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# EFFECTIVITNESS OF SETS MODEL WITH LOCAL WISDOM ON CREATIVE THINKING SKILLS IN BIOLOGY LEARNING

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**ABSTRACT**

The 21st century demands that learning in schools must be able to encourage students to develop their critical and creative thinking skills in order to be able to compete in the global world. But on the other hand, it is also expected that students do not forget their national identity. So that biology material in schools that is very closely related to the surrounding environment needs to be linked to existing local wisdom. Therefore, an appropriate learning strategy is needed to accommodate all these interests. This study aims to determine the effectiveness of the SETS (Science Environment Technology Society) model containing local wisdom on creative thinking skills in environmental material. Using quasi-experimental research with a nonequivalent pretest-posttest control group design. The population is all students of class X SMAN 7 Pekanbaru with a sample of two classes taken randomly. Data were collected through tests with multiple-choice test instruments. Data analysis with parametric t-test statistics. The results of the study showed that the average N-Gain of the control class was 0.46 (moderate) and the experimental class was 0.51 (moderate). The results of the N-Gain t-test obtained a sig value. (2-tailed) 0.000<0.05 then reject Ho. This means that the application of SETS learning containing local wisdom is effective in increasing students' creative thinking skills.

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## Introduction

Globalization and internationalization in the 21st century has been known as the century of knowledge, all aspects of life are more dominant in the context of knowledge. The development of technology and information is a major part of the 21st century. The use of technology and information is a necessity in everyday life. The 21st century emphasizes information and knowledge so that it requires a more competitive, knowledgeable, creative and innovative workforce that leads to improvements in education and development (Fok, Fong & Sidhu, 2014).

According to Wijaya (2016) the 21st century is characterized by easy access to information, faster computing that can replace routine work with machines and make it easier for humans to communicate. These signs are an opportunity to further improve the quality of human resources through the implementation of an education system with mastery of science and technology (Alfindasari & Surahman, 2014). Research conducted by Chineze, Leesi and Chiemezie (2016) states that the state of the 21st century environment demands several skills in the learning and teaching process.

21st century learning requires students to have a deep understanding of knowledge and skills acquired from several disciplines. Understanding and skills can help students to transform the knowledge they have from context to factual circumstances (Hioang & Osman, 2015). The 21st century skills according to Binkley, Erstad, Herman, Raizen, Ripley and Rumble (2010) are ways of thinking (creativity and innovation; critical thinking; problem solving; decision making; and learning for metacognition), ways of working (communication; collaboration; and teamwork), tools for working (information literacy; information technology; and communication literacy), and life skills (career; personal; and social responsibility).

Critical and creative thinking is an inseparable part of 21st century skills. Widodo and Prabowo (2012) stated that students' critical thinking skills are still low because only a small proportion of junior high school science teachers and the equivalent develop critical thinking skills so that it affects students' mastery of concepts. This statement is reinforced by the TIMSS (Trends in International Mathematics and Science Studies) 2015 test results showing that Indonesia is ranked 45 out of 48 countries in the science aspect and even in general states that Indonesia is still weak in every aspect tested such as cognitive and mathematics (Kemdikbud, 2016).

21st century education is an education that makes skills in knowledge, skills and attitudes integrated in life which includes the ability to information and computer technology. Education. As an educator is required to prepare students to face their life roles in the 21st century. Many things must be prepared by an educator, one of which is learning that provides meaning in tasks or problem solving that occurs in the lives of students or society. One of the elements in learning is the application of the SETS model is appropriate and can support 21st century education.

This SETS model is used for learning biology in the context of society, environment, and technology. Learning activities with SETS convey the message that students must be able to apply social biotechnology in the classroom. Students then analyze the technology individually and in groups based on the scientific concepts and principles used and its various applications in the physical and mental environment (Azkiyah, 2020). SETS learning has a positive effect on the development of students' critical thinking skills (Rikizaputra et al, 2021).

In the midst of this globalization era, it would be wiser and wiser to include cultural approaches in learning. According to Dr. Kasa (2011), the importance of local wisdom should be considered as one of the supporters of environmental efforts that are declining naturally. Therefore, in schools there needs to be lessons that contain local culture-based materials. A

wise teacher according to Sudarmin (2014) should be able to slip the local cultural values of a local area in the process of learning science or non-science, but in reality science learning, including biology in schools, pays less attention to local culture in the local area. Therefore, a study was conducted on the Effectiveness of the SETS Model Containing Local Wisdom in Biology Learning Towards 21st Century Thinking Skills.

## Research Methods

This research is a quasi-experimental with a pretest-postest non-equivalent group design. In this study the treatment group was selected randomly, before being given the treatment both groups were given a pretest to determine the initial ability. It was conducted in April-May 2024 even semester of 2023 at SMAN 7 Pekanbaru. The population of class X amounted to eight classes and two classes were randomly sampled. Data were collected through tests using creative thinking test instruments. Data analysis was done by parametric statistics.

## Results and Discussion

Based on the data from the results of the research that has been carried out, the recapitulation of pretest and posttest data is obtained as follows:

**Table 1. Recapitulation of Pretest and Posttest Scores**

| Value | Class | N | Learning Outcomes | | | Average |
|---|---|---|---|---|---|---|
| | | | Ideal Value | Min Value | Mak Value | |
| *Pretest* | Control | 30 | 100 | 26.67 | 66.67 | 53.78 |
| | Experiment | 30 | 100 | 26.67 | 80.00 | 61.11 |
| *Posttest* | Control | 30 | 100 | 66.67 | 93.33 | 76.00 |
| | Experiment | 30 | 100 | 80.00 | 90.00 | 80.89 |

Based on Table 1, it can be seen that the number of samples in the control class amounted to 30 students and the experimental class amounted to 30 students each. The minimum pretest value in the control class was 26.67 in the experimental class 26.67 The minimum posttest value in the control class was 66.67 while in the experimental class it was 80.00. The maximum value of the control pretest was 66.67, the experimental class was 80.00. The maximum posttest value of the control class was 93.33 and the experimental class was 90.00. The mean pretest of the control class was 53.78 while the experimental class was 61.11. The mean posttest of the control class was 76.00 while the experimental class was 80.89. For the scale or ideal value of the pretest and posttest of 100.

Pretest and posttest data that have been obtained in the control class and experimental class, then data analysis is carried out, in the form of a normality test using Shapiro Wilk. Shapiro wilk is a test conducted to determine the distribution of random data for small samples of no more than 50 samples. Homogeneity test with Levene test, as a prerequisite for knowing parametric or non-parametric comparative hypothesis testing, if the data is normally distributed then continue the t-test, if the data is not normally distributed then it is tested using the Mann Whitney U-test. The results of the pretest and posttest data normality test in the control class and experimental class can be seen in Table 13 below.

**Table. Pretest and Posttest Normality Test Results**

| Data Type | Class | Normality Test Results | | | |
|---|---|---|---|---|---|
| | | ***Asymp. Sig (2-tailed)*** | **α** | **Decision** | **Description** |
| *Pretest* | Control | 0.086 | 0.05 | Accept $H_0$ | Normal |
| | Experiment | 0.091 | 0.05 | Accept $H_0$ | Normal |
| *Posttest* | Control | 0.241 | 0.05 | Accept $H_0$ | Normal |
| | Experiment | 0.316 | 0.05 | Accept $H_0$ | Normal |

Table 2 shows the results of the pretest and posttest data normality test in the control class and experimental class. The value of Asymp. Sig (2-tailed) value of control class pretest data is 0.086> 0.05, so accept H0, this means that the data comes from a normally distributed population. The value of Asymp Sig. (2- tailed) on the experimental class pretest data of 0.091> 0.05 then accept H0 this means the data comes from a normally distributed population. Asymp Sig value. (2- tailed) on the control class posttest data is 0.241> 0.05 then accept H0 this means the data comes from a normally distributed population. The value of Asymp Sig. (2- tailed) value on the experimental class posttest data of 0.316> 0.05 then accept H0 this means the data comes from a normally distributed population.

The following homogeneity test is carried out which aims to determine the homogeneity of variants and uses the Levene Test. The results of data analysis Homogeneity of Pretest and Posttest data can be seen in the following table.

**Table 3. Hasil Uji Homogenitas Pretest dan Posttest**

| Data Type | ***Sig.(2-tailed)*** | **α** | **Decision** | **Description** |
|---|---|---|---|---|
| *Pretest* | 0.726 | 0.05 | Accept $H_0$ | Homogeneous |
| *Posttest* | 0.164 | 0.05 | Accept $H_0$ | Homogeneous |

Based on Table 3, it can be seen the results of the homogeneity test, the value based on trimmed mean on the pretest is 0.726> 0.05 with a significant level ( ) 0.05 the decision obtained is to accept H0. This means that the pretest data comes from a homogeneous variant. While the posttest is 0.164> 0.05 with a significant level ( ) 0.05 the decision obtained is to accept H0. This means that the posttest data comes from a homogeneous variant.

Based on the results of the pretest and posttest data analysis, it is known that the data is normally distributed and homogeneous, so a decision can be made to conduct a t-test. This comparative test is useful for knowing whether the data is significantly different or not significantly different. The results of the t-test on pretest and posttest data can be seen in the table below:

**Table 4 T-test Results of Pretest and Post-test Data**

| Data Type | ***Sig.(2-tailed)*** | **α** | **Decision** | **Description** |
|---|---|---|---|---|
| *Pretest* | 0.000 | 0.05 | Reject $H_0$ | Significantly different |
| *Posttest* | 0.000 | 0.05 | Reject $H_0$ | Significantly different |

Based on Table 4 above, the pretest t-test results obtained a value of 0.000 <0.05, so reject H0, which means there is a significant difference in pretest scores between the control class and the experimental class. While the results of the posttest data t-test obtained a value of 0.000 <0.05, then reject H0, which means that the posttest data has a significant difference between the control and experimental classes.

The amount of improvement in students' creative thinking skills after learning can be seen from the N-Gain results obtained. The average N-Gain of the experimental and control classes is as in the following table:

**Table 5. Descriptive Statistics of N-Gain Data in Control and Experiment Classes**

| No | Class | n | N-*Gain* | | | Average | Category |
|---|---|---|---|---|---|---|---|
| | | | Ideal Value | Min Score | Max Score | | |
| 1 | Control | 30 | 1.00 | 0.0 | 0.86 | 0.46 | Medium |
| 2 | Experiment | 30 | 1.00 | 0.14 | 0.83 | 0.51 | Medium |

In Table 5, the minimum N-Gain value of the control class is 0.0 while the experimental class is 0.14, the maximum result of the control class is 0.86 while the experimental class is 0.83. The average N-Gain value of the control class was 0.46 in the medium category, while the experimental class N-Gain value was 0.51 in the medium category.

Data N-Gain kelas kontrol dan kelas eksperimen yang telah didapat kemudian dianalisis dengan melakukan uji normalitas, uji homogenitas, dan uji hipotesis komparatif. Jika data berdistribusi normal dan mempunyai varian homogen maka uji yang digunakan statistik parametik yaitu dengan uji-t, tetapi apabila data tidak berdistribusi normal dan homogen maka digunakan statistic non parametrik salah satunya dengan menggunakan uji U Mann- Whitney

To test the normality of the data, a normality test must be carried out, which is a requirement for determining the t-test using parametric and non-parametric statistics. Shapiro-wilk was used to test the normality of data distribution. N-Gain normality test data in the control class and experimental class are listed in the following table.

**Table 6. N-Gain Normality Test Results**

| Type | Class | N-Gain Normality Test | | | |
|---|---|---|---|---|---|
| | | *Asymp. Sig (2-tailed)* | $\alpha$ | Decision | Description |
| N *Gain* | Control | 0.341 | 0.05 | Accept $H_0$ | Normal |
| | Experiment | 0.524 | 0.05 | Accept $H_0$ | Normal |

Based on Table 6, it can be seen that the results of the N-gain normality test in the control class and experimental class with a significant level of 0.05 obtained an Asymp. Sig (2-tailed) for the control class is 0.341> 0.05 and the Asymp. Sig (2-tailed) for the experimental class is 0.524> 0.05 so that in each class a decision is obtained which means that the data comes from a normally distributed population. Furthermore, the N-gain data homogeneity test was conducted. This homogeneity test is useful for knowing the homogeneity of data variants. Analysis of homogeneity test data using the Levene Test. The results of the homogeneity test of the control class and experimental class can be seen in the table below

**Table 7. Homogeneity Test Results of N-Gain data**

| Data Type | *Based on trimmed mean* | $\alpha$ | Decision | Description |
|---|---|---|---|---|
| *N-gain* | 0.648 | 0,05 | Accept $H_0$ | Homogeneous |

Based on Table 7, it can be seen that the results of the homogeneity test of the Based on trimmed mean value in the Levene test table are 0.648> 0.05 with a significant level (0.05 the decision obtained is to accept H0. So it means that the N-gain data of the control class and experimental class comes from a homogeneous variant. After the N-Gain data is known to be normally distributed and homogeneous, a decision is made to conduct a comparative hypothesis test to determine whether the N-Gain data is different between the control class and the experimental class using the 2-Sample Independent t-test. The results of the N-Gain data t-test can be seen in the table below:

**Table 8. N-Gain t-test results**

| Data Type | *Sig (2-tailed)* | $\alpha$ | Decision | Description |
|---|---|---|---|---|
| *N-gain* | 0.000 | 0.05 | Reject $H_0$ | Significantly different |

Based on Table 8, the Sig. (2-tailed) for N-gain data in the control class and experimental class is 0.000 <0.05 with the decision to reject H0, which means there is a difference between the N-gain of the control class and the experimental class.

## Conclusion

Based on the research results that have been obtained, it can be concluded that the application of the SETS learning model containing local wisdom is effective in improving the creative thinking skills of grade X high school students in biology learning on environmental material.

## Suggestion

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