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USING BLENDED LEARNING WITH THE HELP OF GOOGLE CLASSROOM AND WHATSAPP IN LEARNING OF SOLID SUBSTANCE PHYSICS

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Abstract
This study aims to determine the effect of blended learning assisted by Google Classroom and WhatsApp on students' cognitive abilities in solid substance physics lectures. This research is a quantitative pre-experimental research with a one-group pretest-posttest design. The research sample was 30 students who were taken with the probability sampling technique. Data collection was done using tests and non-tests. The data analysis technique used was descriptive statistics. The analysis showed that students' cognitive abilities reached good criteria, with an average pretest score of 40.13. In contrast, students' cognitive skills on the posttest amounted to 71.17, with an average n-gain of 0.52. The results of student responses to the implementation of blended learning assisted by Google Classroom and WhatsApp, most students gave a positive response; this can be seen from the acquisition of an average percentage value of 73.30%.

Keywords: Blended learning; Google Classroom, Whatsapp.

INTRODUCTION

The COVID-19 (Coronavirus Disease-2019) outbreak has impacted the education sector and changed the learning process (Nurkholis, 2020; Martorejo, 2020). The learning process is done face-to-face but online (Setiaji & Dinata, 2020). One of the subjects affected is solid matter physics. The ongoing face-to-face learning process must be continued with online independent learning, but online independent learning can also be combined with face-to-face learning.

The combination of face-to-face and online learning is known as blended learning (Olelewe, 2014; Nurhayati et al., 2018; Dziuban et al., 2018). With blended learning, students can carry out other learning activities besides face-to-face, namely in the form of online homework, online questions, and discussions (Li & Tang, 2012; Inggriyani, 2019).

Blended learning using a learning management system (LMS) in the form of e-learning, Google Classroom, WhatsApp, zoom meetings, Schoology, Edmodo, and other information media can help lecturers and students carry out a compelling and exciting learning process (Pakpahan & Fitriani, 2020). In blended learning, there are

five components of communication, namely lecturers, students, learning materials, learning objectives, and learning media, for example, Google Classroom and smartphones via WhatsApp (Sholihatin et al., 2019).

Based on the results of research (Melton et al., 2009), blended learning is preferred over traditional classes; with blended learning, students can better master the concepts of learning physics well (Husni et al., 2010), understanding concepts after attending Web-assisted learning is increasing (Abdullah, 2018), blended learning can improve student performance and has a high impact compared to face-to-face learning (Bawaneh, 2011).

Furthermore, from the results of research (Kartikawati & Pratama, 2017), the use of WhatsApp is effectively applied in the learning process and can improve students' critical thinking skills; the use of the WhatsApp application has an effect and increases student learning motivation in physics subjects (Indriani et al., 2018).

Solid-state physics learning at the tertiary level is essential in developing conceptual understanding, mathematical reasoning processes, and technical skills. In solid matter physics, methods for solving a problem and the ability to learn independently of each student are also trained (Novia et al., 2013; Hamid, 2018).

Concept understanding is the result of the construction or reconstruction of an object and is explained in the form of oral, written, and mathematical symbols (Mahaputri & Dantes, 2013). Each student has a way of analyzing, evaluating, and synthesizing a problem, so concept understanding has different levels (Purbaningrum, 2017). The success of a lecturer or educator in providing understanding for learning can be seen from the test scores of student learning outcomes (Prastiyo & Purnawan, 2018).

The cognitive domain includes understanding the concept, which can help remember certain information or concepts (Juhanda & Sari, 2014). Students will only be able to apply a concept if they know the meaning of its contents in advance (Gunawan & Palupi, 2016). Concept understanding can be translated into interpreting, giving examples, classifying, drawing conclusions, comparing, and explaining (Lusiana et al., 2018).

Based on the results of surveys and interviews with several students, information was obtained that there are still many students who need help understanding the concepts of solid-state physics and other information that blended learning has never been used in solid-state physics learning. Therefore, a study is needed using a blended learning design assisted by Google Classroom and WhatsApp to accommodate students' difficulties in understanding the concept of solid-state physics during the COVID-19 pandemic.

METHOD

The method used in this study is a quantitative method with a pre-experimental type. Based on the type of research, a one-group pretest-posttest design was used. As shown in Table 1.

Table 1. Research Design Pattern

Group	Pre-test	Treatment	Post-test
Experiment	O1	X	O2

The population in this study were students who took solid matter physics courses in the sixth semester of the 2020/2021 academic year, which consisted of three classes with a total of 65 students. The research sample was 30 students using the probability sampling technique.

The data collection instruments used in this study were tests and non-tests (questionnaires). Pre-test and Post-test were used to reveal students' cognitive abilities before and after being given treatment using blended learning assisted by Google Classroom and WhatsApp. The non-test instrument uses a Likert scale with five scales: strongly agree, agree, have no opinion, disagree, or strongly disagree (Sugiono, 2016). Questionnaires were used to collect data on student attitudes, interests, and understandings of synchronous, asynchronous, and blended learning in solid-state physics learning. The data analysis technique used is descriptive statistics.

RESULTS AND DISCUSSION

The results of the cognitive ability test of the experimental class students were described after the pre-test, and post-test data from 30 students were collected. The processing results can be seen in Table 2.

Table 2. Student Cognitive Ability Data

Score	Pre-test	Post-test	N-Gain
Minimum	17	50	0,33
Maximum	61	87	0,68
Average	40,13	71,17	0,52
Std. Deviasi	11,15	7,72	0,08

Based on Table 2, the initial cognitive abilities of the experimental class students are still low. Based on the achievement, the average pretestpretest score obtained is still below the ideal score; the average pretestpretest score is 0.40 from the ideal score.

Several things cause students' low initial cognitive abilities, including the learning approach that does not emphasize student involvement in learning, so that students are not called to study solid matter physics in depth to achieve maximum learning outcomes. Then, learning that has yet to accommodate individual differences,

especially with many students in one class, limited student attention, and theoretical content that requires deep understanding.

The posttest results show that the student's cognitive abilities have increased from their initial abilities after being given learning treatment using a blended learning model assisted by Google Classroom and WhatsApp, with an average posttest score of 0.71 from the ideal score.

From the test results data, the average difference between the pretest and posttest is 31.04; this shows that learning solids physics with blended learning models assisted by Google Classroom and WhatsApp can affect students' cognitive abilities regarding knowledge and the application of knowledge to solve the problem. This influence is caused by the use of the blended learning model assisted by Google Classroom and WhatsApp when the learning process has positioned students as subjects and objects of learning and can accommodate individual differences (Sabara & Sabran, 2019) and involves students in two learning processes, namely independent asynchronous and direct synchronous (Sabara & Sabran, 2019) face to face) (Kurniawati, Santanapurba and Kusumawati, 2019).

Based on the results of the acquisition of the N-Gain value converted from the pretest and post-test scores for students' cognitive abilities, it can be grouped into categories based on interpretation, frequency, and percentage. The data grouping is based on the frequency with which the number of students who get a specific N-Gain score provides information on how many students fall into a specific category compared to the overall data. The following table for obtaining N-Gain for the experimental class based on the category.

Table 3. Categories of students' cognitive abilities based on N-gain

Percentage (%) N-Gain	Category	Experiment Class	
		F	(%)
$g < 0{,}3$	Low	0	0
$0{,}3 \leq g \leq 0{,}7$	Moderate	30	100
$0{,}7 > g$	High	0	0

Based on Table 3, the N-gain category of students' cognitive abilities in solid-state physics learning assisted by Google Classroom and WhatsApp is in the medium category. According to Bloom's taxonomy, students with moderate cognitive abilities only fulfil several stages of problem-solving, which include understanding the problem, planning problem-solving, and completing the problem-solving process, as well as meeting several indicator criteria for understanding concepts, namely understanding, application, and analysis (Gunawan & Palupi, 2016).

Questionnaire analysis of student responses to blended learning models assisted by Google Classroom and WhatsApp can be seen in Table 4 below.

Table 4. Student responses to learning the Blended Learning model

Indicator	Synchronous	Description	Asynchronous	Description	Blended Learning	Description
Attitude	70%	Agree	56,7%	Agree	70,0%	Agree
Interest	66,7%	Agree	63,3%	Agree	76,7%	Agree
Understanding	63,3%	Agree	53,3%	Agree	73,3%	Agree
Total average	66,7%	Agree	57,8	Agree	73,3%	Agree

Student responses to blended learning models assisted by Google Classroom and WhatsApp were positive, with an average value of 73.3%, as seen in Table 4. The responses given by students to each indicator are as follows. For attitude indicators, 70.0% of students agree with blended learning model learning; for interest indicators, 76.7% are interested or agree with blended learning; and for understanding indicators, 73.3% of students understand or agree with blended learning.

The results of the student response questionnaire on implementing the blended learning model assisted by Google Classroom and WhatsApp can be seen visually in Figure 1 below.

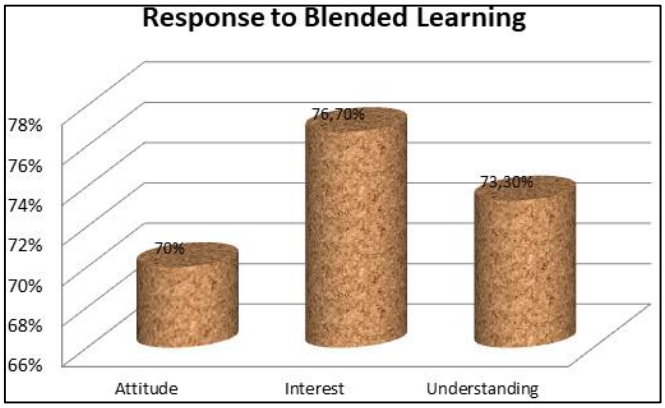

Figure 1. Student Response to Blended learning

Based on student responses to blended learning assisted by Google Classroom and WhatsApp, it can be obtained information that students are very interested in blended learning because the information obtained by students is more in various forms and is always up-to-date (Hadi, 2016; Dihamri, 2021; Saputra et al., 2021; Kurniasari, 2021). This statement follows the results of research conducted by Mahmudi et al. (2022), who found that the learning process using a blended learning model based on the Google Classroom application increased students' interest. This can be seen from student

learning activities during the learning process using a blended learning model based on the Google Classroom application.

In their research, Haka et al. (2020) stated that the Google Classroom-assisted blended learning model affected the creative thinking ability of students in the experimental class, indicated by the N-gain value in the medium category. There is an influence of the Google Classroom-assisted blended learning model on the learning independence of students, as indicated by the results of the N-gain data analysis in the medium category, so this model can be recommended to be applied in learning.

CONCLUSION

Based on the research and discussion results, implementing blended learning with the help of Google Classroom and WhatsApp can improve students' cognitive abilities in the solid-state physics course material. This is evident from the results of the cognitive ability test, which has an average n-gain of 0.68 and is in the medium category. Student responses to implementing blended learning assisted by Google Classroom and WhatsApp in the teaching and learning process were positive; this can be seen from the average value of student questionnaires of 73.30%.

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