Video-Assisted Blended Learning on Cognitive Learning Outcomes of Junior High School Students on Waves and Sound Materials

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Abstract - *This study aims to determine whether video-assisted blended learning influences the cognitive learning outcomes of junior high school students on wave and sound materials. This research is quantitative research. The method used in this study is pre-experimental designs with one group pretest-posttest. The sample in this study encompassed 31 students from class VIII-10 of SMP Negeri 4 Samarinda. Data collection uses a multiple-choice test consisting of 24 questions. The results showed that the use of video-assisted blended learning influences students' cognitive learning outcomes. This was evidenced by the students' experiencing an increase in cognitive knowledge learning outcomes during the 3-meeting learning. Here, the n-gain obtained from the means of the pretest and posttest was 0.61, which was more than 0.30 and less than 0.70. Therefore, it was concluded that the increase in the students' learning outcomes was moderate.*

INTRODUCTION

In this era of globalization, it is demanded that the world of education prepare people who are able to showcase their intelligence, creativity and independence (Kholifah et al., 2020). The Covid-19 pandemic requires that the education system be able to adapt to the current situation and condition, and thus the education system must move from face-to-face to online learning (Fitriani, 2021). Following the pandemic subsidence, the government has resumed in-class learning; in consideration of the number of the students, the students are then divided per session. Learning outcomes, especially cognitive learning outcomes, are the main foundation needed by the students in order to adapt to the current learning that have changed, that is, from online learning to face-to-face (offline).

Given the advantages of a technological development at the present time, especially in regards to the use of learning media, technology must be able to facilitate the attainment of learning goals that are considered as an acceptable addition. Therefore, there is a need of a learning media that is compliant with today's students' criteria and needs but not ignorant to the moral vision of learning (Aisyah et al., 2020).

Several previous studies have shown that there is an effect of blended learning on student learning outcomes at junior high school level (SMP). The results of this study indicate that the outcomes from the learning that uses Blended Learning model are higher than those from the learning using conventional models (Indayani et al., 2021; Suranti et al., 2020). There are several ways to improve learning outcomes, one of which is by using video. Video can assist teachers in conveying material. It is certainly more practical. In addition, it can also trigger the students' understanding so that it is easier for them to understand each of the concepts given (Turrahmi et al., 2018).

Based on observations made at Samarinda Junior High Schools (hereinafter

SMP Samarinda), the learning system is currently adapting limited face-to-face meetings. Previously, the schools in the city of Samarinda implemented online learning system. Here, based on the results of interviews with the school teachers, the cognitive learning outcomes of the students during the online learning were still low. In addition, there are still plenty of students who certainly do not understand in detail the material taught online. Therefore, during the current learning adaptation period, the researchers would like to conduct research on a learning model that can be used during the reentering of face-to-face learning period—that is, blended learning, which is a learning method that combines the advantages of both face-to-face and virtual learning (Husamah, 2014).

Blended learning combines a variety of activities, including face-to-face classes, in-person online classes, and independent learning (Singh, 2021). Here, blended learning or the combination of online and face-to-face learning is highly recommended in order that the learning can adapt to the digitalization era of the 21st century (Zain & Jumadi, 2018; Simangunsong & Trisna, 2021). The blended learning model used in this study is flipped classroom. This type of blended learning makes use of a reverse learning where what is generally done in class is now done at home and what is usually done at home is now done in class (Bergmann & Sams, 2012). Although there is no standard proportion of the face-to-face physical presence and absence, what is certain is that blended learning always combines face-to-face activities and e-learning in the effort to facilitate learning (Dwiyogo, 2016). Through a video, that is, by watching learning videos, students get an oral explanation about the subject matter from the teacher through the teacher's explanation and narration in the video

(Widianta, 2021). The reasons why learning videos are appropriate to be used as learning media are as follows: (1) they allow efficient use of class time, (2) they provide more active learning opportunities for students, (3) they can help explain material clearly, (4) each individual's learning style is different and videos can cater to the needs raised, and (5) they reduce the burden from the teachers, in using the lecture model in the teaching and learning process (Agustini & Ngarti, 2020; Praptama et al., 2021). Here, the researchers are therefore interested in conducting research with the title "Video-Assisted Blended Learning on Cognitive Learning Outcomes of Junior High School Students on Waves and Sound Materials", under the hope that video-assisted blended learning can improve students' cognitive learning outcomes.

RESEARCH METHODS

The research conducted in this study used a quantitative approach where the research data was presented in the form of numbers and analyzed using statistics (Fraenkel et al., 2012). The research method used is a type of pre-experimental designs, that is, One Group Pretest-Posttest. Using this design, only one group was used as the research subject. The group that will be given the treatment is first given an initial pretest. Then, the researcher treats the group by displaying learning videos while in-class face-to-face learning is still in progress. Meanwhile, students who join from home will learn the material independently using learning videos sent via WhatsApp group. Finally, the group was given a posttest final test. Here, the magnitude of the effect of the treatment can be determined by comparing the results of the pretest and posttest.

Table 1. Pretest-Posttest Group Control Research Design

Pretest	Treatment	Posttest
O	X	O

Whereby:

O is the pre-test score

X is the treatment done (i.e., video-assisted blended learning)

O is the post-test score

Source: (Fraenkel et al., 2012)

This research was conducted at SMP Negeri (State Junior High School) 4 Samarinda. The population of this study were all students of class VIII SMP Negeri 4 Samarinda, while the sample were 31 students from class VIII-10. The sampling technique used is purposive sampling technique. Purposive sampling is a sampling technique which aims to select the subjects of a study based on a specific purpose—not randomly, or based on strata or region (Rifa'i, 2019).

The data for this study was collected using a multiple-choice test which consists of 24 questions. The pre-test questions were given at the beginning of the meetings to find out the students' prior knowledge, while the post-test questions were given at the end of the meeting to find out students' learning outcomes after treated using video-assisted blended learning. To analyze the students' learning outcomes, the researchers used the pre-test and post-test questions prepared beforehand. The learning outcome is measured in the scale value of 0 to 100 using this formula:

$$\text{Score} = \frac{\Sigma score\ obtained}{\Sigma maximum\ score} \times 100 \qquad (1)$$

After that, the mean is used to discover the average score of the students for the pretest and posttest. The formula used is as follows:

$$\bar{x} = \frac{\Sigma X}{N} \qquad (2)$$

Description:

$\bar{x}$: Students' average score

Σ_X : Pre-test or post-test total score

N : Total number of students

Students' learning outcomes for the pretest and the posttest are grouped based on certain criteria. These criteria are presented in Table 2.

Table 2. Learning Outcome Assessment Criteria

Score	Criteria	Category
$80 \leq X \leq 100$	A	Excellent
$70 \leq X < 80$	B	Good
$60 \leq X < 70$	C	Fair
$50 \leq X < 60$	D	Poor
$0 \leq X < 50$	E	Bad

Source: Sudjana, (2012)

The N-Gain test is a test that can provide an overview of the increase in the learning outcome scores after a method is implemented. From the pre-test and post-test scores, the students' cognitive learning outcomes can be seen to have increased after the learning used web-based teaching materials. According to Meltzer (2012), the increase in cognitive learning outcomes will be seen using the formula:

$$g = \frac{posttest\ score - initial\ test\ score}{maximum\ score - initial\ score} \qquad (3)$$

The category for score attainment level is shown in Table 3 as follows:

Table 3. N-gain score category

Nilai N-Gain	Kategori
N-Gain > 0.70	Tinggi
$0.30 \leq$ N-Gain ≤ 0.70	Sedang
N-Gain < 0.30	Rendah

Source: Hake, (1999)

The normality test is used to determine whether the data obtained from the research results are normally distributed or not (McQueen, R & Knussen, 2013). In this study, the normality test was carried out with the help of the 25th version of IBM SPSS

Statistics software using the Shapiro Wilk Technique. A data is said to be normally distributed if the significance level is $\geq \alpha$. On the contrary, if the significance level is $<\alpha$, the data are thus not normally distributed.

The t-test used in this study is paired t-test. Paired t-test is a method that tests a hypothesis for a data that is not independent (Montolalu & Langi, 2018).

RESULTS AND DISCUSSIONS

In the meetings conducted before the treatment is given, the researcher first conducted a pretest to measure students' initial abilities before they are given the material. The pretest was given in 2 lesson hours during the first meeting. The test given is in the form of multiple-choice questions with a total of 30 questions. The number of the pretest data analyzed in this study was 31, in accordance with the number of students in the sample class—class VIII-10. Before using video-assisted blended learning model, students' cognitive learning outcomes obtained an average score of 27.10. The lowest pretest result obtained was 3 and the highest score was 53.

cognitive learning outcomes of all of the students were still lacking.

The learning using video-assisted blended learning was held for 3 meetings, after which the researchers conducted a posttest to measure the students' final abilities or students' cognitive learning outcomes. The posttest was given for 3 lesson hours during the last meeting. The test given includes the same type of questions as those given in the pretest, that is, 30 multiple-choice questions. The total number of the data was the same as that for the pretest, namely 31 students, in accordance with the number of students in the sample class, that is class VIII-10.

Based on Figure 2, 4 students (13% out of 100%) obtained excellent results (i.e., the results fall under the category of excellent) for the post-test, while 14 (45%) obtained good results (i.e., the results fall under the category of good). This shows that at the time of the posttest, that is, after video-assisted blended learning model is used, overall, the students' learning outcomes were good.
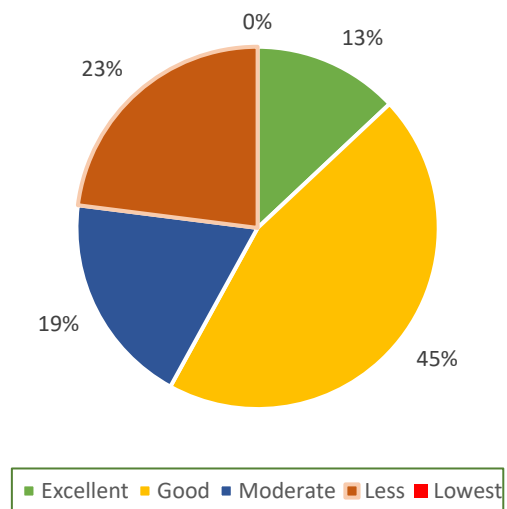

Figure 1. Circle Diagram for Students' Learning Outcome Categories (Pretest)

Based on Figure 1, all of the 31 students' cognitive learning outcomes for the pretest are categorized as bad. This shows that at the pretest, before video-assisted blended learning was used, the

Figure 2. Circle Diagram for Students' Learning Outcome Categories (Posttest)

The results for Pretest-Posttest Data Normality Test can be seen on Table 4.

Table 4. Pretest-Posttest Data Normality Test Results

	Shapiro-Wilk		
	Statistic	Df	Sig.
Pretest	.972	31	.574
Posttest	.950	31	.155

The significance value of the normality test results has proven that the pretest and posttest data are normally distributed. Therefore, the next test, that is, the paired samples test, can be conducted.

Table 5. *Pretest-Posttest Data t-test results*

Paired Samples Test

		T	df	Sig. (2-tailed)
Pair 1	Pre-Test - Post Test	-27.690	30	.000

As seen from Table 5 above, with a sample size of 31 students, the results of the t-test obtained a t-count of -27.690 and a significance value of 0.00. Here, since the significance value is less than 0.05, it can be concluded that there is a significant difference between the pretest and posttest scores of the students in SMPN 4 Samarinda. The N-Gain obtained from the average score of the pretest and posttest is 0.61, which is more than 0.30 and less than 0.70. Therefore, the increase in the students' learning outcomes is included under the medium category.

This research was conducted in 5 meetings, each of which consists of 2-3 lesson hours. This amounts to a total of 5 lesson hours (20 minutes/each) per week in class VIII-10. During the first meeting, a pretest was given to the students. Meanwhile, during the last meeting, a posttest was given. In the first meeting, all students were present. Therefore, the pretest was given to a total of 31 students. Similarly, none of the students were absent in the last meeting and thus, the pretest and the posttest

were given to the same number of students. In the second, third, and fourth meeting, the students were given assignments in the form of exercises and student worksheets (LKS) to find out the extent to which they understand the materials after they have been given a lesson with the help of learning videos. Here, the videos were all previously sent to the WhatsApp group consisting of the students and the researchers.

Blended learning has several learning stages, which have been modified by (Ramsay, 2001). The first stage/phase is seeking of information. At this stage, the teacher provides information about the competencies being taught and then conveys the learning to the students. After that, the teacher explores the students' knowledge through in-class face-to-face learning or online face-to-face learning (via Zoom meeting or other online media). The second phase is called Acquisition of Information. At this stage, the students work on their student worksheets (LKS) individually or in groups—according to the instructions given by the teacher. The teacher then communicates the tasks that have been completed by the students through direct face-to-face meeting or through online applications that are used. Here, the researcher provides the learning videos online—via WhatsApp, through a link that the students can click on to be able to study the material presented. Furthermore, the teacher can test the students' abilities by giving them an assignment. This way, whether or not the learning video sent as a 'learning assistant' before the direct face-to-face learning has a significant effect can be observed. The third phase is called Synthesizing of Knowledge. At this stage, the students listen to the explanations and streamlining of the material that has been given once more. This is so that the students can receive and gain comprehensive

knowledge and, together with the teachers, can conclude the learning that has been conducted.

The test instrument used for the pretest and posttest was in the form of 24 multiple choice questions. The test items are used to measure students' cognitive learning outcomes. During the second, third, and fourth meeting, examples were given in the form of practice questions that were worked on jointly by the teacher and the students using Q&A technique. In addition, during the three meetings, individual practice questions were also given in order to discover the students' learning outcomes. This in turn serves as a reference for the teacher to improve the learning methods so that they can be even more optimal. The third meeting was conducted face-to-face, online, using the help of a Zoom meeting. Meanwhile, the first, second, fourth, and fifth meetings were held face-to-face in class without using a Zoom meeting like the third one. This is because the researcher used blended learning model, through which the lessons can be conducted via either in-class face to face meeting or online face-to-face meeting with the help of Zoom meetings.

Based on the results obtained from the pretest and posttest, the students generally experienced an increase in their learning outcomes—though there were still some students who had not experienced such a significant increase. The pretest results obtained an average score of 24.71 while the posttest obtained an average score of 70.45. In addition to the posttest result, the results of the individual exercises given also experienced an increase in the third meeting (this is the first individual task/exercise). Here, the average score obtained was 69.93, while the highest and lowest scores are 100 and 16 respectively. Furthermore, in the fourth meeting, the second individual task was given. Here, the average score of the

student's individual assignments is 85.64, with the highest score being 100 and the lowest score, 50. The video is given via WhatsApp group before in-class face-to-face learning is carried out. The content of the learning video revolves around the initial understanding of a wave. The provision of the learning videos is intentional, so that the students can already understand the material by the time they study the material through Q&A between the teacher and the students.

The use of blended learning is very beneficial for both the teachers and the students. As stated by Nande & Irman (2021), blended learning is a model that can combine face-to-face (offline) and computer-based (online, via the internet and mobile learning) learning delivery methods. The use of this model allows students to access their lessons anywhere through the learning videos given previously by the teacher. The time-limited learning that is currently occurring happened because Indonesia had previously experienced the Covid-19 outbreak. Such outbreak caused the government to change the education system to online learning. Nevertheless, face-to-face lessons is currently being re-implemented with several adaptations. Thus, 1 lesson hour was only given a short period of time: around 20-25 minutes. In such case, the teachers must be able to use the right model—and blended learning is very suitable to be used during an adaptation period. Here, such opinion is in accordance with the opinion from Zain and Jumadi, (2018), which states that combining online and face-to-face learning or blended learning is a form of adaptation to the digitalization era of the 21st century and is thus highly recommended.

The students' cognitive learning results showed that there was a significant change in students' cognitive learning outcomes. Here, even though there were still

a number of questions that the students could not answer correctly, an increase after the learning process is shown nonetheless. The difference in the pretest and posttest score is quite significant because students can repeat the learning videos given by the teacher. In addition, there also provided, some examples on how to work on practice questions as well as individual exercises. As stated by Turrahmi (2018), there are several ways that can be done to improve learning outcomes. One of these is by using a video that can assist teachers in conveying the material—one that is certainly more practical and can trigger students' understanding so that it is easier for them to understand each of the concepts given.

The description above shows that video-assisted blended learning can significantly improve cognitive learning outcomes of junior high school students for the material waves and sound, as evidenced by the Paired Samples T-test having a significance of 0.00 and the N-Gain test obtaining 0.61 (medium category). This research is in line with the research conducted by Indayani (2021) which states that blended learning has an influence on junior high school students' learning outcomes. Based on research conducted by Jalinus & Verawardina (2020), blended learning not only utilizes digital technology in learning, but also requires appropriate system management and technological competence in its use. This is so that the learning process can be even more effective and efficient, as is expected.

One of the many usages of technology revolves around its use as a learning video that is sent via the students' WhatsApp group. As many as 20% of the students experience a high increase on their learning outcomes. Meanwhile, 80% of the students are included as having a medium increase. This means that all of the students' cognitive learning outcomes have experienced an increase after the implementation of video-assisted blended learning.

CONCLUSION

Based on the results of the research and data analysis carried out at class VIII-10 SMP Negeri 4 Samarinda, it can be concluded that, the students' learning outcomes have increased significantly. This statement is based upon the Paired Samples T-test of the average score of 24.71 to the average score 70.45, with the N-Gain Value of 0.61 (medium category). This means that there is video-assisted blended learning does affect/has influence on students' learning outcome.

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