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# Influence Of Use Of Geographic Information System Media Overlay & Scoring Based To Improve Critical And Creative Thinking Skills In The Implementation Of The Independent Curriculum

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**Abstract** – **This research aims to determine the influence of geographic information system learning media based on overlay and scoring on the ability to think critically and think creatively in geography subjects in the implementation of the 2023/2024 independent curriculum. This research uses a quantitative approach with experimental research methods. The research design used in this research is Quasi Experimental with a None-equivalent Control Group Design. The population is all X students, totaling 324 students. From this population, samples were taken, namely class X-5 as the experimental class, totaling 34 students and class The sampling technique uses the Purposive Sampling Technique, namely sampling based on certain considerations. The instruments used in this research were questionnaires and observation sheets. The research results obtained from class X-5 as an experimental class had an average posttest score of 76.62. Meanwhile, in class X-6 as the control class the average posttest value was 71.47. The hypothesis test results obtained were sig. (2-tailed) 0.000. So a value of 0.000 < 0.05 means that H1 is accepted and Ho is rejected. So it can be concluded that there is an influence of overlay and scoring based Geographic Information System Learning Media on the ability to think critically and think creatively in class X-5 SMA Al Kautsar even semester of the 2023/2024 academic year.**

**Keywords** – **Media Overlay and Scoring, Critical Thinking, Creative Thinking, Geographic Information Systems.**

## I. INTRODUCTION

The 21st century skills that students must have are critical thinking skills. Critical thinking means reflective thinking that focuses on deciding what actions to believe or something to do (Ennis, 2013: 1) Geographic Information Systems (GIS) as a geography learning medium will really help teachers in the teaching and learning process and can be used as a tool to help achieve learning goals Geography is in accordance with the curriculum and is expected to improve student learning outcomes with conditions that are dynamic, creative and relevant to everyday life.

Results of my observations in March 2022. So far, geography learning activities at Al Kautsar High School have been faced with problems, including; (1) students are not creative, independent and dependent on the teacher's explanation, (2) the condition of students seems not ready to learn, (3) students look bored, bored and passive, (4) students' skills in constructing

and finding material based on their understanding are limited and not developing, (5) some students are seen chatting, busy with their own activities, (6) students lack courage in asking questions, only 3 - 4 people usually ask questions and are considered to have advantages in their academic skills,

(7) skills active communication between students in groups is less than optimal, (8) limited learning resources.

One of the reasons for this is that the learning media used is less interesting and there is a lack of variety in geography learning. Geographic Information System (GIS) learning media as an external factor can be used to improve learning outcomes because it has the potential or skills to stimulate the learning process, which will ultimately increase students' absorption of the learning provided. Geographic Information System (GIS) learning media as a tool or means of carrying messages from learning sources to message recipients (students) to increase effectiveness and efficiency in achieving learning goals.

By using overlay & scoring media, students can directly train their critical and creative thinking skills so that they are able to solve problems, understand material in groups, make conclusions, and present in front of the class as a step in evaluating the learning activities that have been carried out. This shows that the use of overlay & scoring media is an effort to achieve the flow of student learning objectives in implementing the independent curriculum at Al Kautsar High School.

It is hoped that GIS learning activities through Overlay & Scoring media can attract students' interest in studying in class so that students can be more active, critical and creative in the learning process, thereby creating learning that stimulates students to learn critically and be able to think creatively.

## II.    LITERATURE REVIEW

Johnson (2009: 183) states that critical thinking is a directed and clear process used in mental activities such as: solving problems, making decisions, persuading, analyzing opinions or assumptions, and conducting scientific research. Cottrel (2005: 1) suggests that "Critical thinking is a cognitive activity, associated with using the mind" which means that critical thinking is a cognitive activity, namely related to the use of the mind. Based on Bloom's cognitive dimensions, critical thinking skills occupy the dimensions of analysis (C4), synthesis (C5), and evaluation (C6).

Creative Thinking Skills are an individual's ability to solve problems and solutions simply according to the results of his own way of thinking so as to form something new and unique. According to Fadilah, A. (in Nelpita Ulandari, et al. 2019: 227) suggests that the process in which someone develops a question or question to get an alternative answer is the definition of a creative thinking skill. According to Elly's Mersina Mursidik, et al (2015:26) states that creative thinking skills can be understood as the ability to build new things or the ability to place and combine various materials originating from someone's thoughts that can be understood, effective and innovative in various ways. influencing aspects.

Overlay and Scoring is an important procedure in GIS (Geographic Information System) analysis. According to Guntara, 2019 Overlay is the skill of placing one map graphic on top of another map graphic and displaying the results digitally or manually. In short, overlay superimposes one map on another map along with its attributes and produces a combined map of the two which has attribute information from both maps. Overlay is the skill of placing one map graphic on top of another map graphic and displaying the results with the new information produced.

## III.    RESEARCH METHODOLOGY

The design of this research is comparative research with an experimental approach. A comparative formulation is a research problem formulation comparing the existence of one or more variables in two or more different samples, or at different times (Sugiyono, 2009: 36).

This design was chosen because it was in accordance with the research objective of comparing two variables, namely the use of different Overlay & Scoring learning media. The approach used in this research is an experimental approach, namely research that aims to investigate whether there is an influence and how big the influence is by giving certain treatments to several experimental groups and providing a control group for comparison (Nazir, 2003: 64). This research uses a quasi-experimental design, namely a type of research that does not allow for full control and manipulation of all relevant variables.

This procedure can be briefly shown in Table 3.1 below. Table 3.1 Field Trial Design Using Two Way Anova

| Student Ability Level | Experimental and Control Class Research Design | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Experiment Class | | | | | Controll Class | | | | | |
| | Pretest | | T R E A T M E N T | Postest | | Pretest | | T R E A T M E N T | Postest | | |
| | Critical | Creative | | Critical | Creative | Critical | Creative | | Critical | Creative | |
| High | T1 (a) | T2 (a) | | T3 (a) | T4 (a) | T5 (a) | T6 (a) | | T7 (a) | T8 (a) | |
| Middle | T1 (b) | T2 (b) | | T3 (b) | T4 (b) | T5 (b) | T6 (b) | | T7 (b) | T8 (b) | |
| Low | T1 (c) | T2 (c) | | T3 (c) | T4 (c) | T5 (c) | T6 (c) | | T7 (c) | T8 (c) | |

Information:

Treatment: Use of GIS Overlay & Scoring Media

T1 (a, b, c): Results of critical thinking ability tests and (pretest) experiments T2 (a, b, c): Results of creative thinking ability tests and (pretest) experiments T3 (a, b, c): Results of the experimental critical thinking ability test (posttest). T4 (a, b, c): Results of the experimental creative thinking ability test (posttest). T5 (a, b, c): Results of the critical thinking ability test and (pretest) control

T6 (a, b, c): Results of the creative thinking ability test and (pretest) control T7 (a, b, c): Results of the control critical thinking ability test (posttest).

T8 (a, b, c): Results of the control creative thinking ability test (posttest).

The data that will be obtained will be analyzed through Two Way-Factor Anova, also called two-way Anova or two-factor Variance Analysis. Two-Factor Anova is used to test the effects of two independent variables (main effects) on the same dependent variable and also examine how the independent variables influence each other on the dependent variable (interaction effects). The purpose of this two-way ANOVA test is to find out whether there is an influence of the various criteria tested on the desired results.

The population in this study were all Class X Regular students at SMA Al Kautsar, totaling 324 students divided into 9 classes. The sample selected in this research was class X-5, totaling 34 students, consisting of 15 male students and 19 female students, as a comparison class. Class X-6 students totaling 34 students consisting of 15 male students and 19 female students, as an experimental class. Samples were taken using a purposive random sampling technique, namely a technique for determining samples from members of the population with certain considerations (Sugiyono, 2008: 124). Certain considerations were made in selecting two classes as samples by looking at the results of the initial test (pretest) in the odd semester of the 2023/2024 academic year. The results of this test are used to determine which samples will be treated so that each class has the same initial conditions. The data collection techniques used in this research are as follows: Observation Technique, Documentation. The data analysis requirements test used is inferential statistics with parametric statistical techniques. The use of parametric statistics requires the fulfillment of the assumptions that the data must be normal and homogeneous, so it is necessary to test requirements in the form of normality tests and homogeneity tests.

## IV.    RESULTS AND DISCUSSION

The results of the students' initial ability tests showed that before being given treatment, the experimental class and the comparison class had the same academic abilities. In the experimental class, the average initial test ability of students was 41.029 with a standard deviation of 7.956, while the comparison class obtained an average score of 40.735 with a standard

deviation of 8.177.



Based on the picture above, it appears that there is no difference in the average of the initial ability tests, both for the experimental class and the comparison class.

Implementation of learning in the Experimental class was carried out in class X-5; with a total of 34 students. At the first meeting the teacher uses it for pre-test, introduction and explanation of the learning model that will be applied to the

comparison class. As a result of this introduction, apart from students becoming more familiar with the teacher, students also gain an understanding of the learning model that will be applied, namely media overlay and scoring. The next meeting the teacher began to apply overlay and scoring media.

The following table contains a description of the achievements of students' critical thinking abilities for each question item reviewed based on a description of the achievements of critical thinking abilities with indicators of simple explanation (Elementary clarification), Building basic skills (Basic support), Providing conclusions (Inference), Providing further explanation (Advanced clarification), Developing strategies and tactics (Strategy and Tactics)

Table 4.8 Percentage of Acquisition of Critical Thinking Skills in the Experimental Class

| Level | Interval skor (skor max 32) | Jumlah Siswa | Persentase (100%) |
|---|---|---|---|
| Low | 0-10 | 5 | 14,7 % |
| Medium | 11-21 | 7 | 20,1 % |
| High | 22-32 | 22 | 65,2 % |
| Amount | | 34 | 100 % |

Source: Processing of 2023 research results

From the data obtained, the number of students who got a high score was 22 or 65.2%, and students who got a score in the medium category were 7 students or 20.1% and students who got a low score were 5 students or 14.7%. %. The test results of students' critical thinking abilities are based on indicators of simple explanation (Elementary clarification), Building basic skills (Basic support), Providing conclusions (Inference), Providing further explanations (Advanced clarification), Developing strategies and tactics (Strategy and Tactics).

Based on research results and data analysis results, critical thinking abilities are categorized as high, medium and low.

Table 4.9 contains a description of the achievements of students' creative thinking abilities for each question item reviewed based on a description of the achievements of students' creative thinking abilities for each indicator of creative thinking, namely fluency, flexibility, originality and detail.

Table 4.9 Percentage of Gain in Creative Thinking Ability in the Comparison Class

| Category | Interval skor (skor max 14) | Jumlah Siswa | Persentase (100%) |
|---|---|---|---|
| Low | 0-4 | 8 | 23,5 % |
| Medium | 5-9 | 16 | 47,1 % |
| Highi | 10-14 | 10 | 29,4 % |
| Amount | | 34 | 100 % |

Source: Processing of 2023 research results

From the data obtained, the number of students who got a high score was 10 or 29.4%, and students who got a score in the medium category were 16 people or 47.1% and students who got a low score were 8 students or 23.5%. %. The results of students' creative thinking ability tests are based on four indicators of creative thinking ability, namely fluency, flexibility, originality and elaboration. Based on research results and data analysis results, creative thinking abilities are categorized as high, medium and low.

### 4.1 Posttest Results of Application of Overlay and Scoring media in the Experimental Class

The results of the critical thinking ability of the experimental class showed an increase. At the beginning of the experimental class, the average score for the critical thinking ability test I (post-test I) was 64.706, and the critical thinking ability test II (post-test II) was 76.618. To make things easier, the data is presented in the following image.
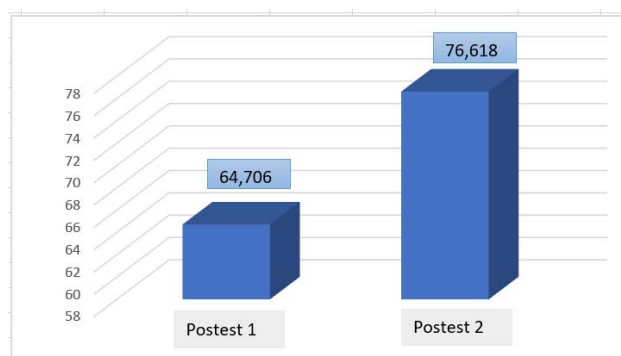


Figure 4.3 Improvement in experimental class learning outcomes

Based on the picture above, it can be seen that in the critical thinking ability test I experimental class which used overlay and scoring media, an average score of 64.706 was obtained, and the critical thinking ability test II increased to 76.618. This shows that the application of overlay and scoring media can improve Geography learning outcomes in Geographic Information Systems material. This is in accordance with the opinion of Frank Lyman, (2008) who stated that overlay and scoring media is a simple type and has many advantages because it can increase student participation and form students' critical thinking skills.

### 4.2 Results of the Application of Overlay and Scoring media in the Comparison Class

The results of measuring the creative thinking abilities of the comparison class showed an increase. In the comparison class, the average score for test I (post-test l) of students' creative thinking abilities was 63.824 and comprehension test II (post-test) of students' creative thinking abilities was 71.471. To make things easier, the data is presented in the following image.
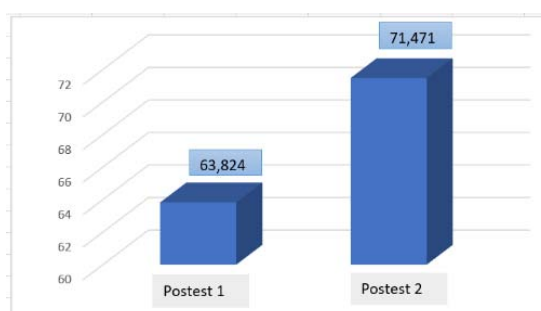


Figure 4.5 Improvement in learning outcomes (creative thinking) in the comparison class

Source: Data Processing of 2023 Experimental Class Posttest Results

Based on the image above, it can be seen that in the comparison class I creative thinking ability test which used overlay and scoring media, an average score of 63.824 was obtained and the second comprehension test increased to 71.471.

This shows that the application of overlay and scoring learning media in GIS learning can improve students' creative thinking abilities.

### 4.3 Improved Results in Experimental Classes (Critical Thinking) and Comparison Classes (Creative Thinking)

A comparison of the increase in the results of measuring critical thinking abilities in the experimental class with creative thinking abilities in the comparison class can be presented in the following picture:
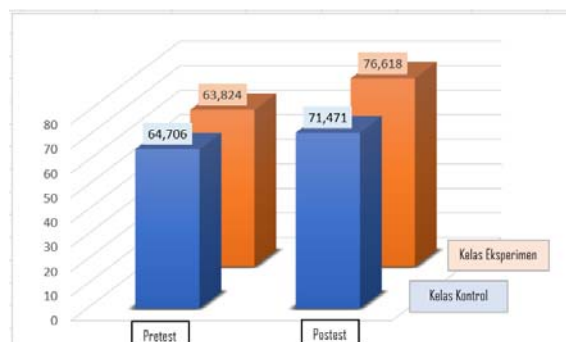


Figure 4.6. Improved measurement results for the Experimental Class and Control Class

Source: Processing of 2023 research results

Based on the picture above, it can be seen that in the overlay and scoring media there was an increase in critical thinking ability and creative thinking ability from post-test I and II. It also appears that the average measurement results in the experimental class which measures critical thinking abilities using Overlay and scoring media are higher compared to the comparison class which measures creative thinking abilities using Overlay and scoring media.

## V. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusion

The conclusions from the analysis results and test results in this research are as follows:

1. There is a significant difference in students' critical thinking abilities through overlay and scoring media in Geographic Information Systems material.

2. There is a significant difference in students' creative thinking abilities through overlay and scoring media on Geographic Information Systems material.

3. The use of Overlay and Scoring learning media is stated to be more effective in measuring critical thinking abilities than measuring creative thinking abilities rather than measuring creative thinking abilities.

### 5.2 Suggestions

1. Research should focus on developing interactive content that is appropriate to the curriculum and learning objectives. This includes the selection and presentation of relevant and interesting geographic information, as well as the effective integration of overlay and scoring elements.

2. Teacher and Student Training: Research could involve training teachers in the use of overlay and scoring media, as well as understanding how teachers can integrate these technologies into their learning in an effective way. In addition, research can also identify student training needs to maximize the benefits of this media.

3. It is best to measure the level of student involvement in GIS learning using overlay and scoring media. This may include analysis of student interactions with the material, level of participation in discussions, and detailed understanding of concepts gained.

5. Research should also be able to measure the cost efficiency of using overlay and scoring media in GIS learning,

including comparing the costs of procuring manual equipment and GIS software with the benefits obtained.

6. This research suggestion can help identify the benefits and obstacles in using overlay and scoring media in the context of GIS learning, as well as help in developing more effective and targeted strategies to overcome obstacles in the learning process.

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