The Effect of Fieldtrip on Geography of Student’s Ecological Intelligence

M Latipah*, M Ruhimat, L Somantri
Department of Geography Education, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi 229, Bandung 40154, Indonesia
*geo14.mazla@gmail.com

Abstract. The occurrence of environmental degradation shows decreased ecological intelligence. Enterprises in evoking environmental awareness can be reflected in the learning process that should be oriented to the contextual problems that exist in the student environment. This study is aimed to find out the effect of using field trip method in enhancing students’ ecological intelligence. The pretest-posttest quasi-experimental design has been used in this study. The sample used in this study is class XI with a total of 62 students. Class XI IPS 1 has been selected as experimental group (N = 31) and class XI IPS 2 is selected as control group (N = 31) with visual media usage. The data collection method uses tests for ecological knowledge, questionnaires to measure attitudes, and performance assessments to measure ecological skills. Data analysis technique using paired sample t test. There is a statistically significant difference in experimental ecological intelligence compared to control groups using visual media. Field trip methods can increase knowledge as well as evoke awareness and awareness of the environment because it is faced directly with the real situation of local environmental problems that occur around it.

1. Introduction
Garut Regency is part of the buffer zone of the capital of West Java Province. At this time experiencing environmental problems that are quite worrying. One of them is the existence of mining and mining activities both legal and illegal in several places that are carried out massively, causing the loss of hills as water catchment areas. As a consequence, people have difficulty getting water in the dry season. The government wants to improve the economy of its citizens by opening quarry mining, but environmental degradation has appeared before the eyes.

The existence of environmental degradation shows a decrease in ecological intelligence. Given that the root cause of degradation is human behavior. Various problems that occur in Garut Regency must be addressed immediately, because if these problems are allowed to continue they will have a negative impact on the survival of the earth. Before our earth gets damaged, humans should preserve life on earth because humans are part of planet earth [1].

The approach to planting knowledge about the development of harmony and environmental balance is through education. Education is believed to have a strategic role to develop environmental awareness, values, morality, and supporting skills towards sustainable development [2]. Geographic content and methodologies contribute to environmental education [3]. Environmental problems have a spatial dimension so that understanding geography is very important in environmental education. As for behavior that includes ecological intelligence, that ecological intelligence is the ability of humans to adapt to the ecological environment in which humans are located [4]. Ecological intelligence is an ability or competence possessed by students in responding to circumstances that occur around their environment and applying it in their daily lives. With ecological intelligence, students can learn about various human activities related to ecosystems and their consequences. With ecological intelligence students are expected to be more sensitive to the surrounding environment, find and understand the problems contained in it, find solutions and apply these solutions in their daily lives to be able to reduce the damage caused.

There are five indicators as well as important practices in implementing ecological intelligence and ecological principles so that one has the intelligence of understanding and caring for the environment
by integrating emotional, social and ecological intelligence. The practical steps to realize environmental care attitudes, namely, (1) Develop empathy towards all dimensions of life, (2) civilizing the principle of sustainability as a community practice, (3) realizing something imaginary into reality, (4) anticipate unexpected impacts, (5) understand how nature sustains life [5]. By implementing these practical steps, it is hoped that the creation of a sustainable society.

One of the things that must be addressed in the learning process is how to package learning scenarios that are able to stimulate the activeness of students in an effort to achieve competencies that must be mastered in the form of ecological competencies of students. it can be reflected in the teaching materials that we arrange must be oriented to real life. This form of learning must be oriented to the contextual problems that exist in the student environment. the concept of the source of teaching materials from the environment is interpreted by utilizing the resources of teaching materials in the environment, which means that an interesting understanding of classroom learning activities (indoor) becomes out of class (outdoor) by utilizing the resources of teaching materials around the students' environment by observing directly. Various steps are taken in the learning process so that it can improve ecological intelligence.

One of the concrete steps is to utilize the environment as a learning resource with a field trip method. Field trip learning is not only in the context of recreation, but if it is packaged and planned properly it will be one of the lessons that can improve understanding for students. The field trip program will provide opportunities for students to apply prior knowledge, see concrete examples set in the worldly framework, and opportunities to be involved, physically, with real situations in the field, all of this will have an impact on more understanding about the subject being studied [4].

Field trip learning methods have advantages and disadvantages. Learning done outside the classroom has advantages, namely a) with varied learning students will think freshly, b) inquiry is more productive, c) exploration ability is more runtu, d) more integrated acceleration, e) fostering concept strengthening [5]. In addition, the advantages of field trip methods, namely a) increasing student learning capacity, b) revealing facts in the field, c) encouraging student learning motivation, d) developing physical-social abilities, e) making student learning meaningful [6][7][8][9].

The purpose of this study are: (1) To find out the significant differences in the initial measurement (pre-test) and final measurement (post-test) of ecological intelligence in the experimental class using field trip. (2) To find out the significant differences in the initial measurement (pre-test) and final measurement (post-test) of ecological intelligence in the control class using visual media (3) To find out the significant differences in the final measurement (post-test) on ecological intelligence in the experimental class that uses field trip and in the control class that uses visual media.

2. Methods

The focus of the study used the field trip method (independent variables) on ecological intelligence (dependent variable) on the geography learning of students of class XI YKBBB Leles High School. The design used is a non-equivalent control group design. The form of this research design was chosen because in the quasi-experimental research design there were two groups, namely the experimental group and the control group [10].

The sample used in this study is class XI with a total of 62 students. Class XI IPS 1 has been selected as experimental group (N = 31) and class XI IPS 2 is selected as control group (N = 31) with visual media usage. The data collection method uses tests for ecological knowledge, questionnaires to measure attitudes, and performance assessments to measure ecological skills before and after the application of field trip. The data collection method uses tests for ecological knowledge, questionnaires to measure attitudes, and performance assessments to measure ecological skills before and after the application of field trip.

The hypothesis in this study uses the t-test. This test is conducted on two samples that are independent / uncorrelated / independent, or unpaired [8]. The analysis used to test the hypothesis in this study uses SPSS version 25 with independent analysis of t test samples if the data is normally distributed and homogeneous. But if one of the data is not normally distributed, it must use non-parametric statistical tests, in this case the Mann Whitney test.
3. Result and Discussion

3.1 The Enhancement of ecological intelligence in Study Outdoor Class

Learning in class by using field trip method is done in four times of meeting. The first meeting before visiting students (field trip) to mining excavation sirtu Pasir Laku. At the next meeting, students are given an initial ability test (pretest) to determine the students' initial ecological intelligence on natural resource management materials. After that, the researcher gave a briefing and preliminary material on managing natural resources and dividing the group into 5 groups with 5-6 people and directing the students' departure to the mining quarry. At the second meeting, the teacher directs students about the observation instructions 1 and 2. Students observe the mining activities of the quarry and the effects of mining quarrying in the environment around the excavation. At the third meeting, students collected observation reports during the field. Before the presentation was made by the group selected by the participants, they did not discuss in groups about the effect of exploiting resource extraction, and the sand behavior of the environment. From the results of the discussion the students gave a solution to the problems found due to mining of quarry excavation. In this case the teacher assesses the active attitude of students in group work.

At the fourth meeting, after learning is done outside the field (field trip) students are asked to fill in the questionnaire responses in the learning they have experienced as a reflection of learning. After that, the teacher reviews what experiences gained by the students from the field trip activities in the Pasir Laku region and discusses the future expectations of Indonesia's natural resource management. Based on analysis result of G-normalized data, Based on the interpretation category the normalized gain criterion obtained gain interpretation that is $g > 0.7$ high category as many as 3 people. $0.3 \leq g < 0.7$ medium category as many as 11 people and low category $0.00 \leq g < 0.30$ as many as 17 people. The Conclusion Gain values above that the use of field trip methods have not provided a positive influence on students. This is seen from the results of the gain of around 55% of students in the low category.

Description of the improvement of the ecological intelligence of the experimental class is shown in the graph below.

![Graph](image)

**Figure 1.** Ecological Intelligence Improvement Experimental Classes are based on the percentage level of the Experiment Class increase

From figure 1 it can be seen that the average percentage increase in the experimental class was 9.7%, the highest increase was 100% by 1 person while the lowest increase was 13 people. Most experimental class students experienced an increase in ecological intelligence after the use of field trip methods. So
it can be concluded that there is an increase in the ecological intelligence of students in geography learning in the experimental class using the field trip method

| Tabel 1. Paired Calculation Results of Ecological Intelligence Test for Experimental Class |
|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Paired Samples Test                  | Paired Differences |
| Mean                                 | Std. Deviation   |
| Std. Error                           | Mean             | 95% Confidence Interval of the Difference |
|                                      |                  | Lower           | Upper           |
|                                      |                  |                 |                 |
| Pair 1                               | Post Test - Pre Test |
|                                      | 5,323            | 10,796          |
|                                      | 1,939            | 1,362           |
|                                      | 9,283            | 2,745           |
|                                      | 30               | .010            |

From the test results on the aspect of knowledge obtained \( t \) count = 2.745 while the table for \( df = 30 \) is 2.042 for the positive region and -2.042 for the negative region, thus based on the criteria 2.745 > 2.042 means that Ho is rejected and Ha is accepted. And the results of the significance test of knowledge aspect of 0.05 shows \( p \)-value = 0.01 less than the value of \( \alpha = 0.05 \) (\( p \)-value < \( \alpha \)) so Ho is rejected and Ha is accepted. Thus it can be concluded there is a significant difference in the initial measurement (pretest) of ecological intelligence in the experimental class using the field trip method.

3.2 The Enhancement of ecological intellegence in Visual Media Class

The first learning process in the control class starts with giving apperception and motivation. The method used is forming a discussion group and dividing students into 5 groups of 6-7 people. After that, the teacher showed photos of the sitru quarry mining activities in the Pasir Laku area. Prior to the group discussion the teacher provided initial material on the types of natural resources to students. After that, the teacher distributes student worksheets in groups equipped with photographs and natural resource materials. Each group discusses the student worksheet provided by the teacher. After that, the teacher explains the format of the report from the results of the discussion and chooses the group that will make the presentation at the next meeting.

At the second meeting with material on environmental impact analysis (EIA) and the use of natural resources with the principles of sustainable development. Before entering the material the teacher collects the previous report and specifies several groups that will present the results of the discussion. After the teacher's presentation was finished, it displayed photos of the environment around the mine, excavating sitru and videos of environmental damage due to the use of citrus quarry. After that each group is given the task to discuss the questions in the student worksheet. Once done, each group collects the results of the work to be assessed and the teacher asks each group to collect the report. The third meeting of each group presented a report that had been made in the form of a written report in accordance with the provisions of the report given by the teacher.

At the third meeting, students collected reports on the results of group discussions. Before the presentation by the selected group, students discuss in a group about the impact of mining and sitru mining on the environment and efforts to overcome it. From the results of the discussion, the students gave a solution to the problems found from environmental damage caused by mining quarry. After finishing, the 2 groups selected delivered the results of the discussion and the other groups responded to the group presentations. The teacher further commented on the results of the group presentation and concluded with making conclusions about natural resource management and its use with the principles of sustainable development. At the fourth meeting, the teacher reviewed the material previously studied.
Next the teacher gives posttest ecological intelligence to find out how far the knowledge, attitudes and ecological skills of students.

Based on the interpretation category the normalized gain criterion obtained gain interpretation that is $g > 0.7$ high category as much as 2 people. $0.3 \leq g \leq 0.7$ medium category as many as 9 people and low category $0.00 \leq g < 0.30$ as many as 20 people. Conclusion Gain value above that the use of visual media has not given a positive influence to students. This is seen from the results of the gain of around 65% of students in the low category.

Description of the improvement of the ecological intelligence of the experimental class is shown in the graph below.

![Graph of Ecological Intelligence Improvement](image)

**Figure.2** Improved Ecological Intelligence of Control Classes based on Percentage of Increase in Control Classes

From figure. 2 it can be seen that the average percentage of increase in the control class is 9.51%, the highest increase is 100% by 1 person while the lowest increase is 16 people. Most of the control class students did not experience an increase in ecological intelligence after the use of visual media. So it can be concluded that there is an increase in ecological intelligence in geography learning in control classes that use visual media, only that the increase is not significant.

Hypothesis testing in comparative research is a difference test of two average parameters which aims to study the difference in the average of a variable or group of variables. Hypothesis testing in this study compares the average pretest and posttest in the control class. Because the data normality requirements were not met, the statistics used were non-parametric statistics with the Wilcoxon.

**Tabel 2.** The Results of the Wilcoxon Test

| Test Statistics\a\b                                      |
|--------------------------------------------------------|
| Posttest - Pretest Pengetahuan                         |
|                                                        |
| Z                                                      |
| -1.393\a                                               |
| Asymp. Sig. (2-tailed)                                  |
| .164                                                   |
| a. Wilcoxon Signed Ranks Test                          |
| b. Based on negative ranks.                            |
Based on the results of the Wilxocon test calculation the hypothesis testing criteria are if the Asymp value. Sig. (2-tailed) > α then H0 is accepted. Because of the Asymp value. Sig. (2-tailed) = 0.164 > α = 5% = 0.05, then H0 is accepted and Ha is rejected, meaning there is no significant difference in the pretest measurement of ecological intelligence in the control class that uses visual media.

### 3.3 The Enhancement Difference of Ecological Intelligence in Field trip Class and Visual Media Class

Before the research was carried out, a pretest was held before the experimental class and control class. Pretest was conducted to determine the ability of cognitive aspects related to ecological intelligence in students in the experimental class and control class before being given treatment. Likewise at the end of the research activity, posttest was held to determine the ability of cognitive aspects related to ecological intelligence in students in the experimental class and control class after being treated. The following is a comparison of the results of the experimental class and the control class posttest.

**Table 3.** Comparison of Experimental Class and Control Class Results Data

| Data            | Experiment Class | Control Class |
|-----------------|------------------|---------------|
| Skor terendah (min) | 50               | 45            |
| Skor tertinggi (max) | 100              | 100           |
| Rata-rata (mean) | 79,19            | 74,52         |

Table 3. shows that the lowest score of posttest in both classes looks quite different, namely 50 in the experimental class and 45 in the control class. The experimental class has a higher score of 5 points with the control class. While the highest score of posttest has the same value of 100, although the average posttest of the experimental class is 79.19 higher by 4.67 points than the control class which has a score of 74.52. Thus it can be concluded that mathematically there are differences in intelligence abilities final ecological student. Difference in results can be seen from the ratio of N gain in the following figure 3.

![Figure 3. Comparasion of ecological Intelligence](image)

4. **Discussion**

Based on the scores obtained from the results of the pretest, as many as 18 students experienced an increase after being given treatment, 6 students decreased and 7 students experienced a fixed value. The average score of students before being given treatment is 73.87 while the average score after being given
treatment increases to 79.19, then an average increase of 5.32 points. This increase has a significant effect on the ecological intelligence of students after being given treatment.

This proves that some of the theories presented at the beginning of field trip will give students the opportunity to apply prior knowledge, see real examples set in the worldly framework, and the opportunity to be involved, physically, with real situations on the field and will have an impact on understanding more about the subject being studied [4]. According to the Royal Geographical Society with IBG (2006) that the use of field trip methods can improve geography knowledge and understanding, appreciate the environment, foster a view in responding to social environmental issues and make learning fun. This is reinforced by the results of questionnaires that have been filled by participants students, the majority of students stated that they liked learning geography with this method, students also agreed that learning using the field trip method made the material easier to understand and the learning process felt more enjoyable.

Ecological intelligence is a human ability to adapt to human ecology [3]. Ecological intelligence as a capability or competence possessed by students in responding to the circumstances that have occurred around their environment. The existence of environmental changes due to mining quarry extracts can provide a truly concrete problem in the environment of students. Students can understand the conditions that occur in their environment and are expected to be able to preserve the environment that is in the vicinity even in a simple way. The increase in the value of students through outdoor learning this study indicates that the field trip method is the right method in fostering ecological intelligence, outdoor studies make students more familiar with the environment [7]. Outdoor learning environmental education can increase awareness and positive attitudes towards the environment [8]. So from the results of the research that has been done, it can be concluded that field trip is proven to be effective in increasing ecological intelligence both in terms of knowledge, aspects of attitudes and skills aspects of students.

In the formulation of problem number two, the researcher proposes a hypothesis stating that there are significant differences in ecological intelligence of students in learning geography between before (initial measurement / pretest) and after treatment (final measurement / posttest) using visual media in the control class. Based on the results of data processing using Wilcoxon test statistics in the control class, it was found that there were no significant differences in the measurement of the initial measurement (pretest) and the final measurement (posttest) of ecological intelligence in the control class using visual media, although there were significant difference. Thus, geography learning using visual media is not possible to improve ecological intelligence, especially in the optimal aspect of knowledge.

Based on observations when the learning process using visual media took place. The use of photos of mining activities in the control class shows the average value of knowledge, namely the value of pretest ($\Sigma70.32$) and posttest value ($\Sigma74.52$), the difference is 4.20 points, thus experiencing an insignificant increase. Usman in Rahayu, 2013 states that the use of visual media will reduce verbalism to increase the students’ understanding. In Edgar Dale’s Cone of Experience that visual media learning activities contribute 30% in the learning process. But in this study not up to 30% of students in the achievement of ecological intelligence in the aspect of knowledge with visual media.

In the formulation of number three, the researcher proposes a hypothesis which states that there are significant differences in ecological intelligence of students in geography learning between experimental classes which apply an field trip method with a control class that uses visual media. To answer the formulation of the problem, the researcher tested the hypothesis using Mann-Whitney test statistics because some of the data were not normally distributed. Based on the results of these statistical tests it is said that there are significant differences between field trip methods and those using visual media, effective outdoor learning increases ecological intelligence. Outside the classroom has advantages that are varied students will think fresh, inquiry is more productive, the ability of explorers is more runtu, more integrated acceleration and foster mastery of concepts [11].

In utilizing the environment and its problems, especially those that occur in the environment of students, the field trip method can be a good choice. Indicators of ecological intelligence in the form of aspects of knowledge, aspects of attitudes and aspects of skills observed from the findings indicate a positive change in each indicator of ecological intelligence. Thus, it can be concluded that geography learning by applying the field trip method in this study can significantly improve the ecological
intelligence of students. Students are faced directly with the real situation of environmental problems from changes in environmental space that occur around students. So that students can learn to overcome problems that occur in everyday life, especially environmental problems that occur around and can also help in making appropriate decisions in the use of natural resources, so as to maintain environmental sustainability.

5. Conclusions
There is a significant difference in the ecological intelligence of students in geography learning between before (initial measurement/pretest) and after the final measurement by applying the field trip method in the experimental class. There were no significant differences in the ecological intelligence of students in geography learning between before (initial measurement/pretest) and after treatment (final measurement/posttest) using visual media in the control class. The average score of students before being given treatment. There is a significant difference in the final results (posttest) between the use of field trip methods and visual media.

This research is suggested to be able to provide knowledge, understanding, and insight in improving ecological intelligence so that students are expected to have awareness in overcoming environmental changes and maintaining their sustainability. Field trip methods can be used as an alternative choice of learning methods in improving ecological intelligence.

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