

**THE INFLUENCE OF THE USE OF GEOGRAPHIC INFORMATION SYSTEM (GIS) APPLICATION AS A GEOGRAPHIC LEARNING MEDIA TO IMPROVE ENVIRONMENTAL KNOWLEDGE OF THE ELEVENTH GRADE STUDENTS OF SMA MUHAMMADIYAH 1 PALEMBANG**

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**ABSTRACT**

*Basically, a geographical information system is a system consisting of interrelated components (related) in achieving a goal, based on information (data, facts, conditions, phenomena) based on geographical conditions (regional, spatial, spatial) whose position can be checked in Earth's surface (geographical reference). The problem in this study was whether the use of Geographic Information Systems (GIS) applications as a medium of learning geography influenced the improvement of environmental knowledge of the eleventh grade students of SMA Muhammadiyah 1 Palembang. The purpose of this research was to determine whether the use of Geographic Information System (GIS) applications as a Geography learning media affects the improvement of environmental knowledge of the students in the subject of disaster mitigation. This study utilized quantitative descriptive methods using data collection techniques through test questions, and documentation. The sample collection technique used in this research was random sampling. Data analysis techniques used were Homogeneity Test and Hypothesis test, data presentation and drawing conclusions or data verification flow. The results of this study indicated that the use of Geographic Information Systems (GIS) application as a learning media for Geography increased the learning outcomes or knowledge about environment of class XI IPS 2 (Experiment) which was better with a value of 78.13 than XI IPS 1 (Control) with a value of 66.50.*

**Keywords:** *Geographic Information System (GIS), Environmental Knowledge, SMA Muhammadiyah 1 Palembang*

**1. Introduction**

Advances in information technology have now developed rapidly and brought changes to human life. The development of science and technology (science and technology), especially information technology has given a positive impact in all aspects of human life, including in the world of education. Education is an interesting problem to discuss, because with education, the goals of education can be achieved. The development and utilization of information technology is expected to be delivered to students for their knowledge and

experience. Utilization of technology can be used as one of the creativity in delivering teaching materials (Ardiansyah, 2015: 1)

The development of technology has an impact on the advancement of data processing technology, which many provide convenience in various fields of science. The development and advancement of data processing technology is greatly supported by the development and advancement of computer technology both *hardware* and *software*.

Basically, a geographical information system is a system consisting of interrelated components (related) in achieving a goal, based on information (data, facts, conditions, phenomena), based on geographical conditions (regional, spatial, spatial) whose position can be checked in Earth's surface (geographic reference). Both types of data, spatial and tabular/textual, are stored in a system known as the Geographical Information System (GIS) database. This database system is the main component that must be available in GIS, along with other components such as computer systems, human resources and organizational or management containers that control the use of GIS (Soenarmo, 2009: 173).

Education at the secondary level (high school), especially in learning Geography in the classroom, is still lacking in the use of media or modern technology as well as the use of Geographic Information Systems (GIS) applications as a source of learning Geography. It causes the learning process to become tedious and lack of student motivation to learn. Under these circumstances, a teacher must be able to improve the student learning motivation that results in increased student learning outcomes or knowledge by creating a comfortable and pleasant learning atmosphere so that students can master the material fully.

The main problem in this study is how the use of media influences teaching and learning process of Geography. A change in the learning process of Geography needs to be made so that students knowledge can be improved. The most fundamental thing in making these changes lies on the way the material is presented, one of which is using learning media. A teacher must be professional in choosing the media that is most suitable for the material to be delivered to make sure that the students feel happy and get more interested in learning Geography.

The phenomenon that occurs generally in several schools is that the teachers conduct Geography learning using learning media that influence students to feel happy learning Geography, one of which is SMA Muhammadiyah 1 Palembang. After conducting

observations and interviews on March 11, 2019 with the Geography teacher at the school, it turned out that 19 out of 34 students (60%) liked the subject of Geography. Therefore, the use of instructional media Geographic Information System's (SIG) is expected to increase students knowledge about environment.

The authors decided to conduct the research at SMA Muhammadiyah 1 Palembang because the school wasnot using Geography Information System's (SIG) in teaching Geography.

## **2. Research Methods**

In this study, the researchers used an experimental research method. According to Sugiyono (2016: 107), "experimental method is a method used to find the effect of the certain treatment". In this study, the subjects taken from certain populations were grouped as a whole into two groups, namely the experimental group and the control group. The experimental group was given treatment using the Geographic Information System (GIS) media within a period of 1 x 3 hours of study for 2 weeks, then both groups were subjected to the same measurements. In XI IPS 2 class(experimental class), Geographic Information System (GIS) was appliedin the teaching process,while teaching and learning process in XI IPS 1 class (control class) was carried out without using the Geographic Information System (GIS) media or using the lecture method. Data were obtained by using instrument research in the form of tests and documentation. The test was a tool or procedure for obtaining data or information that was desired about a person in a way that was considered to be fast and precise, while the documentation, derived from the word document, meant written goods.

## **3. Results**

In this study, the researchers made direct contact with the object to be studied to find out the results or increase environmental knowledge of students after using the Geographic Information System (GIS) media by dividing them into two groups, namely the Experiment group and Control group. Those group were given different treatments to know the results of the use of the media. The results of this research could be seen from the results of the test of XI IPS 2 students as an experimental class that utilized the Geographic Information System (GIS) media in learning Geography, specifically on the disaster mitigation material. The

results showed a higher value than the test results of XI IPS 1 students as the control group that did not use the Information System media Geographic (GIS) (using the lecture method).

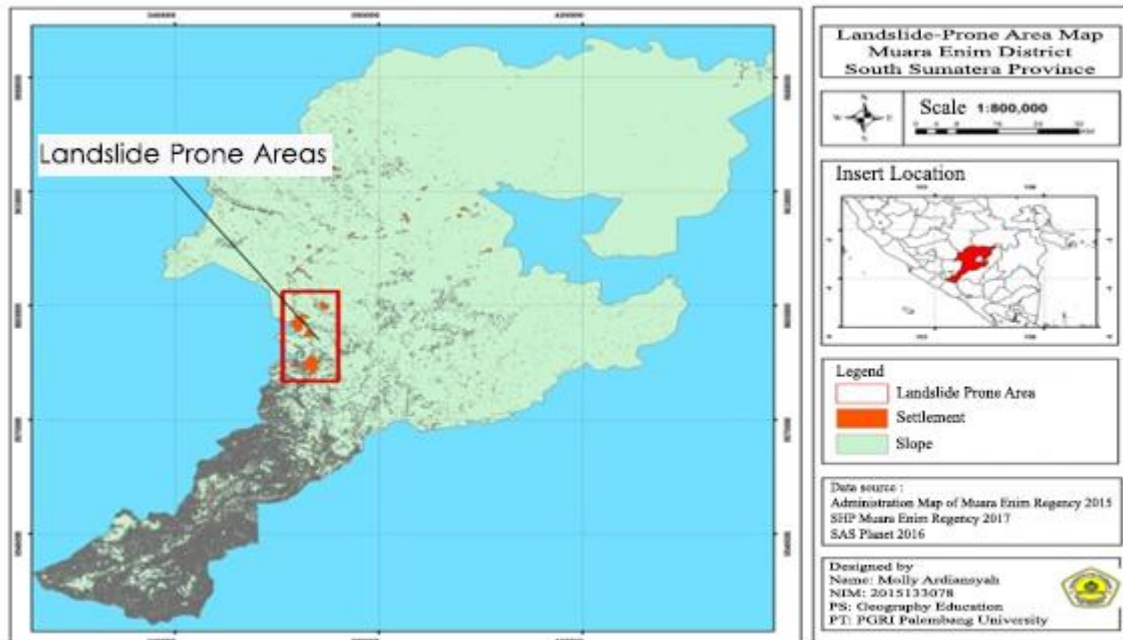


Figure 4.4 Map of Landslide Prone Areas (Source: own work)

**Table 1**  
**Experiment Test and Control Class Test Data**

No	Class	The highest score	Lowest Value	Average value
1	Experimental	95	65	78.13
2	Control	80	50	66.50

Source: Primary Data Processing 2019

Homogeneity test was carried out to test the similarity of the average values that were normally distributed and proved the similarity of the variance of the groups that made up the sample. In other words, the groups were taken from the same population. The requirements for sampling had to be *representative*, meaning that the sample had to be able to represent a population well. The analysis used to test the similarity of variance in this study was the *Bartlett* test using F table with the steps as follows:

Table 2

Homogeneity Test with Bartlett Test

Based on the determination of the validity of the test with a significance  $\alpha = (0.05)$

$$dk = n - 2 = 72 - 2 = 70$$

To search for a  $t_{table}$  is

$$dk = n_1 + n_2 - 2$$

$$dk = 36 + 36 - 2$$

$$dk = 70$$

Therefore,  $t_{count}$  was 27.04 while  $t_{table}$  was not in the t distribution, then the interpolation had to be determined with the formula:

Sample	dk = (n-1)	$S_1^2$	Log $S_1^2$	(dk) . Log $S_1^2$	dk. $S_1^2$
XI IPS2 Class (Experimental)	35	8.16	0.91	31.8	285.6
XI IPS 1 Class (Control)	35	5.89	0.77	26.9	206.15
<b>Amount</b>	<b>70</b>	<b>14.0</b>	<b>1.67</b>	<b>58.7</b>	<b>491.75</b>

Where:

The dk 70 value was not found at dk 80, the t value for dk 70 was 1.670

while the value of t for dk 80 was 1.666, then the difference in value of t is shown as follows:

$$\text{Value of } t_{r \text{ value}} = 2.0003 - 1.9944 = 0.0059$$

While the difference between value of two nearest d.k was  $80 - 70 = 10$

Then:

$$I = \frac{r - t_{\text{value}}}{r - d.f.} \times (d.f. - \text{lowest } d.f.)$$

$$I = \frac{0,00059}{10} \times (70 - 58)$$

$$I = 0.00059 \times 12$$

$$I = 0.00708$$

Value t for d.k 80 = value d.k of 70 - I

$$= 2.0003 - 0.00708$$

$$= 1.99322$$

Based on the hypothesis testing criteria, it can be seen that  $t_{arithmetic} > t_{table}$  was  $16.6 > 1.99$ . Therefore,  $H_a$  was accepted. Furthermore, the proposed hypothesis: The Effect of Using the Application of Geographic Information Systems (GIS) as a Geography Learning Media To Increase Environmental Knowledge of Class XI Students of Muhammadiyah 1 Palembang High School, could be accepted.

Based on the calculation results obtained for XI IPS 2class, the data normality test obtained was  $Km = 0.12$ , while XI IPS 1 class was  $Km = 0.76$  and the value was located between (-1) and (1), so it could be said that the data of XI IPS 2class and XI IPS 1class were normally distributed. In addition, the calculation results for the homogeneity test data obtained were  $\chi^2_{count} = 2.163$  and  $\chi^2_{table} = 3.841$  and homogeneous requirements:  $\chi^2_{count} < \chi^2_{table}$ , then got:  $2.163 < 3.841$ . Therefore, it can be concluded that the sample came from the same population or type for which the research data of the two experimental classes followed the normal and homogeneous distribution.

Based on the analysis results of the main data with the subject of disaster mitigation using the application of Geographic Information Systems (GIS) as a medium for learning Geography in the classroom and processing data on student geography learning outcomes, the researchers obtained the results of  $t_{count} = 27.04$  on the basis of a significant level of 0.05 for dk 70, obtained  $t_{table} = 1.99$ , then  $t_{arithmetic} > T_{table}$  was  $16.6 > 1.99$ . These results showed that  $H_0$  was rejected and  $H_a$  was accepted. It also showed the Influence of the Application of Geographic Information Systems (GIS) as a Geography Learning Media to Increase Environmental Knowledge of Class XI Students of SMA Muhammadiyah 1 Palembang.

## 5. Conclusions and research implications

Based on the results of the research conducted by the researchers using the application of Geographic Information Systems (GIS) as a medium for learning Geography, it was obtained that the learning outcomes or knowledge about the environment of class XI IPS 2 (Experiments) was better than class XI IPS 1 (Control). It could be seen from the average value of student learning outcomes taught using the Geographic Information System (GIS) application as a Geography learning media of 78.13 in the experimental class and the average scores of student learning outcomes taught using the teaching model as much as 66.50 in r control class. Based on the results of the t-test,  $t_{count} = 16.6$  which was then compared with  $t_{table} = 1.99$ , then  $t_{count} > t_{table}$  was  $16.6 > 1.99$ . Therefore, the hypothesis stating the influence of Geographic Information Systems (GIS) Application as a Geography Learning Media To Increase Environmental Knowledge of Class XI Students of SMA Muhammadiyah 1 Palembang was accepted (received).

The suggestions that we would like to convey after seeing the results of this research is:

1. For students, it is expected to be able to use the Geographic Information System (GIS) media in learning Geography to increase their knowledge in managing data and increase their knowledge about the benefits of GIS itself at the educational level.
2. For teachers, considering the successful implementation of learning by using Geographic Information Systems (GIS) application as a medium for learning Geography, teachers should be able to apply it in improving students' understanding and the benefits of GIS at the educational level.
3. For schools, it is expected to increase the provision of supporting facilities in the teaching and learning process used by teachers so that students can compete with other countries by utilizing current technological advancements.

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