

The Potential of Using Mobile-Based Interactive Multimedia to Improve Scientific Literacy



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ABSTRACT: The level of scientific literacy among students in Indonesia is still low. Teachers have attempted to improve it through the use of different teaching models, a variety of resources and technology, and incorporating a scientific approach in the learning process. Mobile-based interactive multimedia can be used as an alternative learning resource to improve students' scientific literacy. This study aims to explore about about the potential of using mobile-based multimedia interactive to improve scientific literacy. This study employs a qualitative research with the survey as the data collection method. The population in this study were all high school students in Special Region of Yogyakarta Province, Indonesia. Meanwhile, the research sample are 10th grade students of SMA 1 Pengasih with a total number of 108 students who were selected randomly. The questionnaires distribution process was conducted online with using Google Forms after the researcher demonstrate various types of media that can be used for learning activities. The results of this study showed that the use of mobile-based interactive multimedia in learning has a great opportunity to be able to increase students' scientific literacy because in addition to high student interest, there are also many benefits that will be obtained by students, especially to make it easier for students to understand learning material.

KEYWORDS: mobile-based interactive multimedia, learning activities, scientific literacy

I. INTRODUCTION

Education has an important role in the life of society in the 21st century. Currently, students are not only required to have knowledge, but also to master various kinds of skills, one of the skills that students must have today is scientific literacy. Scientific literacy is one of the 21st century skills that is included in the domain of digital era literacy in addition to basic literacy, economic literacy, technological literacy, visual literacy, information literacy, and multicultural literacy (North Central Regional Educational Laboratory & the Metiri Group, 2019).

Some research results regarding the scientific literacy profile of students, especially in Indonesia, show that the indicators of identifying and controlling variables are in the low category, recognizing and analyzing alternative models and explanations in the sufficient category, making appropriate conclusions in the sufficient category, understanding and analyzing data in the sufficient category, constructing and interpreting graphs in the low category, making hypotheses in the low category, and designing research procedures in the low category (Innatesari & Sukarmin, 2019).

Scientific literacy is very important to develop because the development of learning activities that can improve scientific literacy in science and technology learning has been proven to increase student achievement (Gucluer & Kesercioglu, 2012). One effort that can be done is by utilizing the context of modern technology that can be applied in the form of interactive learning media. This is important because technology is a context in scientific literacy.

The integration of learning with technology in the form of the use of interactive learning media has become relevant since the Covid-19 pandemic has hit the world. The Covid-19 pandemic has made many countries require learning that was originally carried out face-to-face in class to become online learning. This pandemic has given us the opportunity to pave the way for introducing digital learning (Pokhrel & Chetri, 2021). Unfortunately, many teachers were not ready to carry out online learning during the Covid 19 Pandemic. This was caused by several factors, one of which was the minimal availability of learning media, especially interactive multimedia. Thus, the development of interactive multimedia is indispensable to support online learning.

Online learning requires teachers to invest time and effort in acquiring technical skills, creating technology-centered curricula, and providing students with meaningful education (Sampson, et,al, 2019). However, there are several factors that make online learning less effective. One of them is a one-way and boring learning method. Teachers tend to only give assignments without using interactive learning media to help students understand the material (He, Swenson, & Lents, 2012).

The implementation of online learning to date has not been without challenges. There are many obstacles when using online distance learning, for example, students may have difficulty understanding chemistry subjects (Shidiq, Permanasari, Hernani, & Hendayana, 2021) (Jannah, 20). Chemistry is considered a challenging subject for students, and one reason for this is the abstract

The Potential of Using Mobile-Based Interactive Multimedia to Improve Scientific Literacy

nature of the concepts. To make it easier for students to grasp abstract material, appropriate teaching strategies are needed, one of which is using interesting media to help students visualize the material (Yakmaci-Guzel, 2013). Chemistry teachers in Indonesia have attempted to use various technology platforms in teaching. However, at this time, the availability of chemistry learning materials is limited (Kyobe & Van Belle, 2018).

Based on various research results that have been conducted before, it appears that the profile of students' scientific literacy, especially in Indonesia, is still low. In addition, the use and development of Mobile-based interactive multimedia in science learning, especially in Chemistry subjects, is still lacking. Whereas according to other research shows that the use of interactive multimedia has a positive impact on scientific literacy. Therefore, researchers want to find out how the potential for using Mobile-based multimedia is to increase scientific literacy.

Based on these gaps, the researchers want to know about the potential of using Mobile-based multimedia interactive to improve scientific literacy. Thus, to achieve the research objectives, several research questions were formulated, including: the use of learning media, the frequency of using learning media, the types of learning media used, and students' perceptions towards the use of learning mobile-based multimedia especially in Chemistry learning.

II. RESEARCH METHODS

This study employs a qualitative research with the survey as the data collection method to know the potential for developing and utilizing mobile-based interactive multimedia to improve scientific literacy. The instrument used to retrieve the research data is with the questionnaire consisting of several questions regarding the implementation of media use in Chemistry learning during the pandemic. The instrument items used in this study adopted questions from the needs analysis research conducted by (Hanif et al., 2018; Qodr et al., 2021). The validity of the instrument is measured by consulting experts or commonly known as expert judgment (Widoyoko, 2018), before all the questions are distributed to the entire research sample. The results of the student responses were then analyzed using the percentage technique (Bustanil S et al., 2019; Qodr et al., 2021) to then find out the number of student responses to several items they answered in the needs analysis questionnaire.

The population in this study were all high school students in Special Region of Yogyakarta Province, Indonesia. Meanwhile, the research sample are 10th grade students of SMA 1 Pengasih with a total number of 108 students who were selected randomly. The questionnaires distribution process was conducted online with using Google Forms after the researcher demonstrate various types of media that can be used for learning activities.

III. RESULTS AND DISCUSSION

This section discusses about the results of a survey that has been conducted to determine the potential for using Mobile-based interactive multimedia to improve scientific literacy. The first thing that is important to know is about students' ownership of smartphone. The result of 108 students was that 100% already had a smartphone. The next statement shows about the Operating System used on student smartphones depicted in Figure 1.

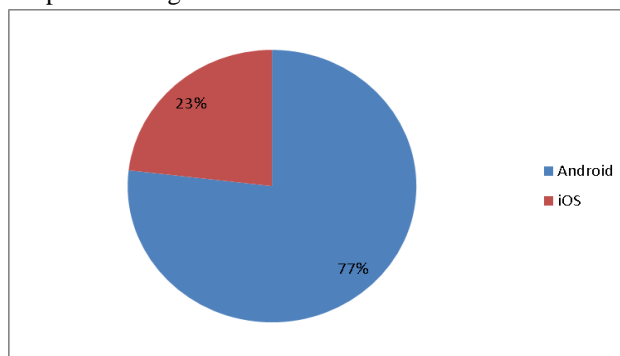


Figure 1. The operating system used on student smartphones

Based on Figure 1 above, it is known that the majority of students use smartphones with the Android operating system. So, this is an opportunity if teachers involve students to use their smartphones to support learning activities. One of the things students can do using their smartphones is to run interactive multimedia applications. Students tend to spend a significant amount of time on their smartphones, which are flexible and portable technology devices. This is evident from student responses on the duration of smartphone use, with 75,70% or (75 students from total 108 students) reporting use of over 6 hours per day, 24,22% or (24 students from 108 students) reporting use of 3-6 hours, and 9,8% or (9 students from 108 students) reporting use of 1-3 hours. In summary, the duration of smartphone use among students is shown in Figure 2.

The Potential of Using Mobile-Based Interactive Multimedia to Improve Scientific Literacy

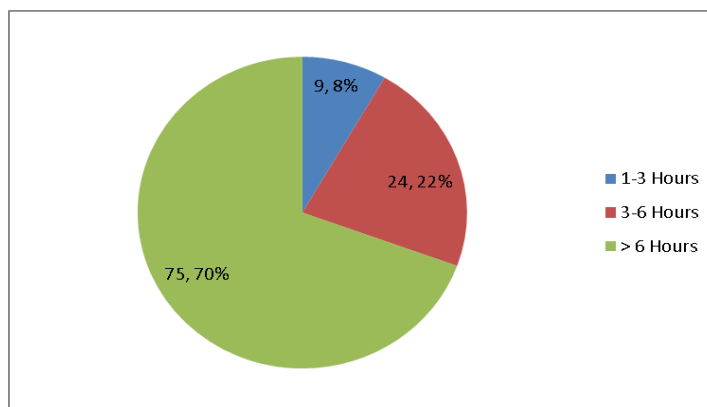


Figure 2. Duration of Students in Using Smartphones

The next thing that was revealed from the results of the student questionnaire was the goals or habits of students in operating smartphones. This is intended to find out how students use smartphones in their daily life. The details will be illustrated in Figure 3.

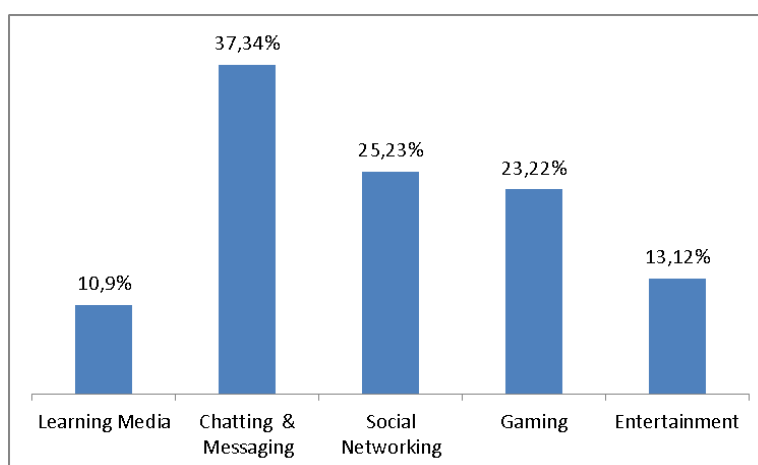


Figure 3. Smartphone Use by Students

According to Figure 3, it can be seen that the results of filling out the questionnaire showed that 37.34% of students used their smartphones for chatting & messaging. Then, as much as 25.23% of students use their smartphones for social networking. Other students, 23.22%, use their smartphone to play games and 13.12% of students use it for entertainment purposes. Meanwhile, only 10.9% of students have used their smartphones for learning media. So, it can be concluded that students have not used the smartphones they have for learning purposes. This is very unfortunate because actually students can use their smartphone as a means of supporting achievement. Thus, it is necessary to have the role of the teacher to start using smartphones for learning activities in class.

These data are an overview of conditions in the field that there is great potential for integrating technology in the learning process. This is because the majority of students currently have mobile devices in the form of smartphones which consist of the Android and iOS operating systems. The two smartphone operating systems can be used to run various kinds of applications that can support the learning process, especially interactive multimedia. This is in line with research conducted by Twum (2017), which stated that the mobile phone had great potential as a learning tool and it could positively be used for teaching and learning purposes in science areas.

Science education is not just about understanding concepts; it also enables students to apply those concepts in their daily lives. This is achieved through the development of scientific literacy, which is valuable in problem-solving activities (Afriana et al, 2016). Scientific literacy is the primary goal of science education and serves as a measure of the quality of education and human resources in a country. (Şentürk and Sari, 2018; Winata et al, 2016)

Interactive multimedia usage can help in the improvement of science literacy because it can make science material more interesting and easy to understand. Interactive multimedia can present science information in various formats, such as images, videos, animations, and simulations, which can make scientific concepts more visual and easier to understand complex concepts. Additionally, interactive multimedia can also provide opportunities for active learning through interaction and exploration, which can enhance understanding and retention of information.

The Potential of Using Mobile-Based Interactive Multimedia to Improve Scientific Literacy

CONCLUSIONS

The results of this study showed that the use of mobile-based interactive multimedia in learning has a great opportunity to be able to increase students' scientific literacy because in addition to high student interest, there are also many benefits that will be obtained by students, especially to make it easier for students to understand learning material. This is shown from the responses of students who agree with the use of mobile-based interactive multimedia in learning, especially in learning Chemistry. In addition, there are many research results that find empirical facts that the use of mobile-based interactive multimedia is preferred by students, because it is interactive, dynamic, and easily accessible by both students and teachers. Therefore, this research can be used as a basis for teachers to use or even develop their own mobile-based interactive multimedia in learning. Other researchers can also develop smartphone-based interactive multimedia on various subjects and various levels of education to measure the level of effectiveness.

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