The Effectiveness of The Animation Video Learning Earth’s Layer Media to Improve Students' Concept Understanding

L Rosdiana*, R M Ulya
Science Department, Universitas Negeri Surabaya Surabaya, Indonesia
*lailyrosdiana@unesa.ac.id

Abstract. Science learning of the earth's layers subject is not optimal. One of the factors causing the less optimal learning is the lack of media that support this subject. Students want a learning media that can motivate them to learn and also make it easier for them to understand the subject matter. This study aims to analyze the effectiveness of instructional video animation media on the earth’s layers subject in terms of the results of understanding the concepts of junior high school students. This study used a research design "One group pretest-posttest design". The subjects of this study were 28 students of class VII-D SMP Negeri 3 Sidoarjo. The data collection technique used the test method. The conceptual understanding indicator used is to give examples, categorize, compare and explain. The results of this study are that the indicators give an example of obtaining an n-gain of 0.84 in the high category, the indicators categorizing obtaining an n-gain of 0.67 in the moderate category, the indicators compare getting an n-gain of 0.69 with the medium category and the indicator explained that obtaining an n-gain of 0.68 in the medium category. The indicator compares getting the lowest posttest score and the indicator gives an example of getting the highest posttest score. So it can be concluded that the animated video media as a learning medium on earth layer material is very effective in increasing students' understanding of concepts 0.69 in the medium category and the indicator explains that it gets an n-gain of 0.68 in the moderate category. The indicator compares getting the lowest posttest score and the indicator gives an example of getting the highest posttest score. So it can be concluded that the animated video media as a learning medium of earth's layers subject is very effective in increasing students' understanding of concepts.

1. Introduction
Currently, the curriculum applied in Indonesia is the curriculum 2013 since mid-2013. There are three aspects of assessment in the main principles of curriculum 2013 development, namely aspects of knowledge, skills, and attitudes and behavior. The three aspects are expected to be able to describe the comparable quality between the achievement of hard skills and soft skills. The educational process that is expected in the curriculum 2013 is the learning process carried out by the education unit in a challenging, inspirational, fun, interactive manner, and can provide motivation to students so that students play an active role and can develop student’s initiative, creativity and psychology [1].

Based on the results of distributing questionnaires to class VIII students at SMP Negeri 3 Sidoarjo, as many as 81.25% of students stated that science is a difficult subject to learn. As many as 61% of students feel bored with the science learning they have been doing so far. As many as 79.7% of students stated that the science learning atmosphere was less pleasant because there were lots of
memorizations, the teacher's delivery was not interesting and difficult to understand. All students stated that the learning resources used during learning were books, worksheets, blackboards, LCD online media and monotonous teacher explanations so that it could be said that students were less motivated in learning. Students feel bored when the learning uses the same method from every meeting. Science subjects for grade VII at SMP Negeri 3 Sidoarjo have a minimum completeness criteria (KKM), namely 71. Based on the daily test scores on earth’s layers subject that have been obtained, 59.4% of students scored below the KKM and as much as 40.6% students score above the KKM. Based on the daily test scores, it can be stated that science learning is still not optimal. There are several factors that cause learning to be less than optimal, namely the lack of media that supports this material. Students want a learning media that can motivate them to learn and also make it easier for them to understand the subject matter. Based on the daily test scores, it can be stated that science learning is still not optimal. There are several factors that cause learning to be less than optimal, namely the lack of media that supports this material. Students want learning media that can motivate them to learn and also make it easier for them to understand the subject matter. Based on the daily test scores, it can be stated that science learning is still not optimal. There are several factors that cause learning to be less than optimal, namely the lack of media that supports this subject. Students want learning media that can motivate them to learn and also make it easier for them to understand the subject matter.

Teacher must be creative and innovative in delivering material to students. In order for the learning process to be fun and not boring, a teacher also needs to use a tool as support learning, namely by using learning media [2]. According to Piaget [3] states that junior high school students who are around 11-15 years old, whose main achievement is in the form of abstract and purely symbolic thinking is also possible. Characteristics of junior high school students are liking pictures or symbols. One of the learning media that is interesting and appropriate for junior high school students is animation video, moreover, animated video is a learning medium that attracts attention and is very close to today's children.

In the previous educational process, the source of student learning was only the teacher. Then the learning resources increase with the book. Furthermore, educators began to realize the need for learning tools that could provide motivation and provide a direct, comprehensive learning experience for students through all senses, especially the senses of sight and hearing. In the mid-20th century efforts to develop learning tools or media were increasingly advanced. This is marked by the use of various media such as visual media which are starting to be equipped with audio equipment, to create audio-visual learning media. The use of media in learning refers to Dale's Cone of Experience theory [4].

Here is an overview of Dale's Cone of Experience:
According to Dale, the cone of one's experience is obtained from direct experience (concrete or real), objects around that resemble reality, to verbal symbols (abstract). The farther up the top of the cone the more abstract the medium for conveying the message. The more real (concrete) the media message given is, the easier it is for students to digest and understand the material given. So the media used in the learning process should be more real (concrete). The teacher should, as much as possible, change the learning subject into a clear visualization so that students are able to digest and understand the subject matter well.

Video can visualize an object moving simultaneously with appropriate sound and background. This is what makes video becomes more attractive. Students will pay more attention to pictures or moving objects than pictures or objects that are still or not moving. Animation can be used to maximize the senses more than something textual, so that students will be more interested in paying attention to animation rather than reading. Attention and interest are what indicate student learning motivation has increased [4].

Computer-based animation can be used as a learning medium. Animation aims to improve student understanding by providing feedback that is carried out in a sustainable manner and optimizing visual effects. Animation has several abilities, one of which is that animation can change material that is difficult or difficult to explain into just pictures or words. So, animation can be used to present material that is abstract or cannot be seen by the eye by visualizing the material so that it can be explained and depicted [5].

The use of instructional media in the form of animated videos can motivate students to learn because students will be more interested in paying attention to moving objects. Describing a process with animation, audio, and appropriate background makes it easier for students to understand the material. The material in the form of moving objects can make it easier for students to understand the material because students can know its concrete depiction. From the results of distributing questionnaires to class VIII students as many as 97% of students agreed that animated video learning media were used in science learning because science lessons were more enjoyable and could overcome difficulties in science lessons.

The results of research conducted by Szofia Szeszak, et al. [6] stated that animated videos are very advantageous over other preparation methods because animated videos are available on the internet and can be accessed widely and for free. Animated videos are very effective for learning to children. Animated videos used in the lesson showed a significant increase in knowledge, namely as many as 98.9% of students experienced a complete understanding of concepts. Therefore, the researcher wants to conduct research on the effectiveness of animated video learning media on earth layer material to improve the conceptual understanding of junior high school students.

2. Method
This study uses the research design "One group pretest-posttest design" described as follows:

\[
\begin{array}{c}
O_1 \quad X \quad O_2 \\
\end{array}
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Information:
- \(O_1\) = Pre-test results before treatment
- \(X\) = Treatment in the form of learning with videos Animations
- \(O_2\) = Post-test results after treatment
The subjects in this study were 28 students of class VII-D SMP Negeri 3 Sidoarjo in the even semester of the 2019/2020 school year. The results of students’ understanding of concepts using the test method. There are two tests, namely the pretest and posttest. The pretest is used to determine students’ prior knowledge. The posttest is used to determine the increase in students’ concept understanding after being given an animated video media of the earth layer material. The increase in pretest and posttest values is calculated using the n-gain formula as follows:

$$<g> = \frac{\text{nilai posttest} - \text{nilai pretest}}{\text{nilai maksimal} - \text{nilai pretest}}$$

Then the scores obtained by students were analyzed by adjusting the following criteria [7]:

| Gain Index | Gain Criteria |
|------------|---------------|
| 0.7 < (<g>) ≤ 1.0 | High |
| 0.7 < (<g>) ≤ 1.0 | Moderate |
| 0.0 < g ≤ 0.3 | Low |

Based on these criteria, the developed animated video learning media is said to be effective if the results of student improvement reach a score of > 0.3.

### 3. Results and Discussion

The results of students’ understanding of the concept of natural disasters and their mitigation were measured using the pretest and posttest questions. To determine the increase in students’ conceptual understanding, the pretest data obtained before learning was compared with the posttest data obtained after learning using the n-gain formula. The results of increasing concept understanding are as follows:

| Students | n-gain | Category | Students | n-gain | Category |
|----------|--------|----------|----------|--------|----------|
| 1        | 0.68   | Moderate | 15       | 0.60   | Moderate |
| 2        | 0.72   | High     | 16       | 0.82   | High     |
| 3        | 0.69   | Moderate | 17       | 0.75   | High     |
| 4        | 0.82   | High     | 18       | 0.82   | High     |
| 5        | 0.90   | High     | 19       | 0.58   | Moderate |
| 6        | 0.81   | High     | 20       | 0.75   | High     |
| 7        | 0.76   | High     | 21       | 0.75   | High     |
| 8        | 0.66   | Moderate | 22       | 0.71   | High     |
| 9        | 0.68   | Moderate | 23       | 0.79   | High     |
| 10       | 0.58   | Moderate | 24       | 0.69   | Moderate |
| 11       | 0.74   | High     | 25       | 0.76   | High     |
| 12       | 0.73   | High     | 26       | 0.63   | Moderate |
| 13       | 0.86   | High     | 27       | 0.66   | Moderate |
| 14       | 0.80   | High     | 28       | 0.68   | Moderate |

**N-gain average**: 0.73

**Category**: High

Based on Table 2, the results of students’ understanding of concepts, as many as 28 students took the pretest before learning using animated video media of natural disasters and their mitigation
and posttest after learning using video learning media animation of natural disasters and their mitigation. The table shows that the increase in student learning outcomes seen from the n-gain value, 17 students with high criteria, 11 students received moderate criteria and no students with low improvement. All students experienced an increase in the results of understanding the concept with the high category, namely obtaining an n-gain of 0.73.

Table 3. Results of the Concept Understanding of Each Indicator

| No. | Concept Understanding Indicators | Pretest | Posttest | n-gain | Category |
|-----|----------------------------------|---------|----------|--------|----------|
| 1.  | Set an example                   | 38.52   | 90.31    | 0.84   | High     |
| 2.  | Categorize                       | 50.89   | 83.57    | 0.67   | Moderate |
| 3.  | Comparing                        | 19.94   | 75.30    | 0.69   | Moderate |
| 4.  | Explain                          | 39.38   | 80.80    | 0.68   | Moderate |

Based on Table 3, the results of students' understanding of concepts on indicators give an example, students get an n-gain of 0.84 in the high category. In categorizing indicators, students get an n-gain of 0.67 in the moderate category. On the indicator comparing, students get an n-gain of 0.69 in the medium category and on the indicator explains that students get an n-gain of 0.68 in the moderate category. The indicator compares getting the lowest posttest score than other indicators, while the indicator gives an example of getting the highest posttest score than other indicators.

The improvement of the students' understanding of the concept was done by using the n-gain formula. The increase in the results of understanding the concept is said to be good if the n-gain value is ≥ 0.3. From this acquisition, the improvement of students' conceptual understanding after using animated video learning media was achieved well. This is in accordance with Fechera, et al. [8] who said that the use of video as a learning medium can provide a positive response from students. Students become more motivated to learn and are able to increase their understanding of the material that has been given.

In Table 3, the results of the post-test which include the four indicators of understanding the concept are obtained, it is known that the comparison indicator gets the average value of all students, namely 75.30 which indicates that the indicator comparing is the indicator that gets the lowest score compared to the three indicators other. Whereas the indicator giving an example gets the post-test average score of all students, namely 90.31 which indicates that the indicator giving an example is the indicator that gets the highest score compared to the other three indicators.

The aspect of comparing involves the process of determining linkages or searching for similarities and differences between two objects, problems or situations, ideas, or more objects. The aspect of comparing includes the search for the relationship between components and patterns in
objects, events or other ideas. The aspect of comparing supports analogical reasoning or conformity [9].

According to Piaget [10] that at this junior high school age students are already at the stage of formal operational development. At this stage of development, students have the ability to think abstractly and can analyze the solution to a problem scientifically. Students at this stage are able to think abstractly, formulate hypotheses or provisional assumptions, draw conclusions and work systematically. However, according to Vygotsky, not all students are able to solve problems on their own, some individuals need help or adult guidance, there are some students who need cooperation with other friends who have more ability than them to solve problems. So that students have different cognitive levels.

There are several categories which are cognitive processes of conceptual understanding, namely interpreting, exemplifying, classifying, summarizing, concluding, comparing and explaining. Comparing includes the sixth cognitive process of understanding the concept, which means that the higher the cognitive process, the more difficult it is [9]. This is what causes the indicator to compare the lowest increase compared to the other three indicators of understanding the concept. This causes the indicator to compare the lowest increase compared to the other three indicators of understanding the concept. This is in line with the research conducted by Razak [11] which obtained results, namely that the indicator compares getting the lowest post-test score compared to other indicators.

The cognitive process of giving an example occurs when students can provide examples of a concept or principle. Giving an example involves the process of identifying some of the main features of a concept or principle and using them to select or create an example [9]. Students are only required to provide an example of a certain concept or principle. This causes the indicator to give an example of getting the highest post-test score compared to the other three indicators. In line with the research conducted by Fadilah [10] which obtained results, namely indicators giving examples of getting high post-test scores because the questions on this indicator are simple questions that only ask students to name examples of a concept or principle.

The results of the increase in understanding the concept of students get an average of 0.73 which according to the interpretation of the n-gain criteria is categorized as high, so that the animation video learning media developed is very effective to be used to improve students' conceptual understanding.

4. Conclusion
Based on the results and discussion of the research that has been carried out, it can be concluded that the animation video learning media on the earth’s layers subject is very effective in being used as a learning media in terms of the results of student activity observations and the results of students' understanding of concepts. The indicator gives an example of obtaining an n-gain of 0.84 with the high category, the indicator categorizes getting an n-gain of 0.67 with the moderate category, the indicator compares getting an n-gain of 0.69 with the moderate category and the indicator explains getting n-gain equal to 0.68 in the medium category. From this assessment it can be said that the animated video media is very effective as a learning media.

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