The Effectiveness of Scimago Mobile Learning to Improve Student Motivation and Learning Outcomes

Aisyah Jiyantika Gitadewi

Student of Science Education, Mathematics and Science Faculty, State University of Surabaya,
e-mail: aisyahjiyantika@gmail.com

Wahono Widodo

Lecture of Science Education, Mathematics and Science Faculty, State University of Surabaya,
e-mail: wahonowidodo@unesa.ac.id

Abstract

This research aims to describe the effectiveness of Scimago mobile learning on life organization system. The type of research used was research and development (R & D) which is only limited to stage 6, product testing and research design namely One Group Pre-test and Post-test Design. The feasibility of Scimago mobile learning based on effectiveness aspect was obtained from the result of learning motivation questionnaires and student learning outcomes tests. The result of students learning motivation questionnaire shows that there was an increase of gain score between initial and final motivation which is 0.6 with medium category. Moreover, for the student learning outcome, there was an increase of gain score between pretest and posttest which is 0.9 with high category. Consequently, 100% of students were claimed to pass the standard. So it can be concluded that Scimago mobile learning on life organization system is effective to be used as a learning media to increase student motivation and learning outcomes.

Keywords: mobile learning, motivation, learning outcomes, life organization system

INTRODUCTION

The development of ICT (Information and Communication Technology) has encouraged the creation of innovation in all fields, one of which is education. The ease of internet access is one of the characteristics of the 21st century. Entering the 21st century, students are children born in the Generation Z era. According to Jiří Bejtkovský (2016) generation Z are people born between 1995 and 2010. Z generation is also called the generation of technology because in that year technology had mastered the world. A lot of their time is spent browsing on the internet. Generation Z prefers things that are applicative and pleasant (Rini, 2016). In this regard, the use of learning methods used by teachers must be able to adjust their tendency to learn, namely using technology.

Today's education refers to education that promotes the science and technology approach (Dzulfikar, 2018). The development of science and technology in education encourages the learning process becomes more applicable and interesting as an effort to improve the quality of education (Nasrulloh, 2015). One of the developments in communication technology that is currently developing is an Internet-based device. Gawai is a device or small mechanical device that is interesting because it is relatively new so

it will create its own interest for the users (Risandari, 2017). Gawai in the general sense is an electronic device that has a special function on each device, such as mobile phones, notebooks, and tablets. One of the common devices used is cellular phones. The use of a smartphone in the classroom can help students in the learning process. Along with advances in technology, in addition to having capabilities on the internet, smartphones also have thousands of applications that can be used as a learning process or learning media.

The mission of SMP Negeri 1 Cerme is supporting the development of science and technology, that is implementing contextual learning and IT-based assessment. But in reality, based on the result of interviewing with one of the students of SMP Negeri 1 Cerme, science learning in schools still uses teachers and discussion methods that do not involve students to be active. The result of the interview states that the method had several weaknesses, that is some students did not pay attention to the teacher when explaining. So based on the result of the pre-research questionnaire, as many as 53.13% of students state that science learning was boring.

Based on the result of the pre-research questionnaire at SMP Negeri 1 Cerme, it shows that as many as 97% of students in one class are users of Android phones. More students who have and use an

android phone, the chance of using mobile devices in learning activities is greater. Learning media that utilize these technologies are called mobile learning (M-Learning). The presence of mobile learning is used as a complement to learning and provides opportunities for students to learn anywhere and anytime (Wirawan, 2011 in Nofia et al, 2016).

The use of M-learning will increase the attention to learning, make learning interesting, and can encourage learners motivation (Fatmawati, 2015). Motivation has been recognized as a very important factor in science learning (Chan & Norlizah, 2007). The motivation of students towards science learning will make it effective (Sarıbıyık, Altunçekiç & Yaman, 2004). Based on the result of the pre-research questionnaire, it was found that students were not challenged or unmotivated to work on difficult science questions as much as 58.59% with sufficient category, and students were not happy when they were given science assignments as much as 46.09% with sufficient category. It can be concluded that in reality, science learning motivation in students is low.

Based on the result of the interview with a science teacher at SMP Negeri 1 Cerme, one of the materials that still have low scores is life organization system. According to him, this material is classified as quite difficult for students to understand because there are foreign terms such as the names of cell organelles that have just been studied by junior high school students, so that students must be able to understand the material not only to know and memorize it. This is evidenced from the value by students on life organization system in one class as much as 50%, still not exceeding the standard of maximum completeness criteria (KKM). National Examination result for Science subjects at Cerme 1 Public Middle School in 2018 which were reported by the Kemdikbud website was low, which had an average of 64.50 categorized as sufficient.

Based on the result of research by Ming-Hung Lin, Huang-Cheng Chen and Kuang-Sheng Liu (2017) from the Tung-Fang Design Institute of Taiwan state that digital learning has a better positive effect on learning motivation than learning with conventional methods and shows better positive effects on learning outcomes than learning by conventional methods. According to the result of research that conducted by Ramadhani, et al (2016) from the FKIP UNS Surakarta state that students knowledge achievement in learning using mobile learning based-android is better than LKS, with an average of 80.88 and 74.72. Based on the two relevant studies, as well as the

potential that generation Z dominates the current junior high school students and the efforts to support SMP Negeri 1 Cerme to utilize the use of mobile phones in learning, this research was conducted to improve motivation and learning outcomes.

Students will succeed in learning if in themselves there is a willingness to learn and an urge to learn because, with good learning motivation, students will be moved and directed in learning. Students who have high learning motivation will get high learning outcomes too, it means that the higher motivation, the more active efforts are made, so the learning outcomes that they get will higher (Sardiman, 2014).

Based on the description above, its carried out the research of development which aims to produce Scimago mobile learning on the material systems of life organization to improve students' motivation and learning outcomes that are feasible in terms of aspects of effectiveness.

METHOD

The type of research used is research and development (R&D). The Research and Development (R&D) method in this study was carried out in up to 4 stages, namely (1) the potential and problem stages, (2) data collection, (3) product design, (4) product validation (Sugiyono, 2017). It used One Group Pretest and Posttest Design which was tested on 20 students VII-F class of SMP Negeri 1 Cerme.

The instrument used in this research is the ARCS motivation questionnaire sheet from John Keller (1988), pretest, and posttest. Learning motivation of students is obtained through filling in the initial (pretest) and final (posttest) questionnaire which is filled by students with reference to the Likert scale. Assessment is given with a score of 1 to 5, with the category number 1 = very less, 2 = less, 3 = sufficient, 4 = good, and 5 = very good.

The test result is declared complete if student gets a value ≥ 70 which is the value of the minimum completion criteria.

The result of the data that obtained will be processed using the N-Gain calculation to determine the increase in student motivation and learning outcomes. Here is the formula N-Gain used:

$$N - Gain = \frac{(posttest\ score - pretest\ score)}{maximum\ score - pretest\ score)}$$

The result of that calculation then determined by the value increase category between the pretest and posttest through the following assessment criteria:

Table 1. The Range of value for Improved Learning Outcomes

Limitation	Category
N-Gain > 0,7	High
0,3 < N-Gain ≤ 0,7	Medium
0,3 ≥ N-Gain	Low

(Hake, 1999)

The feasibility of Scimago mobile learning based on the effectiveness aspects is obtained based on the result of the increase in student motivation. Then it was also declared effective if the posttest value of students knowledgeability was greater than the value of the pretest before being given learning treatment with Scimago mobile learning.

RESULT AND DISCUSSION

Scimago mobile learning on life organization system material that developed was made with ndroid Studio software. This media was developed to be used as a learning media in the material of the organizational system of life for class VII SMP / MTs, the material contained about the concepts of plant and animal cells, plant and animal tissues, organs, and organ systems. The media contains basic competencies and indicators, materials, student worksheets (LKPD), exercise, evaluation tests, and assistance in using the application. The difference of this learning media from previous research is at the end of the execution of exercise and evaluation there are scores obtained by students, and there is a review of the correct answers, so that students can find out the right and wrong answers. If the answer chosen is correct then the column is green, whereas if the answer chosen is incorect the column is red. Here are some of the views of Scimago mobile learning that were produced:
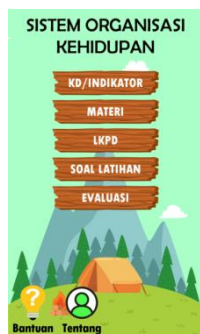

Figure 1. Menu Display on the Application

Figure 2. Exercise Menu Display

Figure 3. Review of Question Answers

The feasibility of Scimago mobile learning based on effectiveness aspect in terms of the results of learning motivation and student knowledgeability

tests. Measurement of student learning motivation was carried out and measured using the motivation questionnaire ARCS model by John Keller. This questionnaire was modified by researchers that consist of 23 positive questions and 2 negative questions. This questionnaire covers the four indicators in each aspect of the statement.

Table 2. Results of Student Learning Motivation

No	Initial Motivation	Final Motivation	N-Gain	Category
1.	54	76	0,5	Medium
2.	53	78	0,5	Medium
3.	81	86	0,3	Low
4.	51	86	0,7	High
5.	50	78	0,6	Medium
6.	54	83	0,6	Medium
7.	65	90	0,7	High
8.	66	78	0,4	Medium
9.	59	82	0,5	Medium
10.	60	76	0,4	Medium
11.	54	86	0,7	High
12.	62	86	0,6	Medium
13.	50	84	0,7	Medium
14.	49	87	0,8	High
15.	59	80	0,5	Medium
16.	62	82	0,5	Medium
17.	51	88	0,8	High
18.	58	76	0,4	Medium
19.	75	82	0,3	Low
20.	47	84	0,7	Medium
Average			**0,6**	**Medium**

The result of the student motivation questionnaire analysis on each ARCS indicator after the learning process using Scimago mobile learning media are presented in table 3 as follows:

Table 3. Improved Motivation Indicators for the ARCS Model

Motivation Indicators	Initial Motivation	Final Motivation	N-Gain	Category
Attention	55	81	0,6	Medium
Relevance	57	80	0,5	Medium
Confidence	59	86	0,7	Medium
Satisfaction	63	81	0,5	Medium
Average			**0,6**	**Medium**

Based on table 2, the data obtained by the average gain score for student learning motivation is 0.6 with a medium category. Increased student learning motivation is also seen from each of the motivation indicators of the ARCS model. Based on table 3, the average gain score for students learning motivation at each indicator is 0.6 with a medium category.

Improvement of student learning motivation can be seen from the implementation of learning that carried out by the teacher. During the 3 meetings, the teacher used Scimago mobile learning in the learning process. According to Miarso (1989) in Susilana, et al

(2009) states that learning media is everything that can be used to channel messages that can stimulate thoughts, feelings, attention, and willingness of students to learn. The use of Scimago mobile learning makes students more interested in the material to be taught so it can be improve the learning motivation of students to understand the material by using media.

Improvement of student learning motivation can also be supported by observing the activities of students during learning (Aminulloh, 2018). It can be seen from the activities that often appear in the first meeting until the third meeting, which is to pay attention to the teacher obtaining an average percentage of 34.90%. This supports the result of an increase in learning motivation on attention indicator that obtained a gain score of 0.6 with a medium category.

Asking questions, answering questions and expressing opinions each get a percentage of 5.40% and 5.07%. These are three activities that support the result of an increase in learning motivation on confidence indicator that obtains a gain score of 0.7 in the medium category. In accordance with the learning motivation of the ARCS model, the level of confidence of students can be seen if students feel easy and able to learn the material, so students will actively participate in learning including asking questions and expressing opinions.

Relevance indicator can be seen from the activities of the students, namely working with Scimago mobile learning, making observations, making problem formulation, making hypotheses, writing data, answering analysis, and making conclusions that get an average of the overall percentage of 25, 96%; 16.60%; 1.18%; 2.48%; 2.30%; and 1.49%. These results support the indicator of relevance that obtains a gain score of 0.5 with a medium category. Keller (1988) states that students will perceive that learning is relevant if the learning is in accordance with their interests. If the learning is in accordance with their interests, then they will know what actions they are taking to make learning useful for themselves. The use of Scimago mobile learning in learning in this research adopts the interest of generation Z which is mostly literate to technology and active with their gadgets so it can support their learning motivation as well.

Indicator of satisfaction on learning motivation of students get a gain score of 0.5 with a medium category, can be seen from the result of the questionnaire positive responses of students to Scimago mobile learning as much as 98% said they felt happy, motivated and made the learning atmosphere not boring.

Using learning media can affect students learning motivation. Arsyad (2016) states that learning media can improve and direct student's attention so that it can lead motivation to learn and allow students to learn independently according to their abilities and interests. This is supported by the results of the validation of the Scimago mobile learning that assessed by the validator, the mobile learning is feasible to motivate students to learn, and the presentation of the material is very feasible to enable students to learn independently.

However, based on the research that has been done, there is a gap between the use of Scimago mobile learning and observation activities on the motivation of students. At first, the observation activities are given with the intention only to support the mastery of the material, but when learning takes place, the observation activities also attract the attention of students. This is because students have never used a microscope in learning activities and have never seen "preparat" that looks interesting. So their attention is divided between using Scimago mobile learning and doing observations. The observation activity also triggers students to be curious and ask questions. This is consistent with the research conducted by Qosyim et al. (2017) which states that doing observation will make students asking and think hard to be able to answer it.

Although both of them attract student motivation, the focus of this research is on the use of Scimago mobile learning. This is then dealt with by staying focused on using Scimago mobile learning during learning, such as asking to see cell video in three dimensions, leaf tissue video, and cell and tissue images, so that when finished doing observations, students are immediately asked to return and completed the LKPD with Scimago mobile learning.

Then for the result of students knowledgeability, can be seen from the increase between the result of the pretest and posttest. The result of the test score is said to be completed based on the minimum completion criteria that set by SMP Negeri 1 Cerme, that is ≥ 70 for science subjects. The results of student tests can be seen in the following table:

Table 4. The Result of Student Learning Outcomes Improvement

No	Pre test	Post test	N-Gain	Category	Complete ness
1.	23	94	0,9	High	Complete
2.	32	100	1,0	High	Complete
3.	40	100	1,0	High	Complete

No	Pre test	Post test	N-Gain	Category	Complete ness
4.	32	100	1,0	High	Complete
5.	38	94	0,9	High	Complete
6.	36	100	1,0	High	Complete
7.	30	94	0,9	High	Complete
8.	9	100	1,0	High	Complete
9.	40	100	1,0	High	Complete
10.	34	71	0,6	Medium	Complete
11.	26	94	0,9	High	Complete
12.	40	100	1,0	High	Complete
13.	36	94	0,9	High	Complete
14.	26	71	0,6	Medium	Complete
15.	38	94	0,9	High	Complete
16.	28	77	0,7	Medium	Complete
17.	19	71	0,6	Medium	Complete
18.	19	71	0,6	Medium	Complete
19.	32	94	0,9	High	Complete
20.	28	94	0,9	High	Complete
Average			0,9	High	Complete

The result of the analysis of improving student learning outcomes in each sub-section after the learning process using Scimago mobile learning are presented in table 5 below:

Table 5. Increased Learning Outcomes for each subsection

No	Sub-section	Pre test	Post test	N-Gain	Category
1	Cell	43	96	0,9	High
2	Tissue	46	87	0,8	High
3	Organ and Organ System	56	89	0,8	High
Average				0,8	High

Based on table 4 the results of the pretest and posttest as a whole have increased. This is evidenced by the gain score of 0.9 with a high category and a percentage of completeness of 100%.

Improvement of learning outcomes is supported by the result of the implementation of the learning that carried out by the teacher. During the 3 meetings, the teacher used Scimago mobile learning in each lesson, both when explaining the material, asking students to understand and work on the LKPD, and giving assessment at the end of the meeting. In addition, in the RPP that have made, there are also steps that the teacher reviews or repeats the previous material with the aim that students remember the material that has been taught. Material reinforcement by students does not take place shortly, so repetition must be done to keep remembering the material being studied (Hamid, 2012).

Improvement of student learning outcomes is also supported by the result of observation of student activities during learning using Scimago mobile learning, namely in the activity of working with Scimago mobile learning and doing observations.

Both of these activities obtained an average overall percentage of 25.95% and 16.59%. The percentage of working with Scimago mobile learning has decreased, but the learning outcomes obtained in this research have increased and resulted in 100% classical completeness. This is because mobile learning is flexible, which allows learning in anytime and anywhere, for example at home.

In this research, student's understanding of the material can be supported by making observations. Based on the theory of experience cone that triggered by Edgar Dale, the concept or knowledge can be embedded in the minds of students in long-term memory through direct experience such as making observations or practicum. Through the activity of making observations, students can use all five senses and their intuition to obtain information. Arsyad (2016) states that direct experience can give a meaningful impression of an information or idea because it involves the senses of sight, hearing, touch, feeling, and smell. The activity of making observations in learning activities as a form of direct experience is better given as a learning experience than just looking at material or concepts (Hamalik, 2016).

This is supported by the results of a research conducted by Mayasari (2017) related to the implementation of learning using observation methods with a microscope which states that before learning using this method the results of the pretest were 23.83 while after learning using this method the results of the posttest were 89.08 with complete categories.

In addition to the implementation of learning and observation of student activities, another factor that supports the improvement of learning outcomes is the motivation to learn. Sardiman (2014) states that learning outcomes will be optimal if there is motivation. The more appropriate the motivation in learning, the more successful learning will be. This is in line with the research results obtained. Sardiman (2012) also states that the use of learning media is one of the factors that support the success of learning. The use of learning media can also help teachers convey information or knowledge to students. Higher learning outcomes can also be supported by the use of flexible Scimago mobile learning. This is in line with the opinion of Munir (2017) which states that mobile learning allows learners to be able to access educational resources anytime and anywhere so that learning becomes increasingly unimpeded. Based on this, the students can still study life organization system material in a fun way even though they are not

in school because Scimago mobile learning can be accessed anytime and anywhere.

Based on research from Sari, et al. (2018) states that learning using mobile learning to improve learning motivation is appropriate and able to improve student motivation, as evidenced by the result of student learning motivation which increased from pretest at 59.14 to posttest at 85 , 36. In addition, it is also in line with Ibrahim and Ishartiw (2017) in their research stating that the effectiveness of Android-based mobile learning products is proven through an increase in learning outcomes that reaching an average pretest score of 65.46 and posttest of 79.53. Based on relevant theory and research, as well as an improvement of motivation and learning outcomes after using Scimago mobile learning, it can be concluded that Scimago mobile learning is effective to improve students motivation and learning outcomes in life organization system material.

CONCLUSION
Conclusion

Scimago mobile learning media which was developed on life organization systems is proven to have feasible effectiveness based on the result of student learning motivation questionnaire shows that there was an increase of gain score between initial and final motivation is 0.6 with medium category, then for student learning outcomes test there was an increase of gain score between pretest and posttest is 0.9 with high category. Consequently, 100% of students were claimed to pass the standard.

Suggestions

Based on the research that has been done, it is necessary to suggest several things as follows:
1. It is best to optimize the use of mobile learning in learning activities as well as possible to minimize observation activities to attract students motivation if the research focus is on the use of mobile learning.
2. Mobile learning media are used individually so that students can be more independent in learning.

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