



Design Based-Learning of Learning Management System (LMS) With Moodle to Improve Independence and Science Learning Outcomes of Junior High School Students.

Jernita Yohana Napitupulu*, Mariati Purnama Simanjuntak

Science Education Study Program, Faculty of Mathematics and Natural Sciences,
Universitas Negeri Medan, Medan, Indonesia

DOI: <https://doi.org/10.15294/jese.v2i2.58477>

Article Info

Received 15 July 2022

Accepted 8 August 2022

Published 26 September 2022

Keywords:

**Learning Management System,
Moodle,
Independence of Learning,
Student Learning Achievement**

*Corresponding author:

Jernita Yohana Napitupulu

Universitas Negeri Medan

E-mail: Jerenitayohanapitulu@gmail.com

Abstract

This study aims to determine the design of learning media based on learning management system (LMS) with Moodle can increase independence and science learning outcomes for junior high school students. The design of the designed learning media can be used as an alternative in distance learning because it can be done without space and time limits. This type of research is research and development (R&D). The sample used in this study was class VII-4 totaling 23 students. The research instrument used consisted of two, a questionnaire and a test. Questionnaires to measure student learning independence and tests to measure student learning outcomes. The test used is in the form of multiple choice with 4 options that have been validated by experts. The relationship between independence and student learning outcomes using the Pearson product moment correlation test assisted by IBM version 25. Based on the results of the study, it was found that the LMS-based learning media design with Moodle can increase student independence and learning outcomes and there is a positive relationship between independence and student learning outcomes in junior high school Negeri 6 Percut Sei Tuan, Medan.

©2022 Universitas Negeri Semarang
p-ISSN 2797-0175
e-ISSN 2775-2518

INTRODUCTION

The development of information technology today is unavoidable its influence on the world of education. The development of information technology on the use of the internet makes educators have many choices in utilizing technology for learning. The innovative learning process is inseparable from the use of Information and Communication Technology (ICT) in education (Huda, 2020). One of the information and communication technologies that aims to activate and hone students' ability to learn is called e-learning. E-learning can be interpreted as learning by utilizing the help of electronic devices, especially computer devices (Dahiya, 2016). The e-learning learning media device that has an important role is the learning management system (LMS). LMS is a software application that is used for the purposes of teaching and learning activities that can be connected online (Mahnegar, 2012). LMS provides an innovative learning system that includes in the field of information technology. LMS-based learning contains materials in the form of multimedia (text, animation, video and sound) which are given as the development of learner competencies (Hernawati, 2016).

One of the media that supports LMS-based learning is to use the Moodle application (modular object oriented dynamic learning). Moodle is a software created for web-based learning media using the principles of social constructionist pedagogy. Moodle is software that has various learning support features that can be easily accessed in an e-learning portal (Turrahma, 2017).

Moodle provides learning facilities because it is equipped with important learning support features, such as assignments, quizzes, chat, collaboration, as well as the main features that can upload various formats of learning materials and are easier to understand because the information presented is not only in the form of writing but also images and videos (Zyainuri, 2012).

Learning independence will be realized if students actively control everything they do themselves, evaluate and plan something deeper in the learning they are going through and are active in the learning process (Primadini, 2019). While learning outcomes are changes in behavior due to learning. Changes

in behavior are caused by students achieving mastery over a number of materials given in the teaching and learning process. This achievement is aimed at the teaching objectives that have been set. Learning outcomes can be in the form of changes in cognitive, affective and psychomotor aspects (Purwanto, 2013).

The results of observations made to several schools in the city of Medan, North Sumatra show that independence and learning outcomes are still not optimal. One of them is SMP Negeri 6 Percut Sei Tuan, there are several obstacles experienced by students at the school based on the results of observations that have been made, namely some students at SMPN 6 Percut Sei Tuan still have difficulty learning science in the material for the interaction of living things and their environment. This is because students still pay less attention to learning science. One of the factors that influence the students' lack of attention is the applied media.

Based on this description, the researchers formulated several problems that became the focus of research, including: (1) how to design LMS-based learning media using Moodle in science subjects for the interaction of living things and their environment at SMP Negeri 6 Percut Sei Tu-an; (2) how to increase independence student learning using LMS-based learning media with Moodle? ; (3) how to improve student learning outcomes by using LMS-based learning media with Moodle? and (4) how is the relationship between independence and student learning outcomes on the design of LMS-based learning media with Moodle?. The aims of this study are: (1) to determine the design of LMS-based learning media using Moodle in science subjects for the interaction of living things and their environment at SMP Negeri 6 Percut Sei Tuan; (2) to find out the increase in students' learning independence by using LMS-based learning media with Moodle; (3) to determine the improvement of student learning outcomes using LMS-based learning media with moodle and (4) to determine the relationship between independence and student learning outcomes to the design of LMS-based learning media with moodle.

Several studies related to this research, one of which refers to the research of Amandu, et al (2013) and Nuriyanti, et al (2013) because in this study using LMS with Moodle, the use of

learning can be an indication of technological progress in the present. This progress shows that learning is not only limited to existence anymore, but the use of innovation as a substitute for reality in the learning system can be recognized through e-learning media in fluid learning. The difference from previous research lies in the subjects, materials, research subjects, and research objectives. This study uses the interaction of living things with the environment in science subjects, the subjects in this study were junior high school students in class VII, and the purpose of the research used was to determine the increase in independence and student learning outcomes after applying LMS-based learning media with moodle.

METHOD

The population in this study were all seventh-grade students of SMP Negeri 6 Percut Sei Tuan, Medan T.P 2021/2022 which consisted of two classes totaling 53 students. The research class is class VII-4 IPA which was chosen randomly with a total of 23 students. The research sample consists of one class that represents the population. Sampling in the study was taken randomly (random sampling). Class VII-4 as the class that was treated by applying LMS-based learning media with Moodle.

This study designs and applies LMS-based learning media with Moodle in Natural Sciences (IPA), material for the interaction of living things with the environment for seventh grade students of junior high school. The research method used is research and development (R&D) with the Borg & Gall model which consists of ten stages.

This model consists of 10 steps of research and development which include: (1) potential and problems; (2) data collection; (3) product design; (4) product validation; (5) product revision I; (6) product trial; (7) product revision II; (8) trial use; (9) product revision III, and (10) mass production. The steps that will be carried out in this development research are only 9 stages due to time constraints, so the steps of dissemination and implementation or mass production are not implemented by the researcher.

The instruments used to collect the research data are: (1) Observation; (2) Interview; (3) Questionnaire; (4) Learning Outcomes Test. Data collection techniques used in the study, namely:

Observation (observation)

Observations were carried out to obtain information related to problems in SMP Negeri 6 Percut Sei Tuan, Medan.

Interview

This type of interview is used to get input about learning media based on a learning management system (LMS) with a moodle that will be arranged to solve problems in the field.

Questionnaire

Questionnaires were used to determine the increase in students' independence before and after applying the LMS-based learning media design with Moodle.

Test

This test is used to determine the improvement of student learning outcomes before and after applying the Moodle-based learning media design. The research design used was one group pretest design with random sampling. The design drawing used can be seen in Figure 3.2.



Figure 1. Research Design

Information:

O₁ = Pretest

O₂ = Posttest

X = treatment, Results of using e-learning with Moodle

Before students were given treatment in the form of using LMS-based learning media with Moodle, students were given a pretest and an independence questionnaire. After the pretest, the students were given treatment, the application of the LMS learning media with Moodle, the students were given a posttest and an independence questionnaire. The test was carried out on a sample class of VII-4 grade students of SMP Negeri 6 Percut Sei Tuan.

The stages of research carried out using the type of RnD research on the Borg and Gall model include:

Research and information gathering

Field observations to the SMPN 6 Percut Sei Tuan school to see and get information about the learning problems faced by the school. Researchers took a communication approach with the interview process and asked for the

data needed and saw firsthand the conditions in the field.

Planning

Researchers plan media products to be made based on information from observations. Researchers select and determine the scope of topics as well as collect sources to fill in learning content, install applications, and set Moodle applications so that they are easy to use for learning.

Initial product development

Researchers will design e-learning products according to the following steps: create e-learning page layouts, both front page layouts and material pages, determine moodle themes and plan what will be presented in e-learning.



Figure 2. Moodle Student Access Homepage Website View

Initial field trial

The initial product developed was in the form of LMS-based e-learning learning media with Moodle that had been made, then tested on material experts, namely lecturers of the Science Education study program and on media experts of the lecturers concerned in teaching learning media.

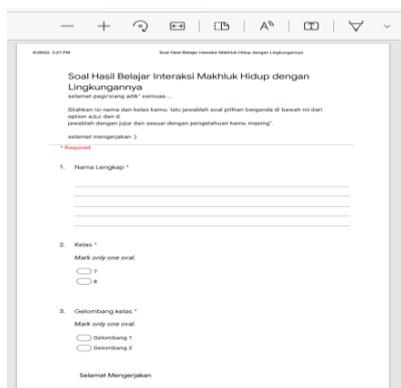


Figure 3. display of learning outcomes

Revising the results of the initial field trials

Product revisions are carried out after validation by material experts and media experts so as to get suggestions or comments for improvement. This revision is intended to correct the shortcomings of the LMS-based e-learning learning media with Moodle.

Field trial

LMS-based e-learning learning media with moodle which has been revised based on validation from media experts and material experts is then carried out product trials with ±3 subjects. Then the subject is asked to provide feedback about the learning media that has been made to be used in the learning process.

Revise the results of field trials

From the results of product trials, responses from students will be obtained. Responses from students can be used as revision material. After the revision, the teaching materials can be used in the trial use with a larger number of subjects.

Conducting field implementation test

In the field implementation test or usage trial, the researcher involved more students than the previous trial phase.

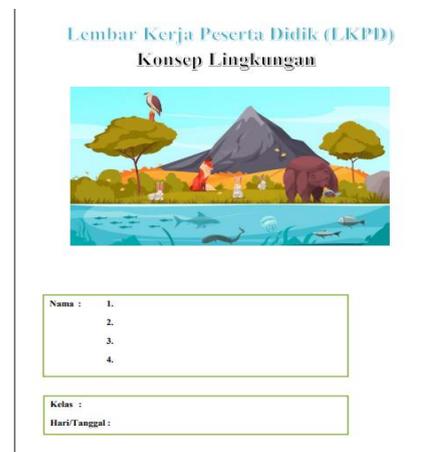


Figure 4. student worksheet display

Revision of final product results

From the results of the use trial, students' responses will be obtained to be used as revision material. In this final product revision stage, researchers used student responses to be used in perfecting LMS-based e-learning media products with Moodle. At this stage the researcher will get the final product that is developed as needed and has been worthy of being used as an online learning medium for

one of the schools in the city of Medan in junior high school science subjects.

Data analysis techniques for increasing student learning independence use a Likert Scale with the following formula:

$$P = \frac{f}{n} \times 100\%$$

Information:

- P : Percentage
- F : Frequency of each answer to the questionnaire
- N : Total score ideal
- 100 : Fixed number

Data analysis to calculate the increase in student learning outcomes using normalized gain (N-Gain). N-Gain is a comparison of the actual gain score with the maximum gain score. Actual gain score is the gain score obtained by students while the maximum gain score is the highest gain score that students may obtain. The calculation of the normalized gain score (N-Gain) is expressed by the formula:

$$\langle g \rangle = \frac{\langle Sf \rangle - \langle Si \rangle}{100 - \langle Si \rangle} \times 100\%$$

Information:

- $\langle g \rangle$ = N-Gain
- $\langle Sf \rangle$ = post-test
- $\langle Si \rangle$ = pre-test

In the data analysis stage, researchers can formulate research results. The data that has been obtained, then the data will be tabulated into frequency data, then processed using the normality test and homogeneity test. After testing the normality and homogeneity of the data, it is continued by analyzing the relationship between independence and student learning outcomes using correlation with the help of IBM SPSS version 25: The hypotheses to be tested in this study are:

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{(n\sum X^2 - (\sum X)^2)(n\sum Y^2 - (\sum Y)^2)}}$$

Information :

- r : correlation coefficient
- X : mean deviation
- Y : mean deviation
- N : number of rank pairs

RESULT AND DISCUSSION

The learning process in cycle I, the material presented, namely the interaction of living things with their environment, was carried out for 2 meetings (5 hours of lessons). The learning outcomes in the first cycle were then compared with the results of the pretest. The results of the pretest get an average value of 45.27 with a percentage of 30% remaining completed learning. In the first cycle the average value of student learning outcomes at the first meeting was 62.17 with a completeness percentage of 42%. While the average value at the second meeting was 76.07 with a completeness percentage of 50%. The comparison of the average daily learning scores of students before and after using LMS-based learning media with Moodle can be seen in table 1.

Table 1. Student learning outcomes data cycle I

Information	Student data	Cycle I
Lowest score	33,65	62,17
Highest score	56,11	76,07
Average pretest score	30	45,27

Learning in cycle II was conducted in 2 meetings at the third meeting and at the 4th (final) meeting. at the third meeting was 82.36 and at the fourth meeting or the end of learning after implementing and using LMS-based learning media design with a Moodle of 84. The average initial test of student learning outcomes was 45.27 and the final test was 86.33. The relationship between independence and student learning outcomes used the Pearson product moment correlation test with the help of IBM version 25. The correlation between independence and learning outcomes was 0.897 with a significance of 0.000.

Based on the results of the study, it was found that the design of LMS-based learning media with Moodle can increase student independence and learning outcomes and there is a positive relationship between independence and student learning outcomes. The comparison of the average daily value of students' learning before and after using LMS-based learning media with Moodle can be seen in table 2.

Table 2. Student learning outcomes data cycle II

Information	Student data	Cycle II
Lowest score	70	82,36
Highest score	75,32	84
Average posttest score	78	86,33

The percentage increase using the normalized gain (N-gain) of student learning independence at SMP Negeri 6 Percut Sei Tuan in science subjects, the material for the interaction of living things with the environment, is 64% in the medium category. The results of the percentage increase in the N-gain of student learning independence based on all indicators can be seen in Table 3.

Table 3. Percentage of N-gain Increase in Independent Learning

Independent Average		N-gain (%)	Category
beginning of learning	end of learning		
58,69	85,15	64	Medium

The percentage increase in learning outcomes was calculated using the normalized gain (N-gain) in class VII-4 of SMP Negeri 6 Percut Sei Tuan. The percentage increase in the overall N-gain of student learning outcomes in science subjects, the material for the interaction of living things with the environment, is 83% in the high category. The recapitulation of pretest and posttest data on student learning outcomes is shown in Table 4.

Table 4. Pretest and Posttest Data on Student Learning Outcomes

Learning outcomes N	Average value		N-gain (%)	Category
	Pretest	Posttest		
cognitive realm	23	40,07	84,3	83 High

N : Total of Students

The relationship between independence and student learning outcomes was tested using the Pearson product moment correlation test. The

results of correlation calculations were assisted by IBM SPSS version 25. The relationship between independence and learning outcomes had a positive correlation of 0.897 with a very strong category. The relationship between independence and learning outcomes can be seen. Attention table 5.

Table 5. Independent Correlation Test Results and Student Learning Outcomes

	Correlations	Independences	Learning outcomes
Independence	pearson correlation	1	0
	Sig. (2-tailed)		0
Learning outcomes	pearson correlation	0,897**	1
	Sig. (2-tailed)	0.000	
	N	23	2

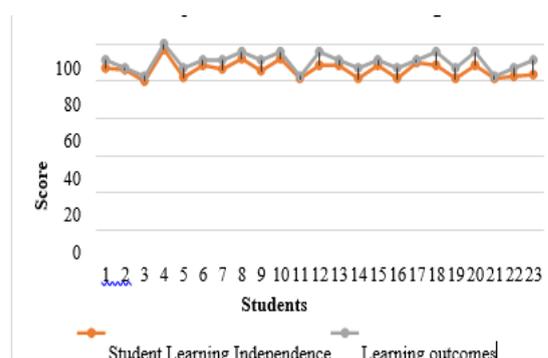


Figure 5. Correlation of Independence and Student Learning Outcomes

CONCLUSION

Increased student learning independence after the application of LMS-based learning media with Moodle on the interaction of living things with the environment by 64% with a medium category. The highest percentage of N-gain learning independence results in the active learning indicator (M7) is 78% in the high category. Improved student learning outcomes after the application of LMS-based learning media with Moodle on the interaction of living things with the environment by 83% in the high category. The highest percentage of N-gain learning outcomes in the understanding indicator (C2) is 92% in the high category. The relationship between independence

and student learning outcomes after the application of LMS-based learning media with Moodle on the interaction of living things with the environment there is a positive relationship with a value of 0.897 with a very strong category.

REFERENCES

- Arikunto, S. (2006). *Research Procedure: A Practical Approach*. Jakarta : Rineka Cipta.
- Arikunto, S. (2015). *Research Procedure: A Practical Approach*. Jakarta : Rineka Cipta.
- Dahiya, S., Jaggi, S., Chaturvedi, K.K., Bhardwaj, A., Goyal, R. C. & Varghese, C. (2016). An eLearning System for Agricultural Education. *Indian Research Journal of Extension Education*, 12(3) : 132-135.
- Hernawati, E., & Aji, P. (2016). Design and Implementation of E-Learning Content through Learning Management System in Improving Learning Motivation. *Journal of Information System Engineering and Business Inteligence*, 2(1) : 23-32.
- Huda, I. A. (2020). The Development of Information and Communication Technology (ICT) on the Quality of earning in Elementary Schools. *Journal of Education and Counseling*, 2(1) : 121-125.
- Mahnegar, F. (2012). Learning Management System. *International Journal of Business and Social Science*, 3(12) : 144-150.
- Primadini, F. N. E., & Lamria. (2019). The Influence of Learning Media and Independent Learning on Science Process Skills in Elementary Schools. *Visipena Journal*, 10(2) : 281-293.
- Purwanto. (2013). *Evaluation of Learning Outcomes*. Yogyakarta : Pustaka Belajar.
- Turrahma, A., Satyariza, E.N., & Ibrahim, A. (2017). Design and Utilization of LCMS Moodle-Based E-Learning in Increasing Efficiency and Effectiveness and Quality of Student Learning Media at MAN Sakatiga. *National Journal of Informatics Engineering Education*, 6(3) : 327-332.
- Zyainuri & Marpanaji, E. (2012). Application of E-Learning Moodle for Student Learning Carrying Out Prakerin. *Journal of Vocational Education*, 2(3) : 410-426.