The implementation of green education-based comic media on coral reef and its impact on students’ conception

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Abstract. The purpose of this study is to examine the effectiveness of green education-based comic media on understanding the concept of elementary school students in West Nusa Tenggara. This study is a quasi-experimental study using a 2 x 2 factorial design. Two sample schools from Central Lombok and North Lombok district were taken randomly with a total of 85 students from grades IV and V. The experimental class was given treatment by using green education-based comic media, while the control class used conventional methods. Data on understanding students’ concepts was collected through test instruments and then analyzed by using the One Way Anova test with the help of SPSS Version 21 software for Windows. The results showed that (1) the conceptual understanding of students in the experimental class is higher than the control class (p = 0.001 < 0.05), and (2) there is no difference in conceptual understanding of students for grade IV and grade V (p = 0.055 > 0.05). It can be concluded that the implementation of green education-based comic media can improve the understanding of students’ concepts and can be used for all levels of the class, especially high classes at the elementary school level.

1. Introduction

Learning media is a tool used to send messages in learning, i.e. to deliver subject to students, so that learning objectives can be achieved [1]. The media serves as a communication tool [2] and serves as a support tool for teachers in the classroom to improve student learning outcomes [3]. Success in learning is influenced by the use of instructional media [4] and can affect students’ thoughts, feelings, and willingness to learn [5]. The lack use of learning media in the classroom will result in students feeling bored and not interested in learning which can lead to student learning outcomes and the mastery of concepts is not going to be optimal [6]. Mabruri [7] argue that students’ understanding will be influenced by the media used by teachers in learning. So a good learning must use a good media. One medium that can be used by teachers in learning is comic media.

Comic is an images and symbols that related to certain sayings that aim to convey information and achieve an aesthetic response from the reader [8]. The implementation of comic media combined with creative learning strategies can maintain student focus and improve the quality of learning because comic is easy to read and have a visual appeal to the audience [9]. In addition, the implementation of comics in learning will reduce the gap between theory and practice [10]. The results of previous
studies indicate that the implementation of comic media in learning can improve student learning activities [11]; comic media combined with scientific approaches can improve students' scientific knowledge and attitudes [12]; comics can improve student attitudes and learning outcomes in biology [13]; even comics can also be used as learning media to improve student vocabularies [14].

The development of comic media that explores the local potential of the regions that used as teaching materials for students is rarely conducted. The research conducted by Sukri [15] resulted in the concept of comic learning media that adopted local primacy of the local area used as teaching material for students. This research is a continuation of previous research conducted by Sukri [15,16] by implementing comic media that adopts local primacy resources in West Nusa Tenggara Province, i.e. coral reef ecosystems. This comic media adopts the concept of green education, which is one of the new ways to preserve local primacy resources in a region through the field of education. Through the concept of green education, efforts to utilize and preserve coral reef ecosystems that pay attention to conservation values are inserted into the material with a presentation model that is easily understood by students. Therefore, understanding the concepts of students given learning media based on green education comics is important to reveal to provide information about students' mastery in understanding the material of coral reef ecosystems as one of the excellent resources in the Province of West Nusa Tenggara (NTB). This article outlines the results of the implementation of green education-based comic media on understanding the concepts of students at different class levels in West Nusa Tenggara.

2. Methods
This study used a quasi-experimental study [17] using a 2 x 2 factorial design [18]. This study consisted of two factors, i.e. the first factor was the treatment variable which consisted of the experimental and control classes and the second factor was the class factor consisting of grade IV and V of primary school. The use of grade IV and V in this study is to test the effectiveness of comic media at different levels for elementary schools. Two sample schools, i.e. SDN Teratak and SDN Malaka from Central Lombok and North Lombok district were taken randomly with a total of 85 students. The experimental class was given treatment by using green education-based comic media, while the control class used the conventional method. Student learning outcomes data were collected through concept understanding test instruments that have been tested for validity and reliability [19] then analyzed by using One Way Anova [20] with the help of SPSS for windows software [21].

3. Result and Discussion
This study aims to examine the effectiveness of green education-based comic media in understanding the concept of elementary school students at different grade levels. One experimental group consisting of grade IV and V is given treatment by using coral reef comic media, while the other control group consisting of grade IV and V was treated by using conventional methods. To find out the difference in conceptual understanding of students in the experimental and control classes, testing was conducted through inferential statistical analysis by using one way ANOVA which the normality and homogeneity of the data has been tested. The results of the analysis of normality and homogeneity indicate that the data were normally distributed (p = 0.2> 0.05) and variantly homogeneous (p = 0.34> 0.05) (Table 3.1).

| Variable            | Normality Test (Kolmogorov-Smirnov) | Homogeneity Test (Levene test) |
|---------------------|-------------------------------------|-------------------------------|
|                     | Statistic  | df      | Sig    | Levene Statistic | Df  | sig       |
| Experimental Class  | 0.102      | 47      | 0.200  | 0.914           | 83  | 0.342     |
| Contol Class        | 0.120      | 38      | 0.181  |                 |     |           |
After testing the normality and homogeneity of the data, the next step was to conduct a one way ANOVA test on the experiment class and control class in order to determine the differences in students' conceptual understanding in both classes after being given treatment. The results of one way ANOVA analysis showed that students' understanding of concepts in the experimental class is higher than the control class (p <0.05) (Table 3.2). The results of this study indicate that the implementation of green education-based comic media has an impact on students' concepts understanding about coral reefs.

| Table 3.2. Summary of One Way Anova Test Results of Experimental and Control Classes |
|----------------------------------|----------|----------|---|--------|
| Sum of Squares                   | df       | Mean Square | F      | Sig.    |
| Between Groups                   | 1523.906 | 1         | 1523.906 | 12.299  | .001    |
| Within Groups                    | 10283.889 | 83       | 123.902  |         |         |
| Total                            | 11807.794 | 84       |         |         |         |

The results of this study reinforce previous research which found that inquiry-based science comic implementation can improve the character and cognitive achievement of elementary school students [22]; can improve academic achievement and level of retention of student knowledge [23]; improve student performance and motivation in learning [24]. The use of comic media for elementary school students is not only to see students' academic achievements in the field of science, but also effective to improve student learning outcomes in social studies subjects in elementary schools [25]. To find out how much the impact of green education-based comic media implementation on student learning outcomes, N-gain analysis is conducted [26] for both experimental classes. The results of the N-gain analysis for the experimental class showed that the influence of comic media on students' conceptual understanding is in the medium category with an N-gain value of 0.3, while the control class has an N-gain value of 0.1 and was in the low category.

The results of this study indicate that the implementation of comic media in learning can improve the understanding of students' concepts of coral reefs. This is presumably because the green education-based comic media that is implemented has a continuously content, simple and attractive language style, so that it is easily understood by students which ultimately increases students' motivation to read and understand comic content. This assumption is reinforced by Sukri [15] which state that the sequence of comic material refers to the strategy of delivering learning that starts from the simplest to the most complex material so that it can be understood by students. The results of this study are in line with previous research which found that the application of comic media is very helpful in making science concepts more interesting and understood by students [27]; in addition, comic media is one way to increase students’ interest in science and can improve students' misconceptions [28].

After finding the influence of comic media on students' concepts understanding in the experimental class. Furthermore, testing the effectiveness of the use of comics for different class levels, i.e. grade IV and V was conducted. This test is important to find out green education-based comic media that have been developed are effectively used for all classes at the elementary school level or are only effective in certain classes. To find out the differences in conceptual understanding of students in grades IV and V, treatment was given by using comic media, the One Way Anova test is conducted. Before statistical analysis, a prerequisite test is conducted to determine the normality and homogeneity of data. The results of the normality and homogeneity test showed that the conceptual understanding were normally distributed (p = 0.2> 0.05) and variably homogeneous. (p = 0.112> 0.05) (Table 3.3).

| Table 3.3. Result of Normality and Homogeneity Test |
|-------------------------------|------------|---------------|----------|---------------|-----------|----------|
| Variabel                      | Normality Test (Kolmogorov-Smirnov) | Homogeneity Test (Levene test) |
|                               | Statistic | df | Sig    | Levene | df | Sig    |
|                               |           |   |        |        |    |        |
To find out the difference in conceptual understanding of students in grade IV and V, One Way Anova analysis was conducted which showed that there is no difference in understanding of students' concepts learned through comic media in both classes ($p = 0.055 > 0.05$) (Table 3.4). These results indicate that green education-based comic media that have been developed are effectively used at different class levels for elementary school levels. This is allegedly caused by the content composition of green education-based comic media adopting the components of the learning variable based on Reigeluth & Merrill [29] which show the material of coral reef ecosystems from the simplest aspects to the most complex aspects, display images that match the material, and use language simple and easy to understand according to the cognitive domain of students at the elementary school level [15;16]. This is based on Piaget's cognitive development theory that the cognitive stages of ten-year-olds (grade IV) are at the level of C5 (Synthesis) the same as grade V even though they are still at a simple level [30]. Furthermore, Bujuri [30] explains that children of this age can do analysis, and connect theory with facts to draw conclusions.

### Table 3.4. Results of One Way Anova Analysis at Different Class Levels

| Students’ concept understanding of grade | Sum of Squares | df | Mean Square | F | Sig. |
|-----------------------------------------|----------------|----|-------------|---|------|
| IV                                      | 514.204        | 1  | 514.204     | 3.779 | .055 |
| V                                       | 11293.590      | 83 | 136.067     |     |      |
| Total                                   | 11807.794      | 84 |             |     |      |

Overall, the results of this study revealed that the material of coral reef ecosystems packaged in the form of comic media can improve students' understanding of coral reefs. This means that the green education concept which includes the principle of utilizing and preserving coral reef systems in accordance with conservation rules can be well understood by students. However, further research needs to be done to find out the impact of comic media implementation on student conservation attitudes towards coral reefs.

### 4. Conclusion

Based on the results of the research and discussion, it can be concluded that the implementation of green education-based comic media can improve the understanding of students' concepts about coral reefs and can be used for all levels of the class, especially high classes at the elementary school level.

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