



**THE EFFECT OF GIVING ONLINE DISCUSSION ON STUDENT LEARNING
OUTCOMES IN IMPULS AND MOMENTUM MATERIALS**

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Abstract

This study aims to determine the effect of online discussion on student learning outcomes on Impulse and Momentum material. The population in this study were all XI classes of SMA Negeri 15 Bandar Lampung who were taking the even semester in the 2017/2018 school year. The method used in this research is Quasi Experimental with the research design of The Nonequivalent Control Group Design, in which one group of subjects is given a certain treatment (experiment), while another group is used as a control class group. The data from the results of this study are quantitative, consisting of the pretest and posttest scores carried out at the beginning and end of the learning process carried out. Based on the research results, there is an effect of providing online discussions on student learning outcomes on Impulse and Momentum material. This is indicated by the N-gain average value of learning outcomes in the experimental class of 0.67, while the average N-gain of learning outcomes in the control class is 0.43. The difference in the average learning outcomes in the experimental class and the control class can be seen from the learning process in each class. In the experimental class, the teacher provides Impulse and Momentum material learning by using an online assignment system outside face-to-face hours at school. Discussions conducted by students before face-to-face learning will make students have a better picture of what material will be studied at the next meeting. This makes students more ready to receive learning material and can understand concepts faster. This is because students have discussed with their friends the problems related to the material during online discussions. On the other hand, not all students in the control class learn the material that the teacher will deliver at the next meeting, so students do not have sufficient initial knowledge. Students who are given online discussion assignments after learning also benefit, they will be reminded again about the material that has been taught in class so that the concepts that have been obtained are increasingly embedded in students.

Keywords: Online Discussion, Learning Outcomes, Impulse and Momentum, WhatsApp.

INTRODUCTION

In this increasingly modern era, we are required to improve our capabilities in following the increasingly developing era of globalization, this also requires all countries to continue competing to prepare human resources who are able to compete with the times. Maximum preparation is needed from an early age so that each country will be able to produce human resources capable of facing the challenges of the times. One of the most important and most needed ways to improve human resources who are able to compete in the era of globalization is to improve the quality of education using all existing educational technologies. Utilization of educational technology is believed to be the most effective way to overcome the problems of today's development (Pradwiradilaga and Siregar, 2007: 155). The activeness of students will lead to a two-way interaction between the teaching staff and students, which will make students creative in collecting reading material from various sources, both from books, newspapers, magazines, journals and from other media such as the internet. With the 2013 Curriculum, we will indirectly generate superior seeds by requiring students to apply technological sophistication in the learning process (Sugiyanta, 2008).

At this time physics learning in high school cannot be said to be fully successful, this can be seen from there are still quite a lot of students who have not been able to understand and still find it difficult when learning physics subjects in high school. This can be seen from the results of preliminary research conducted by the author on November 24, 2017 at SMA Negeri 15 Bandar Lampung in class X who are taking the first semester, of 34 samples, 20.59% of students said that class X physics material is very difficult, 50 % of students said that physics material was difficult, and 29.41% of students thought that physics material was in a moderate level. Less than optimal physics learning, of course, must find a solution to overcome this problem. The development of science and technology should be used to solve problems in learning physics. The use of technology that can be used for learning is the use of social media or websites. Such as research conducted by Djamil (2017) which uses web-based learning to improve physics learning outcomes.

Currently, the students at SMA Negeri 15 Bandar Lampung are very supportive of using social media for learning physics. Based on the results of preliminary research, out of 34 students, 97.05% have internet access that can be accessed via smartphones, tablets and laptops. The internet connection that is owned by the students is also quite fast, where 64.70% of students have a fairly fast internet connection. This internet connection speed can support learning that is carried out online outside of face-to-face hours. Based on this preliminary research, it is also known that 55.88% of students prefer to study online if they will be given additional study hours and 88.23% of the sample think that their understanding of physics material will increase if they are given additional hours outside of school hours.

Judging from the intensity of students accessing the internet where 61.7% often access the internet every day and 88.23% of students at SMA Negeri 15 Bandar Lampung have used social media to help study physics, find material, and help solve physics problems, the writer wants conducting experiments with students on the effect of online discussion to see the effect of online discussions on student learning outcomes. With the support of research that has been previously carried out by Nu'man (2014), it is concluded that the effectiveness of using edmodo-based E-learning media is higher than using conventional learning media.

It is hoped that by using the Whatsapp application that is supported by an internet network, we can conduct online discussions as a way to attract students to learn and be more interested in certain materials that can be done in discussions using the Whatsapp application. The discussion through the Whatsapp application is expected to attract students to take part in learning, so that they can study seriously, so as to improve students' understanding of concepts.

METHOD

This type of research is a quasi-experimental research. This research was conducted in two classes, namely one experimental class and one control class. The experimental class is a class that is given special treatment, namely physics learning using online discussions assisted by mobile instant messaging with Whatsapp, while the control class is given treatment using conventional learning. This study involved one independent variable (X) and one dependent variable (Y). The independent variable in this study is the holding of online discussions, while the dependent variable is the student's physics learning outcomes. This research is a quasi-experimental study using the non-equivalent control group design. This research uses the control class and the experimental class. In this research design, there are pretest and posttest before and after learning.

Table 1. Experimental Design The Nonequivalent Control Group Design

Class	Pretest	Treatment	Posttest
Experiment	O_1	X_1	O_2
Control	O_3	X_2	O_4

In this design, there are two groups, each of which was selected by purposive sampling. The first group given treatment (X_1) and the other group given treatment (X_2) is called the control group. The influence of the treatment (treatment) is represented (O_2 : O_4). The population in this study were all XI classes of SMA Negeri 15 Bandar Lampung who were taking the even semester in the 2017/2018 school year. The research sample was taken at SMA Negeri 15 Bandar Lampung using purposive sampling technique. This research was conducted deliberately based on the background of students who have the same abilities, which is seen from the average value of the same material before, at the same time, and with the same teacher who is considered homogeneous or relatively homogeneous.

The research process was carried out for 4 meetings with details of 1 meeting for the initial test, 2 face-to-face meetings, and 1 meeting for the final test with an allocation of 3 hours of lessons consisting of 45 minutes per lesson hour. Learning in the experimental class was carried out by implementing the blended learning method with online discussions assisted by mobile instant messaging with Whatsapp, while the control class was given treatment using conventional learning. In the first online discussion activity, students are asked to observe phenomena, ask questions and make hypotheses. Face-to-face activities of students designing and conducting experiments, analyzing data, and presenting the results in groups. The second online activity, students are asked to complete online assignments related to the material that has been studied. The research instruments used in this study were instructional videos, discussion guides or Student Worksheets (LKPD), and test sheets to determine student learning outcomes. This test is used during the pretest and posttest in the form of 10 multiple choice questions, each of which is contained in each assessment indicator. Before the research was carried out, the research instruments in the form of pretest and posttest questions were tested first to determine the validity and reliability of the questions. The results of the validity and reliability tests are presented in Table 2 and Table 3.

Table 2. Results of the Validity Test of Cognitive Learning Outcomes.

Question Number	r _{count}	r _{table}	Information
1	0,015	0,2785	Invalid
2	0,396	0,2785	Valid
3	-0,140	0,2785	Invalid
4	0,201	0,2785	Invalid
5	0,798	0,2785	Valid
6	0,674	0,2785	Valid
7	0,755	0,2785	Valid
8	0,140	0,2785	Invalid
9	0,377	0,2785	Valid
10	0,714	0,2785	Valid
11	0,636	0,2785	Valid
12	0,112	0,2785	Invalid
13	0,777	0,2785	Valid
14	0,670	0,2785	Valid
15	1,000	0,2785	Valid

Based on the results of the validity test using SPSS 21 with the number of respondents namely 35 students and a value of $\alpha = 0.05$, the question is said to be valid if the value $r_{count} > r_{table}$. From the results of the question validity test, there were five invalid questions, namely question number 1 ($\alpha = 0.015$), 3 ($\alpha = -0.140$), 4 ($\alpha = 0.201$), 8 ($\alpha = 0.140$), and 12 ($\alpha = 0.112$). It was concluded that there were 10 valid questions, all of which could measure the achievement of the indicators.

Table 3. Results of the Validity Test of Cognitive Learning Outcomes.

<i>Cronbach's Alpha</i>	<i>NofItems</i>
0,900	10

Based on Table 3, it can be seen that the Cronbach's Alpha value is 0.900. The Cronbach's Alpha value is between 0.81 to 1 which means it is very reliable, so it can be concluded that the instrument of learning outcome test questions in the study is reliable.

The next stage is to analyze the data. The data obtained were then analyzed by performing a normality test used to test whether the study sample was a type of normal distribution, with the criteria if the significance value was > 0.05 , then the value was normally distributed. Furthermore, the homogeneity test is to determine the homogeneity of the behavior given to the sample, with the criteria if the significance value is > 0.05 , then the sample is homogeneous. The last stage, namely the Independent sample t-test, is used to determine whether or not there is a difference in the average between two unrelated sample groups.

RESULTS AND DISCUSSION

The data obtained from this study is quantitative data consisting of student cognitive assessments. Cognitive assessment is obtained based on the results of the students' pretest and posttest which were held at the beginning and end of the study. The average data of students' pretest, posttest, and N-Gain results can be seen in Table 4.

Table 4. Average data of pretest, posttest and N-Gain results

No	Class	Pretest	Posttest	N-Gain
1	Control	47,94	71,17	0,43
2	Experiment	49,43	85,14	0,67

Based on the data in Table 4, it can be seen that the N-Gain value in the control class is 0.43 and the experimental class is 0.67. This shows that the experimental class has a higher learning outcome than the control class. The normality test is carried out to determine whether a group of data used has a normal or abnormal distribution. The normality test used the Kolmogrov-Smirnov statistical test. The results of the normality test of cognitive learning outcomes can be seen in Table 5.

Table 5. Data Normality Test of Cognitive Learning Outcomes

No	Class	Sig	Normal Distribution	Not Distributed Normally
1	Experiment	0,077	√	
2	Control	0,348	√	

Based on Table 5, it can be seen that the average value of student learning outcomes is normally distributed with the Asymp value. Sig. (2-tailed) above 0.05, namely 0.077 for the experimental class and 0.348 for the control class. This result is one of the fulfilled conditions for conducting a 2-free sample test using the Independent Sample T-test. Furthermore, the homogeneity test was carried out to determine whether the data variants were the same or not. This test is performed as a prerequisite for the analysis of the Independent Sample T-test. The results of the homogeneity test are shown in Table 6.

Table 6. Data Homogeneity Test of Cognitive Learning Outcomes

Levene Statistic	df1	df2	Sig.
2,470	1	67	0,121

Based on Table 6, it can be seen that the Sig. 0.121 because the significance value is more than 0.05, it can be concluded that the two data groups have the same variants. After testing the normality and homogeneity of the \bar{N} -gain scores from the control class and the experimental class, two free samples were tested using the Independent Sample T-test to determine whether the research hypothesis was accepted or not with the results in Table 7.

Table 7. Independent Sample T-Test Test Results

	Gain
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		<i>Equal Variances Assumed</i>	<i>Equal Variances Not Assumed</i>
<i>t-test for equality of Means</i>	T	-4,615	-4,635
	df	67	62,628
	<i>Sig (2-tailed)</i>	0,000	0,000

Based on Table 7, it can be seen that the significance value ($0.000 < 0.05$), it can be concluded that H_0 is rejected and H_1 is accepted. Based on the results of these tests, it can be concluded that "there is an increase in student learning outcomes before and after being given learning treatment using the online discussion method". So, learning using the online discussion method has an effect on student learning outcomes.

DISCUSSION

Based on the results of hypothesis testing using the Independent Sample T-test, it can be seen that the average learning outcomes of the experimental class using online discussion are higher than the control class using textbooks commonly used in class, meaning that there is an effect of online discussion on the results. student learning on Impulse and Momentum material at SMA Negeri 15 Bandar Lampung. The average N-gain of student learning outcomes in the experimental class is 0.67 in the high category. In the control class, the average N-gain of student learning outcomes is 0.43 in the moderate category. The difference in the average learning outcomes in the experimental class and the control class can be seen from the learning process in each class. In the experimental class, the teacher provides Impulse and Momentum material learning by using an online assignment system outside face-to-face hours at school. Discussions conducted by students before face-to-face learning make students have a better picture of what material is studied at the next meeting. This makes students more ready to receive learning material and can understand concepts faster. This is because students have discussed with their friends the problems related to the material during online discussions. On the other hand, not all students in the control class learn the material that the teacher will deliver at the next meeting, so students do not have sufficient initial knowledge. Students who are given online discussion assignments after learning also benefit, they are reminded again about the material that has been taught in class so that the concepts that have been obtained are increasingly embedded in students.

Djamil (2017) says that if physics learning is done on a website and carried out with correct instructions, it can be an effective medium to improve students' abilities in understanding physics concepts and website-based learning media allows teachers to create student-centered, collaborative learning, as well as contextual learning so that students will be able to get better learning outcomes. Web-based physics learning which is also applied with joint activities in computer laboratories or outside the classroom online allows students to freely interact, exchange ideas, and solve problems together so that they can get the best learning results. In line with research conducted by Susilowati & Wicakasana (2019) by utilizing e-learning media using Schoology as a learning supplement, especially in the Static Fluid material developed effectively used for supplements in learning seen from the results of the effectiveness test, namely 80% of students have reached the KKM. It is also supported by research that has been carried out by Bimantoro (2018) that online discussions have an effect on improving the socio-cognitive abilities of 2015 Education Technology students, State University of Malang.

Research conducted by Aunillah, Suana, & District (2018) states that learning using LMS-based blended learning with a scientific approach can improve learning outcomes in the cognitive

domain. Giving online discussion assignments to students can provide opportunities for students to be actively involved in learning and students can freely express their opinions. Involvement and activeness in learning make it easier for students to understand the learning material so that it will further improve student learning outcomes.

In Ramadhani's (2012) research on the Effectiveness of the Use of Web-Based E-Learning Media in Information and Communication Technology Lessons on Class X Student Learning Outcomes in SMA Negeri 1 Kalasan conventional. Research conducted by Amalia (2016) shows that: 1) The application that has the highest System functionality value is WhatsApp. 2) The application that has the highest System interactivity value is WhatsApp. 3) The application that has the highest Usability value is WhatsApp.

Another opinion was put forward by Larasati (2013) in his research on the Effectiveness of the Use of the WhatsApp Application as a Learning Discussion Tool for Students who stated that the use of the WhatsApp application as a means of learning discussion was included in the effective category, but could still be improved to be very effective if an evaluation was carried out back to the user himself as the one who exploits. With several things that must be considered, among others: 1) Users should participate in enlivening group chat on WhatsApp during discussions take place. 2) Users participate more actively when in discussions on WhatsApp group chat. 3) The user participates actively in the discussion of the learning material provided. 4) Discussion participants try to get satisfaction by participating in discussions and exchanging information. If you are not satisfied with the results of the discussion or responses to questions and statements, the user must continue to ask and provide new responses to the statements or answers obtained until the expected satisfaction is fulfilled. In addition, according to Kamila, Suana, & Maharta (2019), in the application of blended learning, image selection, selection of activities, and question exercises are further improved to make it more attractive to motivate students in learning.

CONCLUSION

The conclusion of this study is that there is an effect of online discussion on student learning outcomes on impulse and momentum material. The difference in the average learning outcomes in the experimental class and the control class is obtained from the learning process in each class. The average N-gain value of the experimental class learning outcomes was 0.67, while the N-gain average learning outcomes in the control class was 0.43.

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