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THE EFFECTIVENESS OF ONLINE OFFLINE LEARNING MEDIA (MO2) BASED ON SMARTPHONE

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Abstract

The purpose of this study was to determine the effectiveness of online offline media (MO2) on improving students' cognitive learning outcomes. This study is a true experiment with a total sample of 60 students (30 students who use smartphones and 30 students who do not) at SMA Negeri 1 Samarinda class XI science in biology subjects. The design of this study used a posttest only control design. The sampling technique is purposive sampling. Data were analyzed using independent sample t-test and N-Gain test. The results of the independent t-test analysis showed that there was a difference in the increase in cognitive learning outcomes in the application of MO2 with a significance value of 0.00 <0.05. The results of the N-gain test showed that MO2 was effective in improving cognitive learning outcomes with a score of 78% (high category). The results of this study indicate that MO2 media is effective in improving student learning outcomes.

Keywords: learning media, online offline media (MO2), and smartphone

Technology-based learning offers various forms of learning and improves the shortcomings of face-to-face learning (Kalyuga & Liu, 2015). The improvement in question is the flexibility of time and place to carry out learning activities (Laborda et al., 2015). This can make it easier for students to learn anywhere and anytime (Khaddage et al., 2016). One of the appropriate technology devices for use in learning is a smartphone. Smartphones can offer a very interactive learning experience and have high flexibility (Boham & Rondonuwu, 2017); (Sobon et al., 2019). In addition, smartphone-based learning can enable a rich, distributed and contextual learning approach (Crompton, 2014). This makes smartphone-based learning no longer considered a technocentric trend but a new study habit in the current era (Khaddage et al., 2015).

This technocentric trend is marked by an increase in the number of smartphone users in Indonesia, which has increased from 11.7 million in 2011 to 62.69 million in 2017 (Machmud, 2018) . As the number of smartphone users increases, it has a negative impact because it is not directed properly. The negative impact that can occur is smartphone addiction in internet surfing activities, social networking services and playing online games (Cha & Seo, 2018). This has made several schools in Indonesia implement a ban on the use of smartphones in the school environment (Machmud, 2018). The prohibition is carried out to anticipate the negative impact of excessive smartphone use. This problem shows that smartphone-based learning is not optimal in schools. Even though teachers can do mixed learning between online and face-to-face smartphone-based.

Mixed learning is an appropriate learning design in the current era, because it already has good management of the use of technology (Spector et al., 2016). This makes mixed learning an option for the right design for the use of smartphones in learning. The learning design requires good internet access, so implementing it is difficult. This can happen because internet access in Indonesia is still not evenly distributed (Ruth, 2015). This problem creates a gap between the existing media and the readiness of infrastructure in schools.

This study examines the effectiveness of MO2 offline online learning media in order to avoid pre-existing gaps. The study was conducted at SMAN 1 Samarinda using two classes with a total of 60 students. The first class consisted of 30 students who used smartphone-based MO2 media for literacy activities, doing assignments, and exams. Content on MO2 media uses two modes, namely: online and offline. Content accessed offline on MO2 media are e-books and videos. Content accessed online are student learning activity sheets (LKPD), discussion forums, and scientific journal seekers. To see the content more clearly, the application can be seen in Figure 1. Or downloaded at https://web.jagel.id/store/gurumuda. Selection of content according to conditions and needs can increase the effectiveness of learning media (Hakim et al., 2017). The second group consisted of 30 students who used conventional media commonly used by teachers at SMA Negeri 1 Samarinda in the form of biology books from the Indonesian Ministry of Education and Powerpoint.

(a)   (b)   (c)   (d)
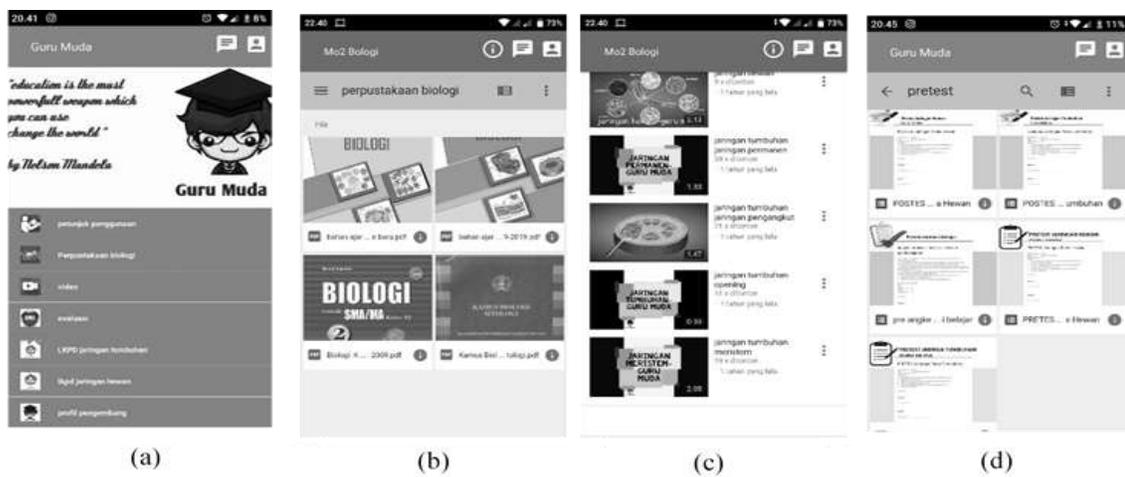
METHOD

This study is an experimental study with a post-test only control group design (Setyosari, 2016) which is explained as follows:

R : the selection of a purposive sample of classes at population
O : learning outcomes test (postest)
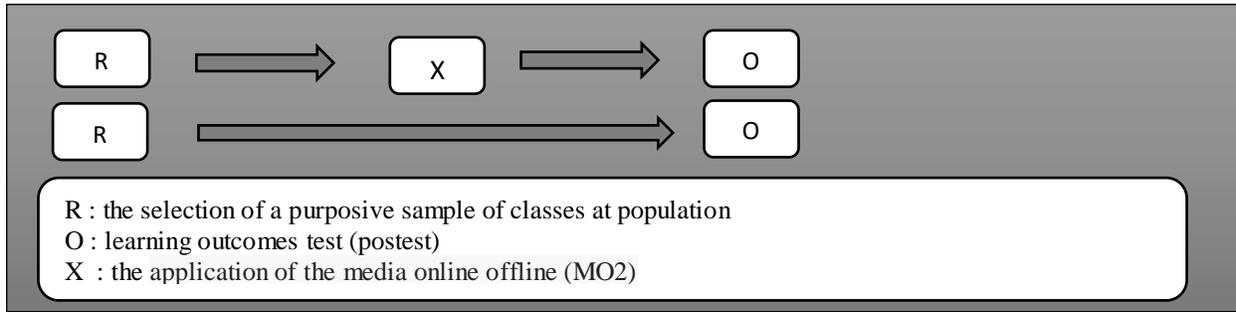X : the application of the media online offline (MO2)

Figure 1. post-test only control group design [13]

The research sample was determined using a purposive sampling technique (Sugiyono, 2014) on students of SMAN 1 Samarinda class XI IPA for the 2019/2020 school year. The sample consisted of 60 students who were divided into two groups. The first group consisted of 30 students as the experimental group, while the second group consisted of 30 students as the control group. The experimental group was treated using MO2 media, while the control group used powerpoint media and the Indonesian Ministry of Education and Culture biology printed book and powerpoint. Each group is given the same posttest at the end of the learning session. The instrument used in this research is a post-test.

To test the effectiveness of the media using an independent test t-test and N-gain scores were applied to the scores obtained under both control and treatment class conditions. The independent T test was used to determine whether there was a difference in the average learning effectiveness of the two samples of the experimental class and the control class. Independent Test T-test can be calculated using the formula (Sugiyono, 2014):

$$t = \frac{\overline{x1} - \overline{x2}}{\sqrt{\frac{s^2}{n1} + \frac{s^2}{n2}}}$$

Information :
t : The coefficient you are looking for
$\overline{x1}$: The mean value of the control group
$\overline{x2}$: The average value of the experimental group
n : Junlah subject
s^2 : Estimated variance

The effectiveness test was carried out using the N-gain test to strengthen the data from the independent t-test results. The N-gain test is calculated using the following formula (Hake & Reece, 1999):

$$g = \frac{\sum postest - \sum pretest}{\sum Maks - \sum pretest} \times 100\%$$

Based on the n-gain calculation obtained, the score categories in Table 2 are used as follows:
Table 2. Distribution of N-Gain Scores

N-Gain Scores	Category
g > 0.7	High
0.30 g < 0.70	Moderate
g < 0.30	Low

(Source: modification of (Wynarti, 2018)

The division of the N-gain acquisition category in the form of a percentage (%) can refer to table 3.
Table 3. Effective Interpretation Category of N-Gain

Percentage (%)	Interpretation
< 40	Ineffective
41 - 55	Less effective
56 - 75	Effective
> 76	very effective

(Source: modification of (Hake & Reece, 1999)

RESULTS

The MO2 effectiveness test used class XI MIPA 3 as the control class and class XI MIPA 4 as the experimental class. The results of the MO2 effectiveness test using an independent t-test can be seen in table 4.

Table 4. Independent Samples Test results

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
Student learning outcomes	Equal variances assumed	2,060	.157	8.927	58	.000
	Equal variances not assumed			8.927	56,438	.000

Based on the data analysis in table 4. shows a positive influence on improving students' cognitive learning outcomes in biology subjects using MO2. These results are evidenced by a significance value of $0.00 < 0.05$. These results indicate that MO2 has a positive effect on improving students' cognitive learning outcomes. These results need to be tested additionally using the N-gain test to strengthen the results of the study in table 4. The results of the effectiveness test using the N-gain test can be seen in table 5.

Table 5. N-Gain Calculation results

Trial stage	School location	<g>(%) Experimental Group(n=30)	Category	Control Group(n=30)	Category
Large Group Test	**SMAN 1 Samarinda**	0.78	High	0.57	Moderate

In the effectiveness test using the N-gain t-test showed a score of 0.78. Based on the n-gain distribution table (Wynarti, 2018) the score can be expressed in the (high) category. After being converted into an effective N-Gain Interpretation category table which was adapted from Hake and Reece (Hake & Reece, 1999) it got a score of 78%. This shows that MO2 media can be declared effective in improving students' cognitive learning outcomes.

DISCUSSION

The effectiveness of a learning can be seen from the success in achieving learning objectives. The success of achieving learning objectives can be measured by increasing learning outcomes and activities. Learning outcomes are characterized by changes in overall behavior which include cognitive, psychomotor, and affective aspects (Nurtanto, Muhammad; Sofyan, 2015). This study focuses more on measuring the effectiveness of learning outcomes in the cognitive domain. The cognitive domain consists of several categories, namely: remembering, understanding, applying, analyzing, evaluating, and creating (Anderson, LW; Krathwohl, 2001). This is the basis for developing MO2. MO2 simplifies and improves learning outcomes in the cognitive domain. Based on the results of data analysis in table 4, it shows that MO2 is effective in improving students' cognitive learning outcomes. The increase in cognitive learning outcomes is one of the positive impacts on the application of MO2. The application of MO2 shows that students are more likely to be active and enthusiastic in learning. Technology-based learning allows high flexibility so that it can enable students to develop creativity in learning (Laborda et al., 2015).

Technology-based learning media can make all learning activities student-centered and position the teacher as a facilitator (Cukurbasi & Kiyici, 2018). The use of learning resources only from books, will not be able to visualize the scientific process that occurs in some biological materials (Nurani et al., 2016). Especially in the current learning era that prioritizes students' critical and creative thinking skills. MO2 has features that can stimulate these skills in the form of audio-visual materials, journal searches, and LKPD. LKPD MO2 refers to indicators of critical and creative thinking skills. It was chosen to raise students' motivation to learn independently in developing students' creative and critical abilities. The use of appropriate learning media can trigger the emergence of students' critical and creative thinking skills (Hakim et al., 2017). Critical and creative thinking skills can support the improvement of students' cognitive learning outcomes. The average student who is able to think critically and creatively can more easily understand the material being taught (Mandari et al., 2020). Good understanding of the material can have a positive impact on student learning outcomes.

MO2 has content that can be accessed online, in the form of student learning activity sheets (LKPD), discussion forums, exams, and scientific journal finder. This makes it easier for teachers to carry out the assessment process during learning and anticipate student anxiety in working on exam questions. Selection of online exam content and LKPD can reduce the level of anxiety that can have an impact on student performance when working on questions (Setyosari, 2016; Sobon et al., 2019). This can have a positive impact on students' cognitive learning outcomes. Students can be calmer in doing assignments and exam questions. MO2 has online discussion content that functions to create collaborative activities between students to solve problems on difficult material. Online discussions can increase the intensity of student collaboration in solving problems (Chao et al., 2018). The content provides discussion space for students freely and can be done in various places. This helps students who are less confident in discussing in person, because MO2 provides a new experience in expressing opinions online. MO2 is in accordance with learning in the 2013 curriculum which requires students to be more active than teachers (Subagiyo & Safrudiannur, 2014).

The results of the MO2 effectiveness test showed very effective results. The results of the effectiveness test show that MO2 gets a score in the high category. These results indicate that MO2 is proven to be effective in improving students' cognitive learning outcomes. Students tend to be more active when studying. Students are very motivated and excited because the presence of MO2 provides a new learning experience. The use of learning media can provide new learning experiences and increase learning motivation (Hakim et al., 2017). Learning motivation can make a positive contribution to students' cognitive

learning outcomes (Indah & Sari, 2014). Students look more enthusiastic and enthusiastic about learning because MO2 media has high mobility and flexibility. The advantages of technology-based learning allow flexibility in time scheduling with students being able to take tests anywhere and anytime (Laborda et al., 2015).

MO2 is designed in the form of a smartphone application. Smartphone-based learning provides a new learning experience and has high mobility (Boham & Rondonuwu, 2017; Sobon et al., 2019). This was chosen because smartphones offer highly interactive learning experiences, which pose challenges to students' cognitive load (Cha & Seo, 2018; Chao et al., 2018). Smartphone devices are considered as effective learning tools because they contain multimedia content that engages the user, but can have a negative impact if not on the right content (McEwen & Dubé, 2015). The selection of the right display design and learning media content will make the learning atmosphere more enjoyable while at the same time attracting students' attention to learning (Kuswanto et al., 2017). The application of smartphone-based learning media is the right option for students in the 4.0 industrial revolution era. The majority of learning media currently available are still entirely online. This makes the existing media unusable in various locations in Indonesia. The quality of the internet in Indonesia is still not qualified and uneven (Ruth, 2015). This makes the current media unable to be used in all schools in Indonesia because the quality of the internet is still not qualified.

The application of MO2 media is the answer to various existing problems. The media designs offered are learning materials designed in the form of e-books and videos that can be accessed offline. This was done to anticipate the problem of the uneven internet network in Indonesia, especially in Samarinda, so that students can continue to study even though the conditions on the network are unstable. This shows that MO2 has a good reception according to the learning needs of students and internet facilities in Samarinda. This shows that there is an effect on increasing students' cognitive learning outcomes, because MO2 can be used online and offline.

CONCLUSION

This study tested the effectiveness of smartphone-based online offline media (MO2) to improve student learning outcomes. MO2 can facilitate teacher performance because it has high mobility and flexibility. This is in accordance with the needs and learning habits of students in the current digital era. Students prefer practicality and flexibility so that learning motivation can increase. Learning motivation can trigger the emergence of student initiatives to carry out independent learning activities. Positive influence in improving students' cognitive learning outcomes. In addition, students can more freely carry out collaborative activities in discussions using the discussion forum feature on MO2 media. Features on MO2 media can be accessed offline to anticipate unstable internet network constraints, so students can still learn even in all conditions. Based on the research results that have been described previously, the application of MO2 learning media can improve students' cognitive learning outcomes.

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