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Use of Used Materials as Learning Media in Increasing Student Science Process Skills

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Abstract: This study aims to find out the use of used materials as learning media in improving the science process skills of class VII students of SMP SATAP Negeri 7 Ende. This type of research is a quantitative research, experimental method and uses a pre-experimental design and a one-shot case study model, that is, there is a group given a treatment/treatment and then the results are observed. The population in this study was all students of class VII SMP SATAP Negeri 7 Ende academic year consisting of two classes with a total of 44 students and the sample was class VIIA with 22 students. The sampling technique used is simple random sampling. The data obtained from the research sample is in the form of observation data on students' science process skills. Data analysis was performed by t-test. The results of the study show that the use of used materials as learning media can improve the science process skills of class VII students of SMP SATAP Negeri 7 Ende. This is evidenced by the value of $t_{count} \geq t_{table}$, that is 8.466 ≥ 1.797 with a significant level of 0.05 and dk = 31 so that H_0 is rejected and H_1 is accepted (the proposed hypothesis is accepted).

Keywords: Learning media; Science process skills; Used materials

Introduction

In the industrial revolution 4.0, learning must begin to shift to placing creativity as the target of optimizing intelligence (Hadiati et al., 2023), so students must be equipped with various kinds of skills, both hard skills and soft skills, to be able to adapt to changes that occur around them (Wahyuningsih et al., 2020). The skills that need to be taught to students are critical thinking skills, creative thinking (creativity), communication and collaboration (Doyan et al., 2020), so changes to both the curriculum and learning are also required (Serevina et al., 2018). Learning that supports the quality of education is effective and innovative learning so that the quality of education can be realized (Khotimah et al., 2021). The quality of learning is said to be quality if it is marked by four criteria, namely: 1) the initial quality of students, 2) the use and selection of quality learning resources, 3) the learning process, and 4) educational output (Hartono et al., 2022). One of the quality of learning that needs to be improved is Natural Science (IPA).

Science learning is learning that requires students to prove something between theory and facts through experiments (Noor et al., 2019), so in practice it must involve students actively to understand scientific concepts through learning experiences (Tahya et al., 2022), in order to achieve effective science learning in the development of a good scientific attitude of students, by understanding a phenomenon, event, and scientific object (Safaruddin et al., 2020).

Science is closely related to nature so it is better taught by providing direct experience which is very beneficial for students so that it is easier to remember and understand (Sahronih et al., 2020). A learning process that directly touches students' lives where students can use the five senses, namely being able to speak, hear, feel, and see directly or in real terms so that what has been learned can be meaningful and last a long time (Suryani, 2016).

One of the real learning experiences is bringing students closer to the environment around them (Agustina et al., 2018). The context of this research is to utilize used materials in the environment as learning media in the classroom. Learning media is an important instrument that supports successful learning (Noris et al., 2023). Innovative learning media can make the learning process better and can improve students' understanding of concepts (Nor et al., 2023), for this reason teachers are required to be smarter in

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determining the tools used during the learning process in class (Rasiman et al., 2014).

Several effective ways of preparing good learning media include (1) the media is designed as simple as possible so that it is easily understood by students, (2) the media should be designed with simple and easy-to-obtain materials without reducing the benefits of the media itself, (3) the media can be designed in the form of models, pictures, structured charts and others but with materials that are cheap and easy to get, so it doesn't make it difficult for the teacher to compile the media. Sugihartini et al. (2020) states that one of the media that is cheap and easy to obtain is learning media from used materials around the students' environment.

Learning media from used goods is the use of used goods and simple equipment as learning media (Saleh et al., 2020). The steps for implementing used goods as learning media are: (1) using used goods in the environment around students, (2) conducting evaluations to determine students' initial abilities, (3) using media that attracts students' attention and interest, (4) stimulate students to think critically, (5) provide initial knowledge, (6) create a pleasant atmosphere (Pambudi et al., 2018).

The use of used materials from the environment as learning media can trigger the creativity of students in learning and learning activities (Desimarlina et al., 2021). Science learning requires students to be creative in utilizing natural resources and human resources (Widiyatmoko et al., 2012). Seeing this, learning innovation is needed to improve students' science process skills (Safaruddin et al., 2020). This creative and innovative concept should be seen in the activities carried out in class and outside the classroom in order to improve students' science process skills (Asih, 2017). Good products result from good process skills. The aim of science is for students to be able to use science skills (Tatontos et al., 2022).

The science process skills possessed by students can potentially build basic competencies through a scientific attitude, and a gradual process of knowledge construction (Wahyuni et al., 2017). Science process skills are basically the basic ability to learn and to form the foundation for each individual in developing themselves (Martiningsih et al., 2019). Science process skills can be classified into two. First, basic science process skills, namely scientific activities which include: observing, communicating observational data in various forms such as pictures, charts, tables and others, classifying, interpreting data, interpreting and forecasting n. Second, integrated science process skills, namely scientific activities consisting of identifying variables, describing relationships between variables, conducting investigations, analyzing investigative data, formulating hypotheses and defining operational variables (Marjan et al., 2014).

Based on the results of observations at SMPN Satap Negeri 7, it can be seen that the laboratory conditions are inadequate where the tools and practicum materials are still lacking. Science teachers lack innovation and creativity to overcome these deficiencies. In addition, practicum activities are rarely carried out due to a shortage of available equipment in the laboratory. Science teachers tend to do learning with theory, so that students' science process skills are still below the minimum completeness criterion (KKM), which is 75. This is in line with research (Asih, 2017), the reason is that some aspects of science process skills have not been fulfilled, some of which are not yet complete the aspects that exist in skills students' science process, even though there have been efforts to get students involved in the learning process but there are still students who prefer to talk with their peers, doing assignments from undergraduate courses and those who apply science process skills in progress, just take notes even though they don't understand the material what the teacher conveyed.

To help overcome existing problems, the researcher provides a solution, namely by utilizing used materials in the surrounding environment as learning media which will provide opportunities for students to be able to observe an object, analyze, prove, and draw their own conclusions about an object. This can provide real experience for students in learning science, and is expected to improve students' process skills in science subjects.

Method

The type of research used is quantitative using experimental research methods. Pre-experimental research design. This research was conducted at SMPN SATAP Negeri 7 Ende, which is located at Jln. Ende-Bajawa Canal, Bheramari Village, Nangapanda, Ende Regency. The population in this study were all 44 class VII students. The sample in this study is class VIIA with a total of 22 students.

This sampling technique is simple random sampling. The data collection technique directly observes the activities carried out by students while learning science is taking place. Observation uses an observation sheet of science process skills which consists of seven aspects that are measured, namely: observing, asking questions, classifying, designing and conducting experiments, measuring, concluding and communicating.

The instrument used is a non-test, namely in the form of observation sheets to assess students' science process skills during the process of teaching science. The analytical technique used to analyze the data validation results is the calculation of the average value. The formula for calculating the average value can be seen in equation 1 below.

$$\bar{x} = \frac{\sum \chi}{n} \quad (1)$$

Description: $\bar{x}$ = Average value; $\sum \chi$ = The total value of the answers by the validator; n = Number of validators.

Test Prerequisites Analysis

The prerequisite test that was carried out was the normality test with the chi-square test technique. The normality test was carried out to prove that the population in this study follows a normal distribution, while the equations are as follows (Sugiyono, 2019).

$$\chi^2 = \sum \left[\frac{(f_0 - f_h)^2}{f_h}\right] \quad (2)$$

Description: χ^2 = Chi-square value; f_0 = Observed frequency; f_h = Expected frequency.

The sample testing criteria is said to be normally distributed if $\chi^2_{count} \leq \chi^2_{table}$ with a significant level (α = 0.05) and degrees of freedom (dk = k-1).

Hypothesis Testing

Test the similarity of the two means: right side test Hypothesis H_0: $\mu < 75$; This means that the use of used materials does not have a significant effect on the improvement of science process skills for class VII students of SMPN SATAP 7 Ende, because they do not achieve KKM H_1: $\mu \geq 75$; This means that the use of used materials has a significant effect on improving the science process skills of class VII students of SMPN SATAP 7 Ende, achieving KKM Significant level (α = 0.05) Degrees of freedom dk = n-1.

Test Statistics

The test statistics use one sample t-test with the formula:

$$t = \frac{\bar{\chi} - \mu_o}{\frac{S}{\sqrt{n}}} \quad (3)$$

Description: t = The calculated t value; $\bar{x}$ = The average x value; μ_o = The hypothesized value; S = Baku Crossroads n = Number of sample members (Sugiyono, 2019).

Test decision: H_0 is rejected and H_1 is accepted if $t_{count} \geq t_{table}$. H_0 is accepted H_1 is rejected if $t_{count} < t_{table}$.

Result and Discussion

Based on the results of data analysis of students' science process skills using used materials as learning media in class, the data obtained can be seen in Table 1. The completeness of student learning at the first meeting and the second meeting can be seen in the Figure 1.

Table 1. Results of Observation of Science Process Skills

Descriptive Statistics	First Meeting	Second Meeting
Research Sample	22	22
Min Value	62	78
Std Deviation	4.702	2.824
Max Value	79	87
Average value	72.88	85.33
Complete Student	14	31
Incomplete Students	10	-
Completeness Percentage (%)	45.45	100
Incomplete Percentage (%)	54.54	-

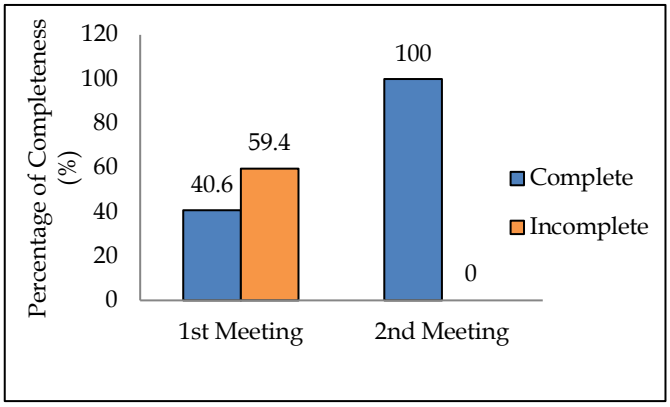

Figure 1. Percentage of completeness of students' science process skills

Figure 1 shows that at the first meeting with a research sample of 22 people, the min value is 62, the max value is 79, the students who complete the study are 10 people or 45.45% who do not complete 12 people or 54.54%, the second meeting the students who complete are 22 people, min value is 78, max value is 87, students who complete the study are 22 people or 100%.

Based on the results of the observational analysis of science process skills when given treatment using used materials around the environment as learning media can be seen in Table 2.

Table 2. Aspects of Science Process Skills

Aspects of Science Process Skills	Percentage (%)		Value	
	M1	M2	M1	M2
Observe	81	90	81	90
Submitting Questions	78	86	76	89
Classify	83	88	81	88
Experiment	70	82	70	82
Measure	65	85	66	85
Conclude	76	88	76	89
Communicating	63	88	64	88

M1 = First Meeting; M2 = Second Meeting

Based on table 2 it can be seen that the highest aspect of science process skills is observing skills with a percentage at the first meeting of 81% and increasing to 90% at the second meeting, the skill of asking questions at the first meeting is 76% and increasing to 89% at the second meeting , identification skills at the first meeting by 81% and increased to 88% at the second meeting, skills to design and conduct experiments by 70% and increased to 82% at the second meeting, skills to measure by 66% and increased to 85%, skills to conclude by 76 % and increased to 89%, and students' science process skills which were still low at the first meeting were communication skills of 64% and increased to 88% at the second meeting.

Data analysis Technique

Prerequisite Analysis Test Results (Normality Test)

Based on the results of the normality test, the data below the sample is normally distributed, this is indicated by a significant level of 0.085 ≥ 0.05. The normality test results can be seen in Table 3.

Table 3. Normality Test Results

		Unstandardized Residual
N		22
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	1.83835744
Most Extreme Differences	Absolute	.333
	Positive	.140
	Negative	-.333
Kolmogorov-Smirnov Z		1.115
Asymp. Sig. (2-tailed)		0.077

Hypothesis Test Results

Based on the hypothesis test results obtained a significance value of 0.00. This shows that the hypothesis H_0 is rejected and H_1 is accepted because the significance value is 0.00 ≥ 0.05. This shows that learning using used materials as learning media has a significant impact on the science process skills of class VII students of SMP SATAP Negeri 7 Ende. The results of the hypothesis test can be seen in the Table 4.

Table 4. Hypothesis Test Results

Test Value = 75					
				95% Confidence Interval of the Difference	
t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
				3.2355	4.3334

Discussion

Based on the results of the hypothesis test, namely the one sample t-test in Table 4, data was obtained with a significance level of 0.0. Where, the criteria for evaluating the hypothesis state that tcount ≥ t_{table}, namely 8.466 ≥ 1.797 with a significant level of 0.00 ≤ 0.05 so that H_0 is rejected and H_1 is accepted (the proposed hypothesis is accepted). This shows that the use of used materials as learning media can improve the science process skills of class VII students of SMP SATAP Negeri 7 Ende. Used materials can be used as a medium that supports the learning process of students in developing various students' science process skills. This agrees with (Nuwairah et al., 2018) who argues that used materials designed to be teaching aids are tools used to educate or teach so that the concepts taught by the teacher are easily understood by students and become a tool in the learning process that is made, by teachers or students from simple materials that are easily obtained from the surrounding environment.

This definition is in line with research (Indriyanti et al., 2014) that used materials in the surrounding environment are designed to become teaching aids that are valued more for creating an effective teaching and learning process because with teaching aids designed both by students and by teachers besides being able to increase understanding students can also improve students' process skills. So that when used materials are used as learning media, students' science process skills increase. The learning process using used materials gives its own satisfaction to students when what they learn can be proven by direct student vision.

This is in line with the opinion (Siarni et al., 2015) which suggests that the learning process using used materials as learning media in the classroom provides opportunities for students to be able to prove concepts through direct observation and discover something new. The existence of teaching aids designed using used materials can foster and increase students' curiosity and interest in learning at school to function as a source of learning or as one of the facilities that support the learning process at school.

This is in accordance with the advantages of using used materials. The advantages of using used materials in improving science process skills are increasing the creativity of teachers and students, fostering student learning interest because lessons become more interesting clarifying the meaning of learning materials so students understand them more easily, teaching media will be more varied so students will not get bored easily, Make more actively carry out learning activities such as: observing, doing and demonstrating (Nazihah, 2018). When students carry out the learning process using used materials as learning media can help improve student understanding because the media is obtained from concrete objects besides that in order to gain success in learning science, the internal factors that exist in students must also be considered such as student skills, attitudes of students learning styles and others (Damayanti et al., 2019).

The use of used materials as learning media also aims to assist teachers in conveying messages or subject matter to their students so that messages are easier to understand, more interesting, and more fun for students (Nasution et al., 2022). These goals can help improve students' science process skills carried out in class. This is evidenced by the results of research that has been done that learning using used materials as learning media can improve students' science process skills with a completeness percentage at the first meeting of 45.45%. Increased to 100% at the second meeting.

Science process skills need to be improved because with the science process skills students can develop the basic abilities that exist in students. This agrees with (Rusmiyati et al., 2009) which states that students' science process skills need to be improved because students' science process skills are basic skills for the development of intellectual, social and physical skills, in line with research conducted by Çetinkaya et al. (2019) which states that improving science process skills will provide permanent learning outcomes because science process skills allow students to solve problems, think critically, make decisions, obtain answers and satisfy students' curiosity. The results of this study are in line with research conducted by Maharani et al. (2017) which concluded that the use of used materials as learning media can improve students' science process skills, but is supported by Hariningsih et al. (2021) whose research results show that the use of learning media concrete can support the improvement of students' science process skills.

Conclusion

Based on data analysis, research results, and discussion it can be concluded that the use of used materials as learning media can improve students' science process skills.

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