The Use of Self Construction Animation Learning Software to Improve the Students’ Concept Mastery on Structure and Functions of Plants

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ABSTRACT

The use of learning media plays an ultimate role in Biology learning to assist students in the understanding subject matter. This study aims to improve students’ concept mastery after using self-construction animation learning software in a subject matter of structure and function of the plant. The method used in this study was Quasi-Experiment, while the design used was Pretest-Posttest None-equivalent Groups Design Research. The study was conducted in the 8th grade of MTs Ma’arif Cikeruh Jatinangor. The sampling used Purposive Sampling, thus 8th B was chosen as the experimental class while 8th was chosen as the control class. The instrument used in this study was a written test in the form of multiple choices. The taken data were analysed by using N-Gain to discover the improvement of concept mastery and hypothesis test analysis to discover the differences of concept mastery improvement. The result of the study shows that there is a significant difference in the concept mastery improvement in structure and function of plants subject matter. The result of N-Gain analysis shows that such a media mentioned earlier can improve students’ concept mastery.

Key Words: Self Construction Animation; Concept Mastery.

INTRODUCTION

The curriculum structure of 2013 does not include Information and Communication Technology (ICT) subjects as subjects in primary and secondary schools. ICT subjects integrated in all subjects. That is, although not included subjects ICT but skills using ICT equipment is absolutely used for the smooth learning process (Rahmi, 2013). So it
is not only ICT subject teachers who master science and technology but also teachers of other subjects. According to Aulia (2013), this time the various forms of science and technology can not be separated from the lives of students. Teachers as educators are required to be able to adapt to the process of interaction of student teacher learning based on information technology harmoniously. In realizing students who are able to master the technology, teachers should be more able to master the technology first. Teachers are required to be able to facilitate the learning process with information technology.

In order to develop students’ learning spirit, the teacher is required to make learning more interesting and innovative, thus encouraging students to learn optimally both in individual learning and in the process of learning in the classroom. One type of media used in the learning process is the animation media. The use of animation media in the learning activities will make the learning process becomes more fun, students remember more material. The pictures shown will clarify the students in understanding the material. In the process of teaching and learning, students are often faced with abstract material and outside of everyday experience so that the subject matter is difficult to be accepted and understood by the students. The specialty of the core animation is to visualize abstract concepts that are difficult to practice in class. There have been many researches to improve the mastery of the concept through animated learning media, one of which has been done by Anwar et al., (2013) and Kardiam (2016) on animation media revealed that learning by using animation media can improve the mastery of the concept compared with the other media.

Animation media usually rarely involve the teacher as a facilitator so that the role of teachers can be replaced by the animation media for students can master the material, because in the animation media there are already many presentation of material that students can learn by themselves without any help from the teacher. However, the media of Learning Software of Self Construction Animation is different from other animation media, this animation media is not completely replaced the role of teacher in the delivery of material, through the media of Learning Software Self Construction Animation teacher role is involved so that the learning process becomes more clear, interesting and efficient for students.

By using Self Construction Animation Learning Software media students can build their own knowledge so that it can improve students’ concept mastery, unlike other animation media that are only provide information only. The media of Self Construction Animation Learning Software can also improve the ability of argumentation because with the way students build their own knowledge students are required to be able to think, and in Self Construction Animation Learning Software students are required to take decisions to build knowledge so that argumentation in taking the decision is needed.

Learning activities can not be separated from the mastery of the concept. Ability in mastering the material can be seen from the mastery of the concept. Mastery concept is the ability of students in understanding the meaning of learning and applying it in everyday life. Mastery concept shows students’ success in learning a concept. Dahar (2011) states that the mastery of the concept can be interpreted as the ability of students in understanding the scientific meaning both the theory and its application in everyday life. Mastery of concept is very important, Anderson and Krathwohl (2001) states that with the mastery of concepts, students can improve their intellectual skills and help in
solving problems that it faces and lead to meaningful learning

The ability to master the concept is very important because the concepts are also considered as a basis for mental processes are high for the formulation of principles and generalizations. In addition, to solve the problem a student must know the relevant rules, and these rules are based on the concepts they acquired (Dahar, 2011). Based on the description above, it can be concluded that, in this study is limited to the use of media in the form of self construction animation learning software to improve mastery of student concepts on the material structure and function of plants.

Teaching Media

According to Gagne and Briggs (1975) in Arsyad (2011) Learning media is a tool that is physically used to convey the content of teaching materials. In other words, learning media is a component of a learning resource or physical vehicle that contains instructional materials in a student environment that can stimulate learning. The above statement is in line with Hamalik's opinion in Arsyad (2011) which suggests that the use of instructional media in the teaching and learning process can generate new desires and interests, generate motivation and stimulation of learning activities, and even bring the influence of psychological influence on students.

The concept of instructional media has two facets that mutually support each other, namely hardware (hardware) and materials or materials called software (software) (Anitah, 2010). Based on the type according to Soegito Atmohotomo in Rohani (1997) media are grouped into audio media (listening media), visual media (visual sense), and audio visual media (media view of hearing). Audio media contains elements that can only be heard such as: radio, phone, cassette recorder, phonograph record etc. Visual media contains elements that can only be seen such as: pictures, charts, graphics, posters, comics, photographs, paintings, silent films, Overhead Projector (oHP), slides and so on. Audio-visual media contains objects not only visible but also audible, such as movies, television, video cassettes, Video Compact Disks (VCDs) and so on.

Animated Media in The Learning Of Biology

In the context of learning, media is basically used to help learn an object or process that is difficult to be presented in the classroom. Therefore, the use of learning media in teaching and learning activities will make learning becomes more meaningful for students. This is because the media can visualize objects, sounds, and processes that can not be seen directly.

Lowe (2004) reveals two animated roles in learning that include affective function and cognitive function. More on this, Gagne & Rieber in McClean et al., (2005) reveals the affective function of animation related to the ability of animation in attracting attention, encourage students in learning activities in the classroom as well as maintaining student learning motivation. While the function of cognitive animation associated with the ability of animation in helping or eliminate the cognitive process of students to develop a dynamic representation of a visual image obtained by them.

The presence of animation media in biology learning strongly supports the process of delivering information from teacher to student. Complex biological processes can be easily explained to students such as plant organ structures, plant organ anatomy, photosynthesis processes, respiration and various processes in the human organ system. The importance of animation as a medium of learning has the ability to describe something complicated and complex and difficult to explain with only images or words
only. Learning animation media can be used to describe material that is not visible to the humans’ eye.

Concept Mastery
Mastery is the process, the way, the act of control or authorize, understanding or ability to apply knowledge, know-how. The word control means the ability of a person to do something. Nurgiyantoro (2001) states that a person's ability to control can be realized both in theory and in practice. A person can be said to dominate the thing when people know and understand the material or the concept so that it can apply to a situation or a new concept. The second conclusion is that sense of mastery is the ability to understand the material or concept that can be realized both in theory and practice.

Whereas, the concept is an abstraction representing a class of objects, events, or relationships that have the same attributes. Concepts are abstractions of experience that are certainly different on each person (Dahar, 2011).

This material needs to be mastered by students because the structure and function of plants is an important material. This material is an abstract material but is close to life and it is possible to observe its phenomenon in everyday life, so students should be able to master this concept, because the concept of mastery is very important, in order to master the concept on the material structure and utilization can be mastered then the students can Use media in the form of construction learning animation software. By using the media in the form of software the student can construct his own knowledge and expected to master the concept and really understand the concept he learned so as to be able to explain by using his own words according to his knowledge, but not change the meaning in it. and apply it in daily life.

METHODS
The Research have been conducted in MTs Ma’arif Cikeruh on November-Desember 2016. The population in this study is students of 7th grade class MTs Ma’arif Cikeruh Sumedang academic year 2016/2017.

The samples taken in this research are two classes of 7th grade class of MTs Ma’arif Cikeruh Sumedang academic year of 2016/2017 as an experiment class and other one class as control class.

Research design
This research used quasi experiment method (quasi experiment) with design as follows.

```
<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Postest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>O₁</td>
<td>X₁</td>
<td>O₂</td>
</tr>
<tr>
<td>Treatment</td>
<td>O₃</td>
<td>X₂</td>
<td>O₄</td>
</tr>
</tbody>
</table>
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(Sugiyono, 2014)

Information:
X1: Control class (Using medium power point and commonly done at school) X2: Experiment class (Using self construction animation learning software) O1: Initial test given to the control class O2: The final test given to the control class O3: Initial test given to the experimental class O4: The final test given to the experimental class.
A. Data collection technique

The test used in the mastery of the concept in this study is a multiple choice test that is in accordance with the indicators to be achieved. Concept of the concept used in the initial test and the final test is the same to see how the improvement of learning on mastery of student concepts. The questions on concept mastering tests are designed in accordance with Bloom's Blooming Taxonomy.

B. Data Analysis Technique

Here are the steps of data analysis to test mastery of concepts. The analysis of statistically tested data is done through the following steps.

A. Assess each student answer sheet according to the answer key.
B. Calculating the value of the initial test and the final test on mastery of the concept obtained by the students in the control group as well as the experimental group.
C. Quantitative data analysis is done by testing the N-gain of the initial test result and the final test of each group (control and experiment) with the following formula:

\[ N \text{ gain (G)} = \frac{\text{posttest score} - \text{pretest score}}{\text{max score} - \text{pretest score}} \]  

(Sugiyono, 2014)

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G &gt; 0,7</td>
<td>High</td>
</tr>
<tr>
<td>0,3 &lt; G ≤ 0,7</td>
<td>Fair</td>
</tr>
<tr>
<td>G ≤ 0,3</td>
<td>Low</td>
</tr>
</tbody>
</table>

Analysis and processing of the data used in this study using a support program / statistical analysis software IBM SPSS™ 22.0. Confidence level used in this study was 95%.

D. Using the IBM SPSS™ 22.0 software, prerequisite tests are performed first. The prerequisite test includes normality test and homogeneity test. After conducting prerequisite test, followed by hypothesis test.

1. Normality test

Shapiro-Wilk Test (Shapiro-Wilk Test), a highly recommended normality test for small sample quantities (n <50). Using the 5% significance level, the test criterion is "if the significance (Sig.) ≥ 0.05 then the data is normally distributed".

2. Homogeneity Test

With the 5% significance level, compare the x2 count with the value of x2 table for α = 0.05 with the following test criteria:
If x2 counts ≥ x2 table, the data is not homogeneous If x2 counts ≤ x2 table, it means homogeneous data

3. Hypothesis Test

Hypothesis test or mean difference test is performed using Independent Sample T-test if the data is normally distributed. However, if there is data that is not normally distributed, a Mann-Whitney test is performed. The
test hypothesis of average difference test is as follows:
H0: μ1 = μ2
(There is no significant difference in the improvement of conceptual mastery between the experimental and control classes by using the media of Self Construction Animation Learning Software in learning the structure and function of plants).
Ha: μ1 ≠ μ2
(There is a significant difference in the improvement of students’ concept mastery between the experimental and control classes by using media in the form of Self Construction Animation Learning Software in learning the structure and function of plants)

Using the 5% significance level, the test criterion is "if significance (Sig.) ≥ 0.05 then H0 is received". This means that if H0 is accepted, then there is no significant difference.

RESULTS AND DISCUSSION

Test data result of initial test data analysis and final test, in experiment class used animation media and control class using power point. After the initial test score and the final test of the two classes of research can be tested N-Gain to see the difference in the mastery of the concept of students to the material structure and function of plants. The results of data analysis can be seen in table 3.

Table 3. The Result of Data Pretest and Postest Concept Mastery

<table>
<thead>
<tr>
<th>Class</th>
<th>Average Value</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>Experiment</td>
<td>50,14</td>
<td>76,28</td>
</tr>
<tr>
<td>Control</td>
<td>47,85</td>
<td>65,71</td>
</tr>
</tbody>
</table>

In table 3 it can be seen that the average test score of mastering the concept of initial test of experimental class students is 50,14 and control class equal to 47,85 with difference of test value of experiment class higher class 2,29 from control class. After applying the lesson, a final test is done to see the change of results from the mastery of the students’ concepts. In the final test of final test concept concepts obtained data where the average value of the experimental class of 76,28 and the control class of 65,71 where the experimental class has a difference of 10.57 more than the control class.

After having initial and final test scores, N-Gain calculations were performed to see the improvement of student conceptualization. The result of N-Gain student calculation on experiment class and control class can be seen in table 4.

Table 4 The Result of Data N-Gain Concept Mastery

<table>
<thead>
<tr>
<th>Class</th>
<th>N-Gain</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>0,52</td>
<td>Medium</td>
</tr>
<tr>
<td>Control</td>
<td>0,34</td>
<td>Medium</td>
</tr>
</tbody>
</table>

In the N-Gain calculation result, mastery of student concept, the data shows the
average value of the experimental class is 0.52 and the control class is 0.34 where the experimental class has 0.18 bigger difference than the control class.

After calculation of concept mastery improvement, calculation of the difference of conceptual mastery by doing hypothesis test. In order to perform the hypothesis test, firstly tested the normality and test the homogeneity of data. Normality test is done to find out whether the data value of concept knowledge test is normally distributed or not. While homogeneity test is done with the purpose of knowing whether the data variance test scores early knowledge of the students concept of experimental class and control class is homogeneous. If the experimental class and control class data are normally distributed and homogeneous, t test can be performed. If the experimental class and control class data is normally distributed but the second variance of the data is not homogeneous, Mann Whitney U test can be performed. While the experimental class and control class data are not normally distributed then Mann-Whitney U test is performed. The analysis of normality test, homogeneity test and test Hypothesis data preliminary test scores concept knowledge. Here are the results of normality test, homogeneity in experiment and control class.

Normality Test
The first assumption test is a test of data normality. The value data of concept knowledge test is tested its normality to know whether the data is normal distribution or not. Normality test using Shapiro-Wilk test with the help of IBM SPSS program version 22. Here is the result of normality test data value of final test of student argument ability.

Tabel 5. The Result of Data Normality Test of Concept Mastery Final Test Score

<table>
<thead>
<tr>
<th>Class Category</th>
<th>N</th>
<th>Sig</th>
<th>Receiver H0 (α = 0.05)</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>35</td>
<td>0.038</td>
<td>Rejected H0</td>
<td>Not Normal</td>
</tr>
<tr>
<td>Control</td>
<td>35</td>
<td>0.049</td>
<td>Rejected H0</td>
<td>Not Normal</td>
</tr>
</tbody>
</table>

Based on table 5, the significance value of the test data value of the final test of the students' conceptual knowledge of the experimental class and the control class is smaller than the alpha significance value (α = 0.05). Each test significance value were both 0.038 and 0.049, respectively. Based on this it can be concluded that the experimental class and the control class occurs rejection of H0 which means the data of the final test value of the students' conceptual knowledge of the experimental class and the control class is not normally distributed. Normality testing continued on the Mann-Whitney U test because the initial test data of the experimental class and control class were not normally distributed.

Hypothesis Test (Mann – Whitney Test)
Hypothesis test data value of final test of conceptual knowledge of experimental class and control class is done by Mann-Whitney U test, because the test result in normality test of final test of experiment class and control class shows that data is not normally distributed. Hypothesis test criteria is if the significance value of the test
results is greater than the value of alpha significance (α = 0.05), then H0 is accepted. However, if the significance value of the test is smaller than the alpha significance value, then H0 is rejected. Here the results of hypothesis test data value of the final test mastery of student concepts with the help of the program IBM SPSS version 22. Mann-Whitney U test results can be seen in Table 6.

Table 6. The Result of Data Hypothesis Test of Concept Mastery Final Test Score

<table>
<thead>
<tr>
<th>Data</th>
<th>Sig (2-tailed)</th>
<th>Receiver H₀</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Test Score of Experimental and Control Class</td>
<td>0.000</td>
<td>Rejected H₀</td>
<td>There is the differences</td>
</tr>
</tbody>
</table>

In the final test data, the Mann-Whitney U test shows that the significance value for the experimental and control classes is 0.000 smaller than the alpha significance value (α = 0.05) which means the rejection of H0. Thus it can be concluded that there is a significant difference in the increase between the average data value of the final test mastery of the concept of experimental class students with the control class.

The superiority of mastering the concept of experimental group students is caused by the experiment class students using self construction animation learning software, complex biological processes can be easily explained to the students. Animation has the ability to convey something complicated or complex and difficult to explain with pictures or words only. Animation media can be used to describe material that is not visible to the eye so as to make the learning process more interesting and concrete. This is in line with Sahin’s (2006) opinion in Kardiam (2016), animation gives students the opportunity to observe the real world and interact with it, provide experience and help solve problems. With the animation can mimic / replicate the actual object so that students are not only motivated by the animation but learn by interacting with the replica as if the student saw the original object. This animated media can serve as a learning resource, as a learning tool and as a tutorial medium, because in this animation contains important information related to the structure and function of the plant according to the indicator then there is a matter of structured exercise so that students are able to master the concept, learn to develop the ability of argumentation and able to improve student learning outcomes.

The material contained in this animated media has a suitability between the material presented with basic competence and learning objectives. Thus, the use of animation media can improve the mastery of the concept and the ability of students' argumentation. The accuracy of the content is necessary to avoid misconceptions in students, because misunderstanding can be a problem in achieving student learning outcomes as revealed by Bekiroglu (in Yayla & Eyceyurt, 2011).

This animation media capable of overcoming the difficulties of students in the structure and function of plant material which can visualize the abstract because the material so that the material is abstract more concrete. This opinion is supported by Ariawati (2011) in Oktarini et al., (2014) who stated that visualization is one of the right ways to make the abstract subject matter to be concrete. The same thing was conveyed by Akcay et al., (2006), who reported computer-based media plays an important role in education, especially science lessons. This opinion is reinforced by Slavin (2011) who argued that learning with animation media can help students in understanding difficult
CONCLUSION

Based on the results of research on the use of media in the form of self construction animation learning software to improve the mastery of the concept on the material structure and function of plants can be drawn the following conclusions:

1. Improving students’ concepts mastery after learning using self construction animation learning software on the material structure and functions of plants obtained the average final test of 76.28 with N-Gain of 0.54 and the category is fair.

2. There is a significant difference in conceptual mastery between students who were treated with learning using the media in the form of self construction animation learning software with students who were treated with conventional learning (using powerpoint) on the material structure and function of plants. Significant results can be seen from the Mann-Whitney test analysis in the final test with a significance value of 0.000 < α (0.05).

Suggestion.

After doing research, the thing suggested by the researcher is that before the learning process is done, the media to be used is prepared in advance so that the time used can be maximized.

REFERENCES


