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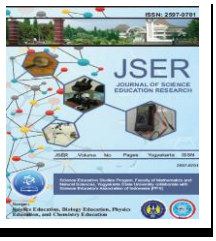

Does an Android-Based Interactive Flipbook Affect the 2nd Grade Junior High School Student's Science Concept Mastery?

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Abstract

The study aimed to determine the effect of using android-based interactive flipbook media in increasing the mastery of science concepts for junior high school students. The research was conducted in one experimental class and one control class at SMP Negeri 2 Genteng, Banyuwangi. The instruments were 10 multiple choice questions and 3 essay questions with cognitive levels of C1 – C6. The method was a Quasi Experiment with a pretest-posttest control group design. The experimental class and control classes were selected by cluster random sampling. The data analysis technique was the analysis of the independent sample t-test with the help of the SPSS application and the standard gain value using the gain equation. Sig value. (2-tailed) independent sample t-test is 0.000. This indicates that there is a significant difference between the average concept mastery of students in the experimental class and control class. The gain value shows that the average score on the concept's mastery of the experimental class increased after treatment to 0.66 in moderate criteria. The average score on the concept's mastery of the control class increased after treatment to 0.24 in low criteria.

INTRODUCTION

The spread of the Covid-19 virus from early 2020 until today has had an impact on education in Indonesia (Sari et al., 2021). The Minister of Education and Culture issued a circular stating that learning in Indonesia is carried out online as an effort to stop the virus outbreak. This circular poses new challenges for teachers, students, and parents. Teachers are required to know and use technology so that learning continues to run well (Hamid, 2021).

Technology in the field of education is focused on efforts to produce the procedures of learning problem-solving. The solution to this problem is in the form of information technology-based educational innovations. The development of information technology that can process, package, display, and disseminate learning information, among audio, visual, audio-visual, and even multimedia, has been able to realize virtual learning (Sepriana et al., 2019). Then, this virtual learning concept was developed so that it can package learning to be more attractive to students wherever they were.

The use of ICT for education has reform the teaching and learning process and create various individual opportunities to learn and access learning resources outside of the school (Ishaq et al., 2020). One form of learning to make it easier for students is to use e-books that can be used on Android smartphones. SMP Negeri 2 Genteng facilitates download link site for an Electronic School Book under the school's digital library program. It isan effort to provide distance learning services but students do not download the book because it is not interactive for students. The Electronic School Book is packaged in the form of an e-book that displays the material and accompanied by pictures.

Teaching materials do not contain supporting materials in the form of video (audio-visual) to minimize material abstraction (Junaidi, 2019; Octaviyantari et al., 2020). Students have not been facilitated with interesting learning media for students to learn science. More than 75% of student, their androids contain applications that are not

related to learning, such as games, social media, and shopping sites. And, 79% of students' androids do not have e-books that can support learning.

Based on surveys and observations at SMP Negeri 2 Genteng, especially natural science subjects, the author found that most of the concept's mastery of the science on class VIII is still low. It is seen that more than 75% of students' Midterm Assessment learning outcomes below the minimum completion criteria. Learning outcomes affect students' mastery of concepts (Zulkarnain, 2019).

The factor of the low learning outcomes of class VIII on science subjects at SMP Negeri 2 Genteng include a reduction in the allocation of learning time during the pandemic which requires 50% limited face-to-face in schools and 50% distance learning. The reduction in time allocation causes learning loss and loss of effective learning opportunities for students in schools which results in a decrease in student competence due to pandemic conditions. Students are passive when limited of face-to-face meetings and embarrassed to ask questions when there is a material that is not yet understood.

This problem is supported by (Mulyadi et al., 2016), that the often arisen problem of science subjects is the lack of student's ability to understand the concept of science. It is caused by students being less active in the learning process because students feel bored with the learning process. Then, learning outcomes are not optimal. Another thing in teaching science, that teachers need to pay attention to build students' mastery of the concepts of the material. Mastery of concepts is very urgent for the success of students' concepts so that it made improvements in the next lesson (Ramdani et al., 2020).

E-books can improve learning outcomes and students' independent learning anywhere and anytime without face-to-face learning at school (Karimah & Churiyah, 2021). In the study, the e-book was packaged in the form of an Android-Based Interactive Flipbook. Display interactive simulations can be done by combining video, animation, and audio.

The combination aims to help students to visualize abstract material so that students can understand the material (Linda et al., 2021). Based on the background of educational problems at SMP Negeri 2 Genteng, the author examines the influence of Android-Based Interactive Flipbook media on the structure and function of plants to improve students' mastery of science concepts.

RESEARCH METHOD

In the study, there was one experimental class (learning using android-based interactive flipbook media) and one control class (learning using electronic school books), each consisting of 30 students of SMP Negeri 2 Genteng for the 2021/2022 academic school year, on November 1 – 5, 2021.

Learning in experimental classes is carried out using the android-based interactive flipbook media. Learning is carried out in the eighth grade of SMP Negeri 2 Genteng, Banyuwangi. Before the treatment, a pre-test is carried out to measure the initial ability of students. Then, after the treatment, a post-test is carried out to measure the improvement of the student's mastery of the concepts. The treatment in the control class is classical learning using the help of an electronic school book.

Each group was given a test of 10 multiple-choice questions and 3 essay questions before and after the learning process to measure students' mastery of concepts. The indicators of the concept mastery instrument are following the indicators of achieving the basic competencies of plant structure and function materials applied through cognitive bloom taxonomy levels C1 to C6.

The method was a quasi experiment with a pretest-postest control group design. The experimental class group and the control class were selected by cluster random sampling. The data analysis technique was the analysis of the independent difference test of the t-test sample with the help of the SPSS application and the standard gain value using the gain equation:

$$\text{Gain score} = \frac{Postest\ score - pretest\ score}{maximum\ score - pretest\ score}$$

The score gains may be categorized into the low, medium, and high categories. The standard gain categories are as follows.

$(g) \geq 0.7$; high gain
$0.3 \leq (g) < 0.7$; medium gain
$(g) < 0.3$; low gain

RESULT AND DISCUSSION

The effectiveness of Android-Based Interactive Flipbook Media was analyzed using a t-test that was previously tested for normality and homogeneity test. The normality test used Kolmogorov-Smirnov and Shapiro Wilk. The homogeneity test used Levene's test. The results of the normality test and homogeneity test of the experimental class and the control class are presented in table 1.

Table 1. Normality Test Results from Students' Mastery of Concepts

	Kolmogorov-Smirnov	***Shapiro Wilk***	**Conclusion**
	Sig.	Sig.	
Experiment Group Pretest	0,150	0,238	Normally distributed
Experiment Group Postest	0,082	0,083	Normally distributed
Control Group Pretest	0,057	0,403	Normally distributed
Control Group Postest	0,171	0,268	Normally distributed

Based on Table 1, after test with the Kolmogorov-Smirnov and Shapiro-Wilk tests, the significance value of the concept mastery data was higher than 0.05, in both the experimental class and the control class. It concluded that the student's concept mastery data is normally distributed, in both experimental and control classes.

Table 2. Levene's Test Result

Levene's Test of Equality of Error Variances[a]					**Conclusion**
	F	df1	df2	Sig.	
Mastery of Concepts	1,731	1	58	0,193	Homogen

Based on Table 2, the significance value of the student's concept mastery data is higher than 0.05. It stated that the data on mastery of concepts are homogeneous, both the experimental and the control class.

After testing the prerequisites for normality and homogeneity, it is continued with the t-test.The hypothesis in the t-test is as follows.

H_0 : There is no difference in the average student's mastery of concepts between the experimental class and the control class

H_1 : There is a difference in the average mastery of students' concepts between the experimental class and the control class.

Table 3. Independent sampel T test Result

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Mastery of Concepts	Equal variances assumed	9.730	58	0.000	25.73333	2.64464

Based on Table 3, the sig values. (2-tailed) independent sample t-test which is 0.000. It stated that the significant value is less than 0.05. So, it concluded that H0 is rejected and H1 is accepted. Based on the results of the t-test, there was a significant difference between the average mastery of students' concepts in the experimental class and the control class. To find out the increased score, the gain value is obtained and presented in table 4.

Tabel 4. *N- Gain Score of Student's Mastery of Concept*

	Average Pretest Score	Average Postest Score	N-Gain	Criteria
Experimental Class	34,2	76,9	0,66	Middle
Control Class	33,8	51,17	0,24	Low

Table 4 shows that the average mastery of concepts of experimental class increased after treatment by 0.66 in moderate criteria. The average mastery of concepts of control class increased after treatment by 0.24 in low criteria.

At the beginning of the android-based interactive flipbook media in this study, there was a video. Videos may be used to generate questions and as a starting point for investigations aimed at arousing students' curiosity about the concept of science and its application in everyday life (Siahaan et al., 2020). In addition, there is also a student activity to identify plants directly by walking around the school environment.Here, students can build the concept of dicotyledonous and monocotyledonous plants. Science should be taught with learning that allows students to develop their abilities and build their concepts (Siahaan et al., 2020). Students mastery of concepts of a material studied affects critical thinking skills (Sepriana et al., 2019).

The effectiveness of android-based interactive flipbook media is shown by the difference in the results of mastering concepts between the experimental class and the control class using the electronic school book. An independent sample T-test used to test the difference. Based on the tests on the posttest scores, results showed that android-based interactive flipbook media had a significant effect on students' mastery of concepts. It is based on the H1 decision received obtained from a significance value of 0.000 which is smaller than the significance level of 0.05.

Based on the gain value, the experimental class in medium criteria and the control class is in the low criteria. Because the experimental class uses interactive media, so it affects students' mastery of concepts. Through an android-based interactive flipbook, students can practice their mastery of concepts as equip with practice questions that indicate mastery of taxonomic concepts in the cognitive realm of C1 to C6. Media that use technology such as flipbooks can help improve students' basic abilities (Higgins & Moeed, 2017).

The result is due to the flipbook's ability to integrate sounds, images, animations, videos, interactive quizzes, material summaries, and interactive practice questions. (Hamid, 2021; Ramdani et al., 2020). E-books enriched with multimedia to motivate and attract students' attention and perseverance in reading. The perseverance of the student in reading means having a desire to take advantage of the material. The results of this study are supported by previous studies, for example. android-based flipbooks can increase students' independence, activities, and learning skills (Karimah & Churiyah, 2021; Mulyadi et al., 2016; Oktasari et al., 2019).

CONCLUSION

Based on the results, it concluded that the value of the sig. (2-tailed) an independent T-test sample of 0.000, shows that there is a significant difference between the average mastery of students' concepts in the experimental class and the control class. The Gain score shows that the average mastery of concepts of experimental class students increased after treatment by 0.66 in moderate criteria. The average mastery of concepts of control class students increased after treatment by 0.24 in low criteria.

Based on the research,, there are several obstacles, namely the weak wifi signal in class VIII-F so that learning uses student data packages. There is also a problem with students' androids that are not supportive (slow) due to full storage capacity. Then, the student is left behind some pages from others.

Based on the findings of these obstacles, the article recommends that in implementation of this interactive media, it needs a strong signal, such as a computer laboratory or digital library. Before learning, students are important to delete unimportant data so that the android does not slow down. The article also recommends to other teachers develop this interactive media on different materials or different indicators. Then, the research in the field of education is more varied.

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