



The Effectiveness of Using Learning Management System (LMS) in Blended Learning Model in The Learning System of 4.0 Era

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ABSTRACT

Technology is one of the suggestions in developing students' potential in finding learning resources outside the classroom. Therefore, Blended Learning combines the two things. In facing the era of the industrial revolution 4.0, a learning system is needed that can form creative, innovative, and competitive students. One of these things can be achieved by optimizing technology as an educational tool. This study aims to apply technological advances in education through the Blended Learning model using LMS and increase student activity in learning. This research method uses classroom action research (PTK) which consists of two cycles and each cycle includes planning, implementation, observation, and reflection. The instrument used is a test of learning outcomes and student activity observation sheets. The results of data analysis from student learning outcomes showed an increase in learning outcomes in each cycle. It is shown by the average value of N-gain in the first cycle of 54.86% while the second cycle is 70.22%. In the assessment of the results of observing student activities during learning in cycle I and cycle II, it showed an increase in an activity wherein cycle I students was very active 8% and in cycle II it became 48%. The results of this study can effectively improve learning outcomes and increase student learning activities.

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1. Introduction

In this century, a paradigm in learning is needed by making changes or reforms in learning to find new ways that are more effective in learning. This is where the demands of teacher's creativity role to find and implement innovative performance in improving the quality of education. This is a challenge that is arguably not only focused on what is taught, but also how education itself is based on the need to meet the needs that exist in the future. (Sene, 2021)

The world of education as a sub-system of community life needs to respond openly to various innovations that exist in the world of education, as well as those that occur in other areas of life as an effort to integrate them so that an educational condition can be achieved that is not left behind by changes that occur in society as a result of the accumulation of innovations. Referring to the problems that have been stated above, the study of innovation learning entering the 4.0 education era is a demand in the world of education which is a must to always pay attention to the changes that occur to face industry 4.0. (Sulianta, 2020)

In the era of rapid technological development, including targeting the world of education, it is difficult for teachers to compete with machines. Machines or robots that are present are much smarter, faster, and more effective in the search for information and knowledge. Therefore, teachers need to change the way of teaching from traditional to multi-stimulant learning. To make learning more fun and interesting. (Sitompul & Situmorang, 2021)



Learning innovation 4.0 emphasizes the mastery of learning methods by educators, their application in the classroom, and their development in learning. Learning innovation utilizes all existing potential, including mastery of technology and its application in learning. The competition in the industrial world in the 4.0 era has given birth to something that may be beyond reason. The era of the Industrial Revolution 4.0 is now an issue that is widely discussed, including in Indonesia. According to (Prasetyo & Trisyanti, 2018), in 2010 through intelligence engineering and the internet of things, globalization entered the era of the Industrial Revolution 4.0 and made it easier for people to do activities in a more effective and efficient time. The revolutionary paradigm that continues to develop periodically is initiated by advances in science and technology as a supporter of the renewal (Asra & Imran, 2021). The world of education in the development of the revolutionary era continues to be required to improve its system. Continued Liao, et al, there are three countries that are at the top in terms of planning the development of the Industrial Revolution. The three countries, namely America, France and Italy, are investing in research and innovation, employment, education, training, and infrastructure modernization. One of the investments that support the progress of human civilization is education. As stated by Shahroom & Hussin (2018), education in the future will experience significant changes. The learning process no longer needs to be done in the classroom. Learning is not only done in the classroom. This means that the classroom is no longer the only place for learning. This development must of course be an evaluation material for whether an educator can adapt to it, or use it in learning, and play a role as a connecting bridge for students in order to achieve learning 4.0.

The era of the industrial revolution 4.0. creates competition in all fields, especially in the field of education so that efforts are needed that can create innovation and creativity that are tailored to needs. Learning innovation can be carried out efficiently, effectively, and optimally if it is supported by learning management (Widyanto et al., 2018), because without learning management, learning cannot be carried out efficiently, effectively, and optimally (Rukayah & Ismanto, 2016). On the other hand, the results of advances in technology and informatics have opened up insight and opportunities for citizens of the world to take advantage of electronic products, including cellular phones and the like. For this reason, on this occasion, the author would like to invite teachers to design learning that supports the development of digital literacy in students through the Blended Learning learning method as an effort to improve the quality of learning, and in time it will be able to usher in the realization of the Learning Process in the Industrial Revolution Era 4.0.

A blended learning method is a form of refinement of the e-learning system, whereby using the blended learning method, learning can be carried out in two directions and is more effective than only teachers teaching or explaining or one-way. In the blended learning method, students are also introduced to various choices of learning media, between being a facilitator or just receiving learning materials. In addition, the blended learning method is also a combination of face-to-face learning and distance learning or online. (Harding et al., 2012)

Masitoh & Hidayah (2018), states that learning in blended learning settings is currently one of the alternative learning innovations for several universities. The phenomenon in the field, it was found that several universities launched a policy so that all majors/study programs within the university's environment should choose several relevant courses designed for blended learning for several face-to-face lectures in one semester. Of course, the realization of blended learning at the elementary and secondary education levels-, is supported by the availability of internet or intranet network hardware facilities as well as the ability and insight of teachers about blended learning. Haqien & Rahman (2020), states that learning plans that use the internet or cellphones as learning media packaged in blended learning with digital literacy insight are expected to be an alternative for teachers and lecturers to empower digital media as learning media.

Online learning can use the internet known as internet-based learning and a website-based bias known as web-based learning, both of which use online networks that are continuously connected from one user to another. Meanwhile, the combination of e-learning and offline face-to-face learning is called blended learning or hybrid learning (Michael E & Furlong, 2010).

The Learning Management System (LMS) was chosen because of the rapid development of technology in the field of education that can support student learning more broadly, making it easier for students to learn. Especially for students who are active in extracurricular activities that require students to practice and participate in competitions, making it difficult for them to participate in learning in class. The positive side is that the School from Home implementation by using the Learning Management System encourages parents to be active in children's learning and to observe and provide optimal development stimulation even though the mother is working (Harri et al., 2020). Learning Management System (LMS) is a term in the world of



technology that was developed specifically to manage and facilitate the entire online learning process. Learning activities through LMS can be developed through various features which include the registration process, payment, distribution of learning materials, the interaction process between teachers and students in virtual classes as well as online tests conducted using computers and android devices (Hidayat, 2014). Some of the functions of the LMS are the publication of learning materials, downloading of learning materials, assignments, and assessment. (Muhson, 2010)

This study aims to determine the effectiveness of the use of LMS (Learning Management System) in the Blended Learning model and to determine the students' activeness in the learning process. The LMS used in this research is Google Classroom, Quizizz, Google Forms, and Moodle which will be adjusted to the needs of the learning process. (Hendarita, 2020)

2. Methods

The research population is all high school students and the sample of this study will be taken from students of class X MIPA – 1 of SMA Nusantara Lubuk Pakam which is one of the schools that needs guidance in information technology-based learning. The sample used is 25 students. The subjects applied in this research are chemistry in Chemical Bonds.

This type of research is CAR (Classroom Action Research) which is a form of a reflective study by action actors, which is intended to deepen understanding of the actions taken during the learning process, and to correct obstacles that still occur in the learning process as well as to realize goals in the learning process.

The researcher's first step is to design a learning system through LMS with the help of the designed application. Where in the LMS there are learning materials, attendance, quizzes, assignments, and student exams. Everything is arranged in the LMS.

In the next learning stage, the teacher through the LMS uploads the lesson plans, syllabus, and learning materials that make it easy for students to access them. In the implementation stage, the teacher conducts attendance online, learning can be done by live streaming if the teacher is unable to attend class, assigning assignments, and collecting assignments can be done on the Google sites page. The supervision stage in the form of evaluating learning outcomes in the form of assignments and exams collected as well as the scores that have been given can be displayed on the Google workspace page, besides that teachers can also carry out online exams and the results can be known immediately after the exam is over. Briefly, the research steps are as shown in Figure 1



Figure 1. Research Scheme

Techniques in collecting research data are carried out using observation sheets and learning outcomes tests, namely:

- Observation, the observation format sheet is used to observe and determine the suitability of the actions taken by the teacher with the plans that have been prepared and student activities during the learning process.
- Tests, Students work on practice questions in the form of multiple-choice and descriptions that are done through Google forms

This data analysis technique describes the data obtained and analyzed to determine the final result. The researcher analyzed the data on student learning outcomes qualitatively and quantitatively. The steps of the data analysis technique are:

- Analysis of Data Obtained from Test Results

Before learning outcomes are scored, scoring is done first. Scoring is done so that the results of the assessment are objective. After the scoring is done, the next step is to give the test scores for learning outcomes.

In this case, if students score below 70, it means they are not complete in learning and vice versa, if students get scores above 70, it means they are complete in learning. The value interval criteria are as follows:

Table 1.
Interval Of Learning Outcomes

No	Mark	Category
1	90 -100	Very Good
2	80 – 89	Good
3	70 -79	Fair
4	≤ 70	Poor

b. Analysis of learning outcomes obtained from observations

The analysis carried out is a stage of observation or observation. At this stage, the observation activities are carried out by the observer. Observations were made during the learning process. During the learning process, the observer observes and records the developments and activities that occur.

3. Result and Discussion

This research was conducted four times or more than one month. The material taught is chemical bonds. From the observation data, it is known that currently, schools are in an online learning system and PTMT (limited face-to-face meetings). Where some students study online and some at school with limited time. This learning system is due to the Covid-19 pandemic that is still hitting Indonesia. Learning activities carried out like this can be called a Blended Learning model which is a combination of online and face-to-face learning.

Before students study, they are given an initial ability test (pre-test) and then a final ability test (Post-test). Then the test results are compared to whether there is an increase in learning outcomes or not

3.1 Interpretation of Learning Outcomes

a. Action Learning Cycle I

Learning outcomes data obtained from the pre-test and post-test scores given before learning and after learning takes place can be seen in table 1.

The results of the descriptive statistical analysis conducted through the pre-test and post-test scores taught through the use of LMS in the Blended Learning model can be seen in table 2.

Table 2
Descriptive Statistics on Learning Outcomes of Class X Mipa-1 With The Use of Lms in The Blended Learning Model Of 25 Students in The First Cycle

Descriptive Statistics				
	N	Min	Max	Mean
<i>pre-test</i>	25	20,00	50,00	33,54
<i>post-test</i>	25	55,00	75,00	70,20
% N Gain	25			54,86%

Based on table 1 shows that the ability of students of class X MIPA-1 during the pre-test on the Blended learning model is categorized as low, this is indicated by the average chemistry learning outcome of 33.54 from a completeness score of 70, this indicates that many students do not understand the material completely. In contrast to the results of the descriptive analysis which shows that the ability of students of class MIPA-1 after the application of using LMS in the Blended Learning model can improve chemistry learning outcomes in the high category with the acquisition of an average post-test score of 70.20 from a completeness score of 70. This is due to the increase in the student learning outcomes which are supported by activities and responses that students have and directed learning guidance through LMS that is adjusted to student needs. Just like during quizzes, students can be directly and actively involved using the Quizziz application. The assignments given by the teacher are collected directly by students using Google Classroom as well as material that can be accessed at any time. Students can also see their scores directly during exams through the Google Forms application so that it stimulates students to learn.

For learning outcomes in the first cycle obtained N gain (increase in learning outcomes) of 54.867%, this means that the learning used has not been effective in improving learning outcomes by the N-gain interpretation table. Thus the indicators of the success of this research have not been achieved. For this reason, there is an improvement in the deficiencies in the first cycle which will be carried out in the second cycle.

b. Action Learning Cycle II



Learning outcomes data obtained from the pre-test and post-test scores given before learning and after learning in cycle II can be seen in table 3.

Table 3

Descriptive statistics on learning outcomes of class X MIPA-1 with the use of LMS in the Blended Learning model of 25 students in cycle II

Descriptive Statistics				
	N	Min	Max	Mean
pre-test	25	55,00	75,00	66,66
post-test	25	80,00	100,00	90,00
% N Gain	25			70,22%

From table 3, it can be seen that the lowest score obtained by students during the pre-test was 55. While the lowest score during the post-test was 80. The highest score in the pre-test was 75, while the post-test score was 100. From the table, it can be seen that most student learning outcomes increase.

For the second cycle learning outcomes obtained an average N gain of 70.22%. This means that learning in the use of LMS in the Blended Learning model is quite effective in improving student learning outcomes. Thus the research is sufficient until the second cycle only.

3.2 Interpretation of Student Activity Analysis

The results of the study and the average percentage of student learning activities in learning activities using LMS in the Blended Learning model have increased in each cycle which can be seen in Table 4 as follows:

Table 4

Average Student Learning Activities In Cycle I And Ii

No	Kategori	Cycle I		Cycle II		% Enhancement
		The number of student	%	The number of student	%	
1	Inactive	8	32	0	0	32%
2	Less Active	5	20	1	4	16%
3	Active	10	40	12	48	8%
4	Very Active	2	8	12	48	40%
% Average Increase						96%

The average increase in student learning activities in using LMS in the Blended Learning model cycle I and cycle II can also be seen in Figure 2 below.

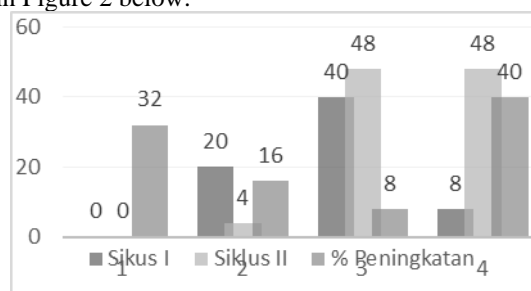


Figure 2. The average increase in student learning activities in Cycle I and Cycle II

Based on table 4 and figure 2 above, it can be described that learning activities from cycle I to cycle II have increased. The increase in chemistry learning activities from observations is because students are accustomed to using LMS through the Blended Learning Model. Here the teacher is more active and creative in the use of LMS during the learning process. Teachers must know what type of LMS is fit to use to the students so that students can learn enthusiastically. The LMS presented in this study are Quizizz, Google Forms, and Google Classroom which are medium for online learning activities.

The responsibility and independence of students towards the tasks given by the teacher are also better. This increase is due to the role of the teacher as a controller and supervisor has been carried out properly.

4. Conclusion

Evaluating from the results of research and discussions that have been carried out in using the LMS in the Blended Learning Model that has been described, it can be concluded that the use of the LMS in the

Blended Learning Model can improve the chemistry learning outcomes of the tenth grader of Senior High School. Based on the results of observations of student activities, there is an increase in learning activities using the LMS in the Blended Learning model.

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