

## IMPLEMENTATION OF BLENDED LEARNING ON PHYSICS SUBJECTS TOWARDS IMPROVING STUDENT LEARNING OUTCOMES

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### ABSTRAK

Permasalahan yang ditemui di pembelajaran fisika kelas XI adalah rendahnya hasil belajar siswa terutama pada materi optika. Tujuan penelitian ini adalah untuk mengetahui apakah pembelajaran yang dilakukan secara *Blended Learning* mampu meningkatkan hasil belajar dari siswa terutama pada materi optika di kelas XI MAN 1 Siak. Penelitian ini merupakan Penelitian Tindakan Kelas (PTK), sampelnya siswa kelas XI.2 yang berjumlah 20 orang. Data penelitian berupa hasil belajar siswa diambil dengan teknik tes dan observasi, hasil tes diperoleh nilai rata-rata 56,80 menjadi 85,60 dengan SD= 11,35 dan 95% siswa memperoleh nilai di atas KKM. Tren kenaikan aktivitas siswa terlihat dari di siklus I ke siklus II. Simpulan penelitian ini yaitu pembelajaran *Blended Learning* dapat meningkatkan hasil belajar siswa pada bahasan optika.

**Kata kunci:** *Blended Learning*; Hasil Belajar.

### ABSTRACT

*The problems are encountered in learning physics class XI is the low result study, especially on optics. Interest research is to know what is learning that is done in Blended Learning can improve the outcomes of learning of students, especially in optics at XI class MAN 1 Siak. This is a research action class, sample students class XI.2 which totaled 20 people. The result of learning, the students were taken to the engineering test and observation, the result of test obtained by the value of the mean average 56.80 into 85.60 with SD= 11.35 and 95% of students get the cycle I to cycle II. Conclusion of research is that learning by the blended learning can improve the result of learning of students in the discussion of optics.*

**Keywords:** *Blended learning, result study*

، الطلاب تعلم نتائج انخفاض هي عشر الحادي للصف الفيزياء تعلم تواجه التي المشكلة : الملخص إجراؤه تم الذي التعلم كان إذا ما تحديد هو الدراسة هذه من الغرض كان. البصرية المواد في خاصة الفصل في البصرية المواد على خاصة ، للطلاب التعلم نتائج تحسين على قادرًا المدمج التعلم باستخدام ، الدراسي الفصل في إجرائي بحث عن عبارة البحث هذا . بالسياك حكومية عالية مدرسة عشر الحادي شكل في البحث بيانات أخذ تم. شخصًا ثلاثون وتضم ثمانية فرقة عشر الحادي الصف طلاب من والعينة متوسط على الاختبار نتائج وحصلت ، والملاحظة الاختبار تقنيات باستخدام الطلاب تعلم نتائج من أعلى درجات سجلوا الطلاب من 95% و SD 11.35 مع 85.60 إلى من 56.80 درجات الدراسة هذه استنتاج. الثانية الحلقة إلى الأولى الدورة من الطلاب نشاط زيادة اتجاه رؤية يمكن. KKM. البصريات مناقشة في الطلاب تعلم نتائج يحسن أن يمكن المدمج التعلم أن هو

التعلم نتائج المختلط التعلم ؛ التعلم أنشطة :المفتاحية الكلمات

## A. PRELIMINARY

Physics is one of the subjects taught at the upper secondary level. The learning process emphasizes direct experience, this aims to develop process skills so that they are expected to understand the surrounding environment, and master science and technology in accordance with the needs of environmental development. In the era of industry 4.0 as it is today, it can be said that it can hardly be separated from IT devices, for example, devices that can be in the form of mobile phones, smartphones, laptops, computers, tablets and others. All of which will have a good and bad impact on us, including students. It's no secret that today's children enjoy playing with their gadgets more rather than paper-based learning activities and physical activities.

Physics learning will be able to take place in accordance with expectations if the learning process is carried out by students in a fun atmosphere . As stated by Fathurrohman & Sulistyorini, (2012) in their book that a teaching activity is essentially an art of managing and regulating an environment with the hope of creating a good atmosphere and the formation of a pleasant learning process. To design learning that is fun for students, one of them can be done using devices that make them feel comfortable, such as computers or smartphones.

To create fun learning, educators need to design learning according to the characteristics of students as learners. In an online article written by Awak, (2016) trying to describe the meaning of a teacher entering the world of children/students. The principle of the teacher entering the student's world is able to bring a learning process to life, fun and meaningful. This means that teachers must be able to adapt to the colors and attitudes of students to the desired world based on learning objectives.

The learning process is an active process carried out by students, so students are required to actively participate in the learning in question. However, the conditions encountered in the field for MAN 1 Siak students are still far from what was expected.

Based on the observations of the researcher as a Physics teacher, it was revealed that the low activity of students when participating in learning was seen from students who had to be asked by the teacher first to open textbooks or notebooks without any awareness of their own, very few students asked and answered questions, this was due to low interest read students so that students do not know what they want to ask and cannot answer because they do not master the subject matter.

Another problem encountered in the field is the low student learning outcomes. This can be found when the researcher looks at the list of scores, most of which are below the Minimum Completeness Criteria (KKM), which is 68.

The researcher as a teacher has tried to motivate students to be active in the physics learning process by providing opportunities for students to ask and answer questions.

To solve this problem, one way that can be done is to apply *blended learning*. *Blended learning* is a collaborative learning model between humans and technology. So, the purpose of this research is to know what is Blended Learning can improve the outcomes of learning of students, especially in optics at XI class MAN 1 Siak?

## B. THEORY STUDY / LITERATURE REVIEW

Research on the application of *blended learning* has been previously researched by Daulay et al., (2016). The results of the research show that the use of the Edmodo-based *blended learning* model which is an *online* learning resource encourages students to learn more actively, and increases the attractiveness of learning on students' learning motivation and has a good impact on learning retention and improving student learning outcomes for the better.

Other research, such as that conducted by Budiharti et al., (2015) explained that qualitative research data and supported by quantitative data through test techniques, document studies and interviews have succeeded in showing the research that has been done, namely blended learning in

integrated physics learning with the theme Environmental Preservation, it is clear that there is an increase in cognitive ability in students' mastery, namely 50.7% in the first cycle and increasing to 78.76% in the second cycle.

Lestari et al., (2016) conducted research in the form of developing learning tools. The learning tools developed are syllabus, lesson plans, teaching materials. Small-scale trials of class XI physics 1 and large-scale class XI physics 2 were conducted on students of class XI physics at SMA N 1 Larangan. The results of this study indicate that the human nervous system *blended learning* device developed has valid criteria with an average of 0.70 an increase in student's critical thinking skills with the high category of N-Gain 0.70. Classical completeness of learning outcomes is 85% and critical thinking skills are 90%. In conclusion, learning tools can facilitate students to think critically because *blended learning* makes students think holistically and raises critical questions and answers.

Other research, such as that conducted by Airlanda, (2016) succeeded in developing the HSPS-based biology learning module in *blended learning* to improve the science process skills of the XI Physics students of SMA Kristen Perta Pematang.

Cahyadi & Probosari, (2012) have succeeded in improving the critical thinking skills of students in class XI physics 4 sons of SMA RSBI Islamic modern Islamic boarding school As-Salaam Sukoharjo through the application of *blended learning* in biology learning.

In connection with the conditions that the authors have described above, and referring to the results of previous studies, the authors want to improve student learning outcomes by applying *blended learning* in learning through media that has never been done, namely by practicum and virtual learning using Google Classroom. Various activities can activate the intelligence possessed by students. Therefore, to meet the wishes of students in the learning process, teachers need to design learning with varied activities. Learning is not what the teacher wants but rather what the students want. As Campbell (2004:4) says if students have

the opportunity to learn through their strengths, positive and amazing cognitive, emotional, social and even physical changes will appear .

### C. RESEARCH METHODOLOGY

This research is classroom action research which is referred to (Juita, 2019) and combines using the *Blended Learning* model (Rachman et al., 2019). The media used is a virtual classroom, namely Google Classroom. Google Classroom is a virtual classroom developed by the world giant Google. The main basis of this classroom action research is to improve student learning outcomes (Suharsimi Arikunto, 1983). In a class action, there are two research activities carried out simultaneously which is the activity of the action (*action*) and research activities (*research*) (Curtis J. Bonk, 2006).

There are two cycles carried out in this study and each cycle uses four stages of implementation. The stages in question are (1) planning, (2) implementation, (3) observation, (4) reflection (Arikunto 2007:16). The research subjects were students of class XI MIA.1 totaling 20 people at MAN 1 Siak, Indonesia. The research instrument are syllabus and assessment, Learning Implementation Plan (RPP), Student Activity Sheets (LKPD), and quiz sheets. The data retrieval instrument used consists of student Observation Sheet, teacher observation sheet, and Learning Results test (Hamdi, 2014).

This research data collection was carried out in the 2019-2020 school year starting from January-February 2020. The technique for analyzing student activity data was using the equation given by Sudijono, (1998) namely the percentage ratio of the frequency of student learning activities to the number of students. The interpretation of the student activity data analysis can be seen from Table 1.

**Table 1. Interpretation of Student Activities**

No	Activity Percentage	Information
1.	81% - 100%	Very well
2.	61% - 80%	Well
3.	41% - 60%	Enough
4.	21% - 40%	Not enough
5.	0% - 20%	not much

While learning outcomes are analyzed by looking at the criteria:

1. Individual learning completeness has been achieved if the test score is 68 (KKM = 68).
2. Classical learning completeness has been achieved as seen from the results of student tests, namely 85% of the total number of students have achieved a score of 68.

To see the completeness of student learning individually, that is by using the percentage ratio between the scores obtained by students and the maximum score. Student learning outcomes are classically analyzed based on student learning completeness by using the percentage of the ratio of the number of students who complete the total number of students.

This classroom action research is carried out in two cycles continuously with the aim of getting better results so that the predetermined indicators of success can be achieved (Manggabarani et al., 2016)

Cycle I was carried out with the following stages: The planning stage was carried out by making a learning implementation plan, providing learning media in the context of implementing CAR, making instruments used in the CAR cycle. Meanwhile, at the implementation stage, the action was carried out by applying the lesson plans using the *blended learning* method and using the format for observing student activities and giving written tests to all students.

The observation stage is carried out simultaneously with the implementation of the actions carried out by the researcher and assisted by one observer. Observers are tasked with helping observe and record

everything that happens during the learning process. The indicators that will be observed are as follows: Asking, Answering questions, Reading either books or gadgets, Working together in groups. The next stage is the reflection stage. At this stage, all data that provides information about the development of the learning process is collected which is then analyzed. From the results of the analysis, it was found that the weaknesses in the first cycle of actions had not yet been implemented in accordance with the established criteria. The criteria for the success of each cycle with the application of *blended learning* in learning can be stated by (a). The student activity achievement rate for each cycle is at least 70% or has a good predicate; (b). The achievement of student learning outcomes has reached a minimum of 68.00 with classical completeness is 80% complete.

One cycle is said to be successful in achieving learning outcomes if students have met the minimum completeness criteria of 68 individually, while classical student success is expected to have reached 80%.

#### **D.RESULTS AND DISCUSSION**

The application of *blended learning* in physics learning was carried out in four meetings. Two meetings in cycle one and two meetings in cycle two. In the first cycle, they study the laws of reflection and refraction, while in the second cycle, they learn about the use of optical instruments.

After finishing discussing one subject, the teacher conducts daily tests to see student learning outcomes. From these results, it can be seen that the average learning outcomes in each cycle increase. The learning outcomes can be seen in the following table.

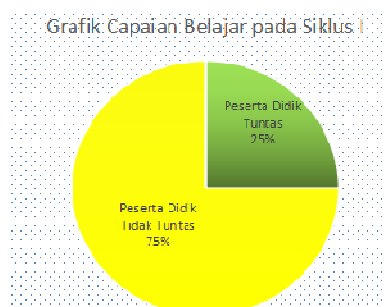
##### **Research result**

##### **Cycle I. Research Results**

After conducting research in the first cycle, statistical data were obtained as shown in Table 2.

**Table 2 Statistics of Cycle I. Quiz Assessment Results**

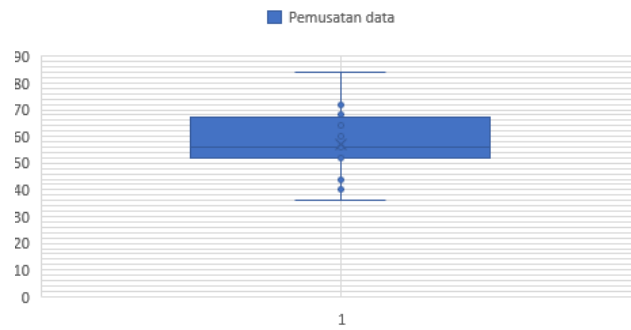
No	Element	Score
1	Number of Samples	20
2	Range ( R )	48
3	Minimum Score	36
4	Maximum Score	84
5	Standard Deviation	11.35
6	Mean (Average)	56,80
7	Completeness presentation	25%



**Figure 1. Graph of Learning Achievement Cycle I**

Based on the research results shown in Table 3 and Figure 1 above, in the first cycle, it can be seen that the average value of students is 56.80 with a large standard deviation of 11.35 and a very large range of 48. In addition , there are 5 students who completed. and those who did not complete were 15 students. The number of students who completed classically is 25%. even though classical completeness is at least 85% of the number of students who achieve completeness. From the description of the data obtained, it can be concluded that the learning process in the first cycle has not been successful because there are still many students who get scores far from the class average. To determine how many students are below the class average, it can be seen in Figure 2.

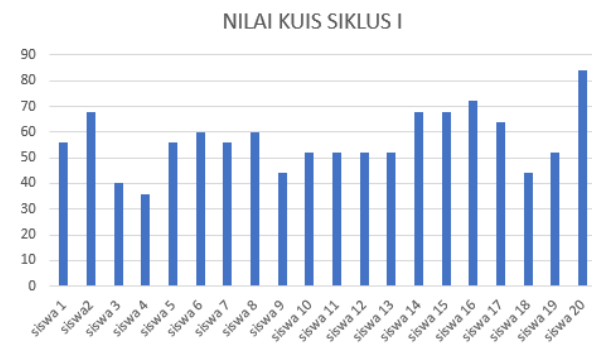




**Figure 2. Graph of data distribution in cycle I**

Based on Graph 1, it can be seen that there are still student score data that are far from the average data. This is very unfortunate, therefore it is necessary to improve the learning process at the next meeting.

To get an idea of how the actual data in the first cycle can be shown in Figure 3.



**Figure 3. Graph of Student Scores in Cycle I**

After completing one cycle, a reflection was carried out with the observer, based on observations and notes with the observer, it turned out that the number of students who had completed did not meet classical completeness, the activities of students in the learning process did not all look active, during the learning process, there were still students who were not serious in following the lesson. there are still students who do activities that are not in accordance with the teacher's directions, for example accessing other things on the internet, chatting and disturbing their friends during practicum activities. So based on these reflections the researchers made improvements as follows:

Group formation is carried out by the teacher (Suharsimi Arikunto, 1983), because in the first cycle the researcher frees students to choose their own group. Meanwhile, in the second cycle, the teacher improved the way of group formation, namely students who had abilities above the average in class XI MIA.1 were distributed to all existing groups. It is hoped that the distribution that the researchers did can improve the learning process carried out by students. So that there are no more students who chat undirected, play alone or don't focus on following lessons or doing practicums that they have to do. After virtual learning activities, at the first meeting and continued with practicum at the second meeting, the teacher conducted a test to determine the achievement of learning outcomes that had been carried out together (Hima, 2017).

### Cycle II. research results



Figure 4. Graph of Student Scores in Cycle II

Figure 4 shows the fact that in the second cycle the student scores were much better than Figure 3, which is the score obtained in the first cycle. The statistical data in the first cycle can be shown in Table 3.

Table 3. Statistics of Student Assessment Results in Cycle II

No	Element	Score
1	Number of Samples	20
2	Range ( R )	36
3	Minimum Score	64
4	Maximum Score	100
5	Standard Deviation	10.07
6	Mean (Average)	85.6
7	Completeness presentation	90%

From Table 3 above, it can be stated that the increase in the number of students who completed from 25% to 95% was possible because of the improvement in the results of reflection with the observer. The data shows that the average student score is above the KKM, which is 68. A complete picture of the state of the data in cycle I and cycle II can be seen in Figure 5.

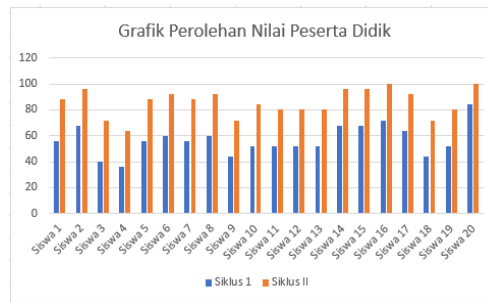


Figure 5. Graph of Score in Cycles I and II

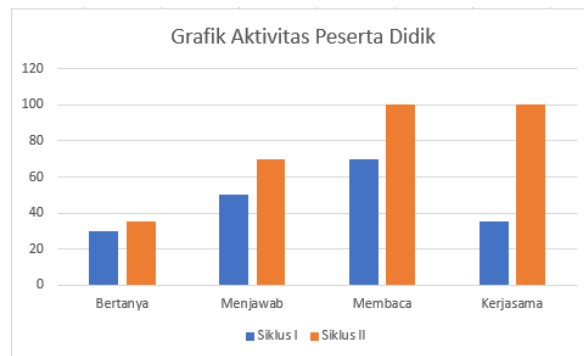
In the second cycle 19 students completed classically, meaning that the improvement of the learning process had a significant impact, while 1 student who did not complete was given further guidance regarding material that was not understood. In everyday life, these students always get the attention of some teachers at school because they have abilities below the average of their classmates. And the average value in the second cycle increased to 85.60.

Based on the description above, it can be concluded that the *Blended Learning* method can significantly improve student learning outcomes. This illustrates that for class XI optical materials it is recommended to use this method. In addition to getting better results, the learning process is more meaningful and enjoyable for students.

After carrying out the learning process in the first cycle, data on student activities was obtained as shown in Table 3.

**Table 3. Student Activities in Cycles I and II**

No	Student Activities	Cycle I	Cycle II
1	Ask	30	35
2	Answer	50	70
3	Read	70	100
4	Cooperation	35	100
<b>Average score</b>		<b>46.25</b>	<b>76.25</b>
<b>Score Improvement</b>		<b>30</b>	



**Figure 6. Student Activity Graph**

## DISCUSSION

In this study, the conditions that occurred in cycle I and cycle II which can be recorded properly and documented from field notes are described as follows.

At the first meeting in the first cycle, the teacher started the lesson by inviting students to pray.

As usual the entrance bell rang but there were still students who were still relaxing outside the classroom. After their teacher was seen, then they scrambled to enter the class. This kind of habit has not completely disappeared from the sight of a teacher in this day and age. But for a teacher this is a challenge to make the world of education more meaningful and take place normally.

After the teacher greeted the students, the researcher checked attendance by using a homemade online android-based application that could be accessed by the principal, homeroom teacher, and other subject teachers or any picket teacher who was not present in the class. Then the

researcher conveyed what material would be done at the meeting that day, which was about optics. Next, the researcher conveys the learning objectives, and the learning steps that will be carried out on that day.

Thus, in general, the steps that the researcher did both in cycle I and cycle II. Based on the value acquisition data in the first cycle, the *blended learning* method has not been carried out optimally. We can note that the average score that students get is 56.80. Judging from classical completeness, the average class that must be obtained by the class should be at least 68.00 so that it can be said that the class has been completed in learning. In the table of scores in the first cycle, it can be seen that those who get scores below the minimum completeness criteria or what we usually call the KKM are 15 people out of 20 students who take part in the learning process. That means that 75% of the unfinished classes in the class. While those who get scores above the KKM as many as 5 people or 25% are still beyond expectations according to the minimum completeness criteria.

Due to the unsatisfactory results obtained in the first cycle, it was continued to the second cycle by making minor changes that were deemed necessary. For example, at the time of the first cycle the group formation was left to students, meaning that students were free to choose friends as members of the same group. From the observations, it turns out that there are groupings of students who have above average abilities gathered in the same group. At the same time, in other groups, students with below-average abilities were gathered in one group. This is what is corrected, namely the division of group members into the responsibility of a teacher.

After the formulation of the group division was carried out, then in the second cycle it took place according to the prepared plan. Based on the data in the second cycle, it can be stated that the average student score is 85.60 with the number of students who exceed the minimum completeness criteria as many as 19 people and only 1 people whose scores are below the KKM. From these data, we can say that the

percentage of the number of students who complete is 95% and only 5% of students who do not complete.

Based on the data in Table 2 regarding the average learning outcomes of physics learning cycle I and Table 3 regarding the average learning outcomes of physics learning cycle II, it can be concluded that there was an increase in the average score of students from 56.80 to 85.60, this indicates that the *blended learning* method applied has a significant impact on student learning outcomes. While Figure 5 shows us that there has been an increase in the percentage of completeness possessed by class XI MIA.1 from Cycle I and Cycle II by 70% from 25% of students who completed to 95%. This significant percentage increase is what makes sure that the method applied is really effective.

Figure 5 also shows us that each student has a tendency to increase learning outcomes from Cycle I to Cycle II. Although there are still students who get scores below the KKM, the percentage is very small, namely 5%. This gives us information that the *blended learning* method can improve student learning outcomes and classically class XI MIA.1 can be said to be complete because the number of students who exceed the KKM is 19 people or 95%.

While the achievement of student activities in the first cycle, which researchers by teachers and observers during the learning process in class can be described as follows:

Based on Table 3 and Figure 6, it is explained that student activity has increased after the learning treatment with *bended learning is* carried out . Table 3 and Figure 6 above can be described as follows.

1. Asking activity increased in cycle II so that it reached a score of 35. Questions that often arise in the learning process are dominated by the process of connecting their devices with Google Classroom devices. It takes approximately 5 minutes to be able to connect between student devices and Google Classroom devices because they are not familiar with them. But after students got experience at the first and second meetings, at the third and fourth meetings

students were able to overcome the problems they faced so that at the third and fourth meetings the activity of asking questions had a downward *trend* . The increase in the score of asking questions in cycle II generally lies in the processing of learning magnets.

2. The student's answering activity also increased by 20 scores from 50 to 70. The explanation of the answering activities carried out by students was as follows: this increase occurred from the first meeting to the second meeting, the activity number from 20 became in the range of 60-80 which means this activity is in good predicate. The questions submitted by the researchers were answered by several students smoothly, meaning that the researchers did not wait for them to answer them but spontaneously the students answered directly from the questions posed.
3. Student activities can be explained, that in the second cycle has reached expectations. A score of 100 indicates that all students have done the activity in question.
4. Collaborative activities have a high number, because in cycle II an integration of virtual and practical methods is applied, so that all students occur the expected collaboration process. In this practicum session, students unconsciously have to work together with their group of friends to complete the given practical task. Overall, it can be seen that there is an increase in the average score of student activities by 30.

## E. CONCLUSION

Based on the results of research and discussion that there is an increase in learning outcomes obtained by students during learning that has been carried out with *Blended Learning*. This research can be favored because students look comfortable and happy in the learning process. So it is hoped that this *Blended Learning learning* can be applied by other colleagues, especially physics teachers in the optical material class XI MIA.1. This research can be continued with a more comprehensive design with aspects of cognitive, psychomotor and affective abilities.

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