The Effect of Android-based Pictorial Biology Dictionary on Students’ Motivation on Topic of Invertebrate

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Abstract. Nowadays the application of Android-based media is currently a trend in science education research. In the subject of Invertebrates, there can be found terms use the Latin or scientific language. Students are having difficulty in following the materials of invertebrates, especially in understanding the terms of invertebrate’s body structures. This research aims to know the effect of the implementation of Android-based biology dictionary on invertebrate’s subject topic to improve student’s learning motivation. Questionnaire is used as instrument in this research. This research used the pretest-posttest control group design. The subject was XI Grader of SMAN 2 Bantul consisted of an experimental class and a control class. The gain scores were analyzed to know the improvement of student’s learning motivation. The result shows that Android-based illustrated biology dictionary is able to provide significant effect towards the improvement of student’s learning motivation.

Keywords: Android, Biology Dictionary, Invertebrates, Motivation

1. Introduction
Based on the observations result at SMAN 1, SMAN 2, and SMAN 3 in Bantul, 99.83% of students did not bring a biology dictionary to school because the dictionary was large and heavy, and also students did not understand the terms in invertebrate material (96.67%). In learning activities, students did not like to look for scientific names in invertebrate material because they thought that the biology dictionary is not interesting and boring (93.33%), and biology dictionaries generally only give scientific names with explanations in the form of text. Students assumed that text will be more interesting with pictures given. [1] By using images, we can illustrate material in a form that is more instinctive and closer to our sensory experience.

The dictionary is usually used to search for the meaning of words, terms or phrases. Dictionaries are generally produced in book form. [2] Dictionary is a reference book containing words and phrases, usually arranged alphabetically along with information about the meaning, usage or translation. A book containing a collection of terms or names arranged in alphabetical order along with an explanation of their meaning and usage.

Basically, dictionaries are reference books for searching terms. In learning, dictionaries are used by students to find information about terms or meanings. This reference book is very useful to find explanations regarding unclear meaning.
Illustrated dictionary is a reference book containing words equipped with pictures and explanations related to the existing picture. Illustrated dictionary is a book that is packaged in attractive and full of bright colors. The purpose of the illustrated dictionary is to attract the attention of people, especially for children who are still in the learning stage. [3] Dictionary has utility to make it easier to find terms that have not understood its meaning. Pictorial dictionaries prioritize the clarity of the images displayed with explanations so that students are able to understand the lessons presented. Pictorial dictionaries are not only limited to imitations of pictures of people, animals, plants but can also replicate the delivery of an activity. In the illustrated dictionary there are 2 languages, Indonesian and Latin.

Learning using technology media has a significant influence on learning. Android devices are very close to the lives of students today, in addition to be a communication function, Android devices are also very potential to be developed into interactive learning media that are useful for students [4]. Integrated technology in learning is one of the strategies to achieve learning objectives because technology is no longer considered as a new thing. This is in accordance with the fact that the use of mobile devices (smartphones, PDAs or tablets) is already familiar to students. Most of high school students have mobile phones that have more up to date features. The smartphone that is being current trend and growing very rapidly is Android, so the development of learning media using Android is quite promising.

Technology that plays a role in the learning process will influence curriculum plans and thoughts in three ways, namely: 1) the use of new technology into the social goals of the curriculum, 2) technology provides resources for curriculum development because it can make teachers find and collect teaching materials and also guide students in learning. 3) Technology can provide tools for assessing various fields of practice, such as simulations namely making models or visualization tools in the field of science and tools for analyzing scripts in the literature [5].

One of the the success of learning is determined by the success of the teacher in the selection of learning process strategies. [6] The learning process as an effort or activity to encourage students to learn. One of strategies that can be done by the teacher to achieve the learning objectives is by choosing suitable learning media as needed. Technology as one of the basic developments of instructional media is expected to bridge the knowledge between educators and students. Technology is used as an innovative learning medium that is considered to be able to keep up with the times.

The use of media in the learning process is one of the efforts to create more meaningful and quality learning. [7] The use of media in the learning process aims to make the learning process take place in an efficient and effective manner so that the quality of education can be improved. In the last few decades, mobile device ownership has increased. This is due to the more affordable prices of these devices by the public.

Android-based media is an alternative learning media that has unique characteristics that can be used anywhere and anytime, supported by interesting visualization. [8] Students can learn indirectly, namely actively interacting by using media or other learning resources so that the learning process can occur anytime and anywhere. Media is no longer only seen as a mere tool for teachers to teach, but rather as a means of channeling messages from the message provider (teacher) to the recipient of the message (students).

Students who are underachieving are not caused by their lack of ability but because there is no motivation to learn so that the students do not try to exert all their abilities [9]. For this reason, teachers' creativity is needed in the learning process, starting from determining goals, learning design, using learning media to assessment systems.

The role of learning media can also be used to improve student learning motivation [10]. Motivation is an internal state that awakens / activates, directs / guides, and maintains behavior over time [11]. Viewed from the context of the learning process, motivation can be defined as something that can cause students to be encouraged to learn, make students keep learning, and determine what students want to learn in order to achieve the desired goal, namely learning success. This study aims to develop learning models and tools to improve high-level thinking skills to know the effect of Android-based biology learning media in increasing learning motivation of high school students.
2. Methods
2.1. Research design
This research is a *quasi*-experiment. The study was conducted at SMAN 2 Bantul Yogyakarta in September 2018. The population in this study were students of class X Science at SMAN Yogyakarta in the 2018/2019 academic year. The research sample consisted of one experimental class and one control class randomly selected. The treatment in the experimental class and control class was made the same except in the experimental class given the media of android-based pictorial biology dictionary.

2.2. Data collection and analysis
Data were collected using two types of instruments, namely tests and questionnaires. Before learning was begun students were given a learning motivation questionnaire with a Likert scale to find out the initial motivation before learning begins (pretest). Then after the end of the learning process students were asked to fill in the motivation learning questionnaire again to find out changes in student learning motivation after going through the learning process (posttest).\[12\] The research design used was *pretest-posttest control-group* as in Table 1.

| Class     | Pretest | Treatment          | Posttest |
|-----------|---------|--------------------|----------|
| Control   | Y₁      | X₁                 | Y₂       |
| Experiment| Y₁      | X₂                 | Y₂       |

Explanation:
Y₁: *Pretest*
Y₂: *Posttest*
X₁: Use power point learning media only.
X₂: Using power point learning media and android-based pictorial biology dictionary.

\[13\] Increasing students’ learning motivation is determined by the normalized gain equation as follows:

\[
\text{Gain score (g)} = \frac{\text{posttest score} - \text{pretest score}}{\text{maximum score} - \text{pretest score}}
\]

To find out whether there is an increase in learning motivation between the experimental class and the control class analyzed by independent-sample t-test. The prerequisite test that must be fulfilled is the normality test and data homogeneity test. Statistical tests were carried out with the SPSS for Windows program with a 95% confidence level. The hypothesis in this study is as follows.

H₀: There is no significant difference in increasing learning motivation between the experimental class and the control class.

H₁: There is a significant difference in increasing learning motivation between the experimental class and the control class.

3. Results and Discussion
The object of this research is the influence of android-based pictorial biology dictionary to increase the learning motivation of high school students. This research was conducted at SMAN 2 Bantul Yogyakarta with a population of students of class X Science. The sample used in this study is one experimental class and one control class. In the experimental class, an android-based pictorial biology dictionary written in Indonesian language was used. The illustrated biology dictionary media used in this study has previously been developed and validated by material experts, media experts, peer reviewers and high school biology teachers. The purpose of the illustrated Biology Dictionary of invertebrate’s topic is to make students more enthusiastic in learning Biology. In addition, some explanations in terms of scientific names that are stated in this dictionary are easy to be understood. Moreover, this dictionary is also equipped with
sound or instrumental music that makes student entertained and enjoyed in reading this dictionary. The display of this dictionary is full of colors and icons which makes the readers interested in using this dictionary. The reverences of the terms in this dictionary come from some books of experts in the field of invertebrates. Display of illustrated Biology Dictionary can be seen in Figure 1.

Figure 1. Display of Android-Based Illustrated Biology Dictionary
The subject matter of the study is taking invertebrate material in high school biology subjects. Before the learning process was begun, students were given a learning motivation questionnaire with a Likert scale to find out how the students' initial learning motivation. Learning motivation questionnaire instrument was developed based on the ARCS model, can be seen in Table 2:

| No | Aspect    | Indicator                                | Total item |
|----|-----------|------------------------------------------|------------|
| 1  | Attention | Linkage to learning                      | 2          |
|    |           | Perseverance in doing assignments        | 2          |
|    |           | Efforts for learning                     | 3          |
| 2  | Relevance | Need for learning                        | 3          |
|    |           | Preliminary knowledge of the material    | 2          |
| 3  | Confidence| Study independently                      | 3          |
|    |           | Not easily give up                       | 3          |
|    |           | Be sure of your own abilities            | 2          |
| 4  | Satisfaction | Satisfaction with the result obtained    | 2          |
|    |           | Feel happy for the material              | 2          |
|    |           | Understand the material                  | 3          |
|    |           | **Total Question**                       | **30**     |

Furthermore, at the end of the learning process students were also asked to fill out the learning motivation questionnaire in order to find out the students' learning motivation after experiencing the learning process. The data used in further analysis were the data gain (increase) normalized from students' learning motivation before and after learning. The average increase in learning motivation of the experimental class and control class can be seen in Table 3.

| Class       | Control | Class experiment |
|-------------|---------|------------------|
| Pretest     | 57,66   | 57,29            |
| Posttest    | 65,95   | 76,32            |
| Lowest score| 59,33   | 59,33            |
| Highest score| 77,33  | 89,33            |
| Average score| 0,20   | 0,45             |
| The number of student | 28      | 29               |

Table 3 shows that in the experimental class shows an average increase that is greater than the control class. However, to find out whether there are significant differences or not between the experimental class and the control class, an independent-sample t-test is needed with the prerequisite test for normality and homogeneity. The results of the normality test can be seen in Table 3.

| Class       | Kolmogorov-Smirnov |
|-------------|---------------------|
| df          | Sig.                |
| 1 Control   | 27                  | 0,3845             | Normal |
| 2 Experiment| 28                  | 0,4995             | Normal |

The results of normality test analysis showed that the gain data in the experimental class and control class are normally distributed. This can be seen from the sig value, greater than 0.05, namely 0,4995 in the experimental class and 0,3845 in the control class. Thus the normality test was fulfilled and then analyzed the gain data homogeneity and independent-sample t-test to determine the effect of media on
the learning motivation of high school students. The results of the homogeneity test and independent sample t-test can be seen in Table 5.

**Table 5. Homogeneity Test and Independent-Sample T-Test**

| Test data                | Sig. | Conclusion                                      |
|--------------------------|------|-------------------------------------------------|
| Levene’s Test            | 0.153| Homogen                                         |
| t-test for Equality of Means | 0.000| Ho is rejected (there are significant differences in increasing learning motivation in both groups) |

In Table 5 it can be seen that the gain data on learning motivation consists of homogeneous data based on Levene's Test results with sig values, 0.153 (sig. > 0.05). Furthermore, the results of the t test can find out the sig value. Is 0.000 (sig. <0.05). It shows that there are significant differences in increasing student learning motivation in both classes, where the experimental class shows a better improvement.

Using technology-based media can improve learning motivation and make learning more attractive, interesting and fun [14]. Thus, in the process of biology teaching and learning process needed a learning medium that can increase student motivation. This is because motivation is the driving force in students that leads to learning activities and ensures the continuity of learning activities, so that the goals desired by the subject of learning can be achieved. Motivation can foster passion, happiness and enthusiasm for learning. Students who have strong motivation, will have a lot of energy to do learning activities. So motivation will determine the intensity of student learning efforts. Learning efforts based on strong motivation can produce good learning achievements [15].

The application and use of this Android-based learning media strongly supports student-centered learning and will foster student interest in trying to learn further. However, biology learning media that can increase motivation at least have relevant characteristics, clear and interesting visualization, flexible, and contain a variety of evaluation questions. Relevant means is the material presented in accordance with the prevailing high school biology curriculum. This relevance is a very important factor in learning media [16]. Clear and interesting visualization is intended to add to the attractiveness of students so that students are not bored in using learning media to explore science [17]. Flexible means that it can facilitate students to study anywhere and anytime.

4. Conclusion

It can be concluded that there are significant differences in increasing the learning motivation of high school students, where students who use android-based learning media have a better improvement. To optimize the learning motivation of high school students, a number of suggestions are proposed, namely (1) the need to develop similar media for material and other subjects, and (2) further research is needed with other variables related to the use of Android-based learning media.

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