Developing the Mobile Learning-based Instructional Media of Excretory Systems in Increasing Students’ Concept Mastery at SMAN 1 Delitua

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Abstract—The aims of this study were to find out (1) the feasibility of mobile learning-based instructional media; (2) the differences in students’ learning outcomes of concept mastery. The subjects were eleven grade students and biology teachers. At the initial stage, a needs analysis was conducted in which the subjects consisted of 3 biology teachers and 11 seventh grade students of SMAN 1 Delitua. Small group trials included 9 students. The medium group trials included 1 class totaling 36 students and a large group trials covered 2 classes of eleventh grade students at SMAN 1 Delitua totaling 72 students. For the test phase of the effectiveness of the mobile learning in excretory system, namely the eleventh grade students of SMAN 1 Delitua included the class of XI IPA-1 (Science) and XI IPA-5 (Science). This type of research was a Research and Development (R&D) with Borg and Gall model. The instruments were the results of teacher and student interviews, assessment questionnaires on mobile learning media and tests of students’ concept mastery in excretory system. The results showed that: (1) mobile learning-based instructional media had a very good feasibility; (2) there was a significant difference in students’ learning outcomes of the concept mastery taught by mobile learning-based instructional media (80.00 ± 3.87) (± SD) higher than the students’ learning outcomes of the concept mastery taught without any mobile learning-based instructional media (68.47 ± 5.92) (tcount = 9.772; P = 0.000) The results implied that mobile learning-based instructional media improve the students concept will become better.

Keywords—Mobile Learning-based Instructional Media; Concept Mastery; Learning Independence

1. INTRODUCTION

In this era of globalization and information, developing the learning media is also increasingly advanced. The use of Information and Communication Technology (ICT) as a learning medium is a common thing to support learning in schools (Muhson, 2010). In the 2013 curriculum also explained that learning should apply the principle of whoever is a teacher, whoever is a student and anywhere is a class. Therefore, the use of ICT is needed in a series of learning processes, with the development of the use of ICT there are five shifts in the learning process, namely: (1) from training to appearance, (2) from the classroom to, where and at any time, (3) from paper to “online” or channel, (4) from physical facilities to network facilities, and (5) from cycle time to real time (Rosenberg, 2001).

Biological learning has biological material characteristics in the form of facts, concepts, principles, and processes of life symptoms, as well as the ins and outs that affect life including its interaction with the environment and in biology learning, the media needed in learning to help deliver material clearly. One of the media that can be utilized is ICT-based instructional media (Hasruddin, 2009). ICT-based instructional media that can be used by students is mobile learning, which is a learning that is learner (learner) is not silent at one place or learning activity that occurs when learners make use of mobile technology devices (O’Malley, 2003). One of the results of technology that is undergoing development, especially among students is communication technology. In helping to do the assignments given by the teacher, students generally used to search through search engines like Google, Yahoo as a source of information through their gadgets, the same thing was found when the initial survey in SMAN 1 Delitua that 93.16% of students had used Android-based gadget.

The media commonly used is PowerPoint media, but the teacher said that using PowerPoint media in the class was less able to optimize mastery of students’ concepts because it could only be displayed in class and after daily test, midterm test, end of semester test on excretory system, students had not been able to master the concept, namely in the process of urine formation, organs and functions of excretory systems so that cognitive learning outcomes were still low and had not reached class classical completeness, 80% of students had not reached the minimum completeness criteria. This was because the excretory system required a strong understanding and speed to understand the lessons for each student differently. Some students could understand after learning once. Many students must learn repeatedly in order to understand learning material. Therefore, to help students master the material
Incorporating educational technology into teaching methods can lead to increased student engagement and improved learning outcomes. For instance, the use of mobile devices in the classroom can provide students with convenient and accessible learning resources. However, it is essential to develop learning media that are well-designed and effective. This study aimed to assess the effectiveness of a mobile learning-based instructional media in teaching the excretory system to eleventh-grade students at SMAN 1 Delitua, North Sumatra Province, between December 2017 and May 2018. The research subjects were eleventh-grade biology and science teachers in Delitua, who were responsible for teaching the excretory system. The instructional design used in the study was a program initiated by educational technology and the excretory system material. The study found that the mobile learning-based instructional media were significantly different from the traditional instructional media in improving students' understanding and retention of the excretory system material. The t-test results indicated that the mean score of students who used the mobile learning-based instructional media was significantly higher than those who used the traditional instructional media (t_count = 9.772, P = 0.000). The study concluded that mobile learning-based instructional media are an effective and feasible alternative to traditional instructional methods, which can contribute to improving learning outcomes in science education.
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Mobile learning is a learning model that utilizes

Jeno (2016) study also concluded that mobile learning provides students no need to be present in the class just to collect assignments, enough tasks are sent through an application on a mobile phone that indirectly will improve the quality of the learning process itself. Murhaini (2016) also found that using or implementing mobile learning can form a learning paradigm that can be done anywhere and anytime. Where the concept of learning mobile learning brings the benefits of the availability of teaching materials that can be accessed at any time and the visualization of interesting material.

Thus, mobile learning is a learning model that utilizes information and communication technology. Where the concept of mobile learning brings the benefits of the availability of teaching materials that can be accessed at any time and the visualization of material that is of interest to eleventh grade students at SMAN 1 Delitua. Through mobile learning, the learning process can run all the time (long life learning), so students can be more active in the learning process, saving time because when applied in the learning process. With mobile learning, the efficiency and effectiveness of the process and learning outcomes of students can increase and be able to increase the tendency of students to want to learn better in the future as Edgar Dale (1969) stated that the acquisition of sensory learning results range 75%, hearing senses 13% and through other senses around 12%. Based on the cone of experience presented by Edgar Dale, the mobile learning media developed has facilitated the experience of students as much as 50% (visual, auditory) which is up to the stage of seeing and hearing learning from teachers assisted with mobile learning media.

V. CONCLUSION

Developing the mobile learning-based instructional media of excretory system for eleventh grade students at SMAN 1 Delitua 1 in this study was obtained with a very good category, on aspects: core material (95.95%), learning media design (86.89%), and learning media technology (92.92%). Furthermore, developing the mobile learning-based instructional media of excretory system was very feasible to apply for eleventh grade students besides the learning outcomes of students’ concept mastery of excretory system taught by using mobile learning-based instructional media (80.00 ± 3.87) (± SD ) higher than the learning outcomes of students’ concept mastery taught without mobile learning-based instructional media (68.47 ± 5.92) (t-count = 9.772; P = 0.000).

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