards), it is designed to achieve competency and character. One of the things that became the background of the research is education about a sustainable lifestyle which is still taboo for students at the elementary school level. A sustainable lifestyle viewed from the United Kingdom, GSSL in (Saraswati: 2012) is a lifestyle that is aware of the environment and the consequences of the choices made. Therefore, it will make choices that will have the least negative potential.

Through education with independent curriculum content, it is expected that students at the elementary school level will become individuals who care about the environment. The characteristics of students at the elementary school level are still not aware of the cleanliness of the environment from waste and the negative impact of the dangers of waste. Thus, it is necessary to apply learning which can facilitate waste management optimally in the Doplang 01 Public Elementary School. Educators must also educate their students about the types of waste and how to reduce the negative impact of waste in the surrounding environment. In the current implementation of the independent curriculum, students are given the opportunity to observe and explore how to carry out waste management to foster creativity in students in implementing the program. One learning model that can develop creativity in waste management is the Science, Community and Environmental Technology (STML) learning model.

2. RESEARCH METHODS

This study employed an experimental method. The method used in this study was experimental with a Time Series Design. Quantitative research is typically associated with a process of numerative induction, namely drawing conclusions based on numbers and abstracting based on generalizations. Meanwhile, according to Krathwohl in Nana Syaodih Sukmadinata (2012: 57-58), the experimental method is validation or testing, namely testing the effect of one or more variables on other variables. Variables that give effect are grouped as independent variables, and variables that are affected are grouped as dependent variables. This form of experimental design is a development of true experimental design, which is difficult to implement. This design has a control group but cannot fully function to control external variables that affect the implementation of the experiment (Sugiyono, 2015: 114).

This study utilized a Quasi-Experimental Design in the form of a Time Series Design. Based on Sugiyono (2010:114-115), the groups used for research cannot be selected randomly in this design. Before getting the treatment, the group was addressed a pretest up to four times, aiming to know the stability and clarity of the condition before being given treatment. This research design used only one group, so it did not require a control group.

Table 1. Quasi-Experimental Design with Time Series Design

$$(O_1\ O_2\ O_3\ O_4)\ X\ (O_5\ O_6\ O_7\ O_8)$$

Notes:
O1 = pretest 1 experimental group
O2 = pretest 2 experimental groups
O3 = pretest 3 experimental groups
O4 = pretest 4 experimental groups
O5 = posttest 1 experimental group
O6 = posttest 2 experimental groups
O7 = posttest 3 experimental groups
O8 = posttest 4 experimental group
X = treatment by Science, Technology Society and Environment Learning Model (STML)

The research results were obtained by comparing the pretest and posttest results of the experimental group. The significance of the research effect was (O1 + O2 + O3 + O4) - (O5 + O6 + O7 + O8).

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3. RESULT AND DISCUSSION

Before conducting research, it was necessary to arrange field permits, prepare research proposals and socialize the research plan to the school where it was carried out. The second preparation is the instruments, namely testing the validity and reliability of the instruments.

Instrument trials were carried out before the instrument was used as a data collection tool. Before testing the instrument, experts first validated it, and then trials of research instruments were carried out on students outside the population. The results of the instrument trials were then analyzed to determine the validity and reliability of the instrument.

The validity of the questionnaire instrument was calculated using the product moment correlation formula. The data obtained was then tested for validity, and calculated by SPSS 25.

The criteria for instrument questions are said to be valid or not depending on the output results of SPSS 25, which are seen in the correlation values compared to the 5% significance level. If r count $\geq$ r table, then the instrument is declared valid, but if r count <r table, the instrument is declared invalid. It was understood that the r table used a significant level $\alpha = 0.05$ with n = 30, so the r table value was 0.367. Calculations using SPSS 25 obtained data from 30 question items in the waste management questionnaire instrument, which obtained a calculated r value of 0.364 – 0.865. Based on these data, 30 instrument items in the independent character questionnaire were declared valid, as described below.

Table 2. Trial of Validation Test

No	Indicator	Valid question	Total	Invalid question	Total
1	Flexibility, ability go out from traditions and customs, for getting new ideas , differences and abnormal results	1,2,3	3		-
2	Fluency, ability to think lots of ideas, and alternative problem solving.	4,5,6	3		-
3	Elaboration, ability to work detail of every idea and solution .	7,8,9	3		-
4	Tolerance and ambiguity, ability to reconcile conflicting ideas _ One each other without creating to a new problem.	10,11,12	3		-

5	Originality, the ability to produce ideas, thoughts, and models, which new, different from others, and able to create something completely beyond the existence	13,14,15	3		-
6	Sensitivity, sensitive to problems that arise in the environment	16,17,18	3		-
7	Curiosity, an open attitude to new inputs and new information, and a strong desire to overcome various problems	19,21,22	3	20,23	2
8	Independence, ability to think of problem alone.	24,25,26	3	27,28	2
9	Action, the ability to realize their ideas become a reality with enthusiasm and energy.	29,30,31	3	32	1
10	Commitment, having high commitment and care to finish problems with ideas and new methods.	33,34,35	3		
	TOTAL		**30**		**5**

The reliability test of the creativity questionnaire was carried out on 30 valid questions. The reliability test was calculated using the Spearman-Brown formula. After calculating using SPSS 25, the value was 0.848. Based on these data, the 30 items of the creativity questionnaire instrument were declared reliable.

The steps of the research procedure carried out by the researcher were as follows:
a. Doing 4-time pretests on grade 4 students at SD Negeri Doplang 01;
b. Based on the pretest results, there were 20 students in grade 4. If the data generated is stable, it can be continued for the next stage, the treatment. If the data is unstable, the sample cannot be used for research.
c. The experimental group was given treatment using the Science, Community Technology and (STML) learning model within a certain period for the creativity of students in managing waste;
d. Giving 4 time posttest to the experimental group;
e. Comparing the results of the pretest and posttest of the experimental group (O1 + O2 + O3 + O4) - (O5 + O6 + O7 + O8) to determine the significance of the effect of implementation using the Science, Technology, Society and Environment (STML) learning model on participant creativity educated in waste management;
f. Applying suitable statistical analysis to determine whether or not the implementation of the Science, Technology, Society, and Environment (STML) learning model on students' creativity in managing waste is significant.

Before conducting research, arranging field permits, preparing research proposals and socializing the research plan with the school was necessary. The second preparation is the instruments, or testing the validity and reliability of the instrument.

Instrument trials were carried out before the instrument was used as a data collection tool. Before testing the instrument, it was first validated by experts/experts, and then trials of research instruments were carried out on students outside the population. The results of the instrument trials were then analyzed to determine the validity and reliability of the instrument.

The validity test of the questionnaire instrument was calculated using the product moment correlation formula. The data obtained was then tested for validity and calculated using SPSS 25.

The criteria for instrument questions are said to be valid or not depending on the output results of SPSS 25, which are seen in the correlation values compared to the 5% significance level. If r count ≥ r table, then the instrument is declared valid, and vice versa. It was understood that the r table used a significant level α = 0.05 with n = 30, so the r table value is 0.361.

Calculations using SPSS 25 obtained data from 30 question items in the student creativity questionnaire instrument with an r-count value of 0.364 – 0.865. Based on these data, 30 instrument items in the student creativity questionnaire were declared valid.

The reliability test was calculated using the Spearman-Brown formula. After calculating using SPSS 25, the value was 0.846. Based on these data, the 30 items of the student creativity questionnaire were declared reliable.

The data from the research results were obtained from the test before being given treatment (pretest) and data from the results of the test after treatment (posttest). The test questions were a creativity challenge questionnaire consisting of 30 questions in a Google form. The research data in the pretest and posttest value were described in the following data descriptions.

Table 3. Statistical Data Description

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	std. Deviation
Before treatment	20	98.00	262.00	360.00	309.7000	28.96295
After treatment	20	93.00	311.00	404.00	354,2500	24.07854
Valid N (listwise)	20					

The descriptive statistical data above shows that the average pretest result was 309.7 while the average posttest result after treatment was 354.25 which illustrated an increase in students' creativity in managing waste after implementing Science, Technology, Society and Environment learning model (STML).

Statistical conclusions were drawn based on the t-test results through SPSS 25. The results of the different tests using SPSS 25 are as follows.

Table 4. Independent t test results using SPSS 25

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	std. Deviation	std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Before treatment - After treatment	-44.55000	30.97788	6.92686	-59.04809	-30.05191	-6,431	19	0.000

Based on calculations using SPSS 25, the probability value or Sig (2-tailed) was 0.000. The probability value or Sig (2-tailed) 0.000 <0.05 meant Ho was rejected and Ha was accepted. It can be drawn that there is a significant difference in the students' creativity in managing waste using the Science, Technology and Environmental Society (STML) learning model.

4. CONCLUSIONS

Implementing the Science, Technology and Environmental Society (STML) learning model at SD Negeri Doplang 01 runs well and smoothly. Based on the results of peer observations, students experience an increase in creativity in managing waste due to the learning model used to make students more active in learning.

Based on calculations using SPSS 25, the probability value or Sig (2-tailed) is 0.000. The probability value or Sig (2-tailed) is 0.000 <0.05, which means Ho is rejected, and Ha is accepted. The research conclusion obtained is that Ha is accepted: "There is a significant difference in the creativity of students in managing waste using the Science, Technology and Environmental Society (STML) learning model at SD Negeri Doplang.".

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