

# E-Learning through Lesson Study to Improve Learning Effectiveness

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Received September 8, 2020; Revised October 26, 2020; Accepted November 11, 2020

## Cite This Paper in the following Citation Styles

(a): [1] Sri Sumarni, Jumintono, Ernawati Sri Sunarsih, Waluyo, Rhahmadani Widya Putri, Taufiq Lilo Adisucipto, Fadilah Umar, Olivia Cherly Wuwung, Febri Kurnia Manoppo, Agus Setiawan, Jamaluddin Hos, "E-Learning through Lesson Study to Improve Learning Effectiveness," *Universal Journal of Educational Research*, Vol. 8, No. 12A, pp. 7426 - 7432, 2020. DOI: 10.13189/ujer.2020.082526.

(b): Sri Sumarni, Jumintono, Ernawati Sri Sunarsih, Waluyo, Rhahmadani Widya Putri, Taufiq Lilo Adisucipto, Fadilah Umar, Olivia Cherly Wuwung, Febri Kurnia Manoppo, Agus Setiawan, Jamaluddin Hos (2020). *E-Learning through Lesson Study to Improve Learning Effectiveness*. *Universal Journal of Educational Research*, 8(12A), 7426 - 7432. DOI: 10.13189/ujer.2020.082526.

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**Abstract** E-learning is electronic learning and teaching and learning process that is carried out online. This study aims to see the effectiveness of E-Learning through lesson study on Building Materials Science subjects. This research uses a descriptive quantitative method. This study involved 40 students in semester 1 of Class A in Science and Building Materials. Data are obtained by polling and questionnaires by providing answers to questions. Polling data were analyzed using the Rasch model, and the data questionnaire was analyzed using the Linkert scale model. The results showed that the application of e-learning through lesson study could increase the effectiveness of learning process with a value of 84.5%, which is quite useful. The effectiveness of learning process is based on considerations of quality, level of suitability, and time required. Learning materials increase students' readiness to learn to teach before learning in class. Students who are motivated to do assignments and understand eLearning learning materials can complete the learning process according to the specified time.

**Keywords** E-Learning, Lesson Study, Learning

Effectiveness, Style of Learning

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## 1. Introduction

Learning effectiveness is an increase that can be achieved in learning. Learning effectiveness is essential in education. Learning effectiveness can identify and increase students' potential in solving problems [1]. Adaptive learning, as part of the learning analysis applied in primary education, can achieve learning objectives [2]. Learning with digital knowledge can improve the learning environment [3]. The development of science and technology affects various areas of life. Science and technology require education to follow the flow, not be left behind, and observe students' learning styles digitally. Educators must understand the digital world and design digital-based learning methods. Visual learning styles perform better than tests of verbal comprehension [4].

E-learning can be the answer to current constraints and conditions. E-Learning is an Internet technology to

distribute learning materials so that students can access from anywhere. Students become flexible in choosing the time and place of study because they do not have to come to a class at any given time. Educators can also update learning materials flexibly from text-based materials and media such as images and videos.

The effectiveness of learning is influenced by the media and methods used. There are many new approaches to e-learning, such as the Massive Open Online Course (MOOC), Virtual Reality (VR), gamification, and Learning Management Systems (LMS). The Learning Management System is an approach to planning, delivering, and managing learning. Moddle-based learning can improve students' mathematical connection skills because it can effectively facilitate communication, information, and learning network development [5], [6]. VR can influence reflective thinking and indirectly increase learning effectiveness [7]. The type of knowledge taught through video media varies in controlling the point of learning [8]. Inquiry-based learning trains students' metacognitive skills virtually [9]. The use of multimedia elements in education can improve student's performance and can develop an understanding of concepts and ideas of knowledge [10]. Student Evaluation Teaching (SET) is to measure the effectiveness of teaching students [11]. This social media can develop students' collaboration skills [12].

Thailand provides free education from kindergarten to high school, but it fails in effectiveness and accountability [1]. Meanwhile, Indonesia's problems in education, such as students from various islands that are spread out very much, cause learning facilities to be uneven. Competent teacher resources are not available as needed. One of the efforts to optimize e-learning implementation requires management by the Learning Community team and quality e-learning guarantor. However, e-learning implementation has encountered several obstacles. The lack of skilled technicians, hardware and software instructors, and students accessing the eLearning system requires networking and cost tools.

Lesson Study is a professional development model for educators through collaborative and continuous learning. Lesson study is based on the principle of collegiality and collective education to build a learning community. Lesson study is an ongoing activity and an effort to apply Total Quality Management principles in improving the learning process and outcomes of students. Lesson Study is an activity that can encourage creating a learning community that is consistent and systematic in making improvements. Learning communities can be used as an approach that can systematically improve student teaching and learning. Lesson study is an effective way of continuing professional development because it is school-centered, focuses on student learning, and draws

on collective and collaborative teacher experiences [13], [14]. Lesson studies use cyclical research with teachers collaboratively investigating student teaching practices [15]. These activities can support teacher and student learning in new contexts [16].

The adaptation of Lesson Study in Western countries has grown rapidly. The lesson study was defended in Denmark by identifying cultural characteristics that had to change [17]. Teachers maintain general ideas about studying their lessons to learn lessons in their schools and consider reasonable practice [18]. Lesson studies are better developed in collaboration with science and technology to get good learning [19]. Collaboration through education can improve professional teacher teaching strategies, networking skills, lesson planning, classroom management, self-efficacy. So that learning collaboration can improve student's performance [20]. Based on the interest in the world of education, a measurement of E-learning effectiveness is needed. This study aims to see the significance of E-Learning through lesson study on Building Materials Science subjects. The research results are expected to provide an e-learning design with lesson study in an effective learning environment.

## 2. Materials and Methods

This research uses a descriptive quantitative method. This study involved 40 students in semester 1 of Class A in Science and Building Materials. Data obtained by polling and questionnaires by providing answers to questions. Polling data were analyzed using the Rasch model, and the data questionnaire was analyzed using the Linkert scale model.

The stages of e-learning through the lesson study that have been conducted refer to the guidelines in Table 1.

**Table 1.** E-Learning stage guidance through learning

No	Activities	Criteria
1.	Planning (Plan)	1. Discussions in the learning Community 2. Lesson Design. 3. Results of discussion on learning.
2.	Implementation (DO)	1. Action Teacher Model Class 2. Roles and Observer. 3. Observer observation Results
3.	Evaluation (SEE)	1. Experience teacher model during execution session 2. Reports of observations from the observer 3. Conformity of learning outcomes based on lesson design

Data were analyzed using descriptive statistics with the assessment. Descriptive analysis data with review can be seen in Table 2.

**Table 2.** Standard conversion measurement score with norm rating

Score	Value
> 98.0	Very high
89.0 – 98.0	High
80.0 – 89.0	Enough
70.9 – 80.0	Low
< 70.9	Very low

Indicators of measuring effectiveness in research can be seen in table 3.

### 3. Results and Discussion

#### 3.1. E-Learning Stage

E-Learning through lesson study can be seen from the lesson study process in learning and the quality of e-learning. The E-learning process through lesson study can be seen in table 4.

The quality of e-learning using Moodle media looks good, which is the up-to-date teaching material and active

teaching material discussion forum. The teaching materials are quite complete, namely, PPT, video, books, paper, SNI, worksheets, discussion materials, applications, and valuation indicators. Simultaneously, the assessment device consists of worksheets, task sheets, test sheets, and assessment guides. The e-learning assessment system is managed by a community team of study lesson studies that have been agreed upon with an open and fast assessment process.

The community team designed a building material learning design in an e-learning design using the Moodle LMS platform. Learning activities are carried out by one of the educators who agree to practice the learning designs that have been compiled with the Learning Society team. In this learning, students have studied the material that has been given to the LMS virtual class. When checking in class, students learn to complete projects in collaboration with friends based on the learning platform's content. The teacher acts as a facilitator, and the students present their assignments. The results of the projects that have been discussed are collected through the LMS. The learning reflection stage consists of three main agendas: model lecturer evaluation, observer observation reports, and conclusions from model lecturers. The observations' results are packaged in the form of photos, videos, and notes written on the observation sheet.

**Table 3.** Learning Effectiveness Measurement Indicators

No	Aspects	Indicators
1.	Teaching Quality	1. Learning process: Interactive, holistic, integrative, scientific, contextual, thematic, practical, collaborative 2. Learning outcomes
2.	The right level of instruction	1. Physical, mental, and emotional conditions. 2. Needs, motivation, and purpose. 3. Skills, knowledge, and other understandings have been learned.
3.	Incentive	1. Inspire encouragement to learners to learn. 2. Explain concrete to what learners can do at the end of the lesson 3. Give rewards to achievements earned so that it can stimulate to achieve better achievements in the latter days. 4. Provide good learning habits.
4.	Time	1. Early preparation of learning. 2. We are receiving material. 3. Practice self-skills. 4. Develop the materials that have been studied. 5. Last

**Table 4.** Specific data on Column/Row

Activities	Elements	Results
Planning stages	What	Lesson design, eLearning Moodle is used to upload teaching materials.
	Where	Learning meeting room.
	When	The planning stage is done a week before performing the initial step.
	Who	Study the Community team (model lecturers and observers).
	How	<ol style="list-style-type: none"> <li>1. Preparing the teaching material that will be upload in Moodle, then discussed with the learning community at the time of the plan session to legitimate it.</li> <li>2. Provide advice and opinions materials to be delivered in the learning and material that is uploaded in Moodle. Looks very enthusiastic in the discussion, expressed mutual views between members of the community learning team.</li> <li>3. Materials and assignments are uploaded in Moodle e-learning according to the learning design.</li> </ol>
	How many	Approximately a week to draft learning with the learning community.
Stages of implementation	What	Learning activities teach the courses of building materials science that take place in the classroom. Teaching model lecturers and observers recorded student behavior during learning and learning outcomes.
	Where	In class
	When	As per the lesson schedule
	Who	Lecturers, observer, and students learn
	How	<ol style="list-style-type: none"> <li>1. The lecturer delivers the learning material that has been uploaded to the moddle. The learning design is in the form of learning materials and assignments that have been designed with the learning community team.</li> <li>2. The lecturer creates a comfortable learning atmosphere and always communicates with students.</li> <li>3. Observer Observe the learning process, observe students' behavior during the learning process, and do the eLearning role.</li> </ol>
	How many	150'
Stages of Reflection (See)	What	Observers observe the learning process, follow the students' behavior during the learning process, and perform the eLearning role.
	Where	Learning meeting room.
	When	After do
	Who	Learning community team
	How	<ol style="list-style-type: none"> <li>1. Lecturer transfer learning experience in class</li> <li>2. The Observer observation report form the photos, videos, and notes were written on the observation sheet.</li> </ol>
	How many	100'

### 3.2. E-Learning Effectiveness with Lesson Study

The success of learning is seen from effectiveness. To know the level of significance is done twice. The measurement is during e-learning without lesson study and e-learning through lesson study. Data on the effectiveness of e-learning through lesson study and without lesson study is shown in table 5.

The level of effectiveness can be calculated based on the score conversion rule with the norm assessment found in table 4. Table 6 is the result of the conversion score. Results of the effectiveness of the e-learning without the lesson study obtained an average of 75.2. This result is included in the category of low significant value. Through the first meeting lesson study, E-Learning got an average of 80.0. The type of value is substantial enough. E-learning through the second meeting lesson study earns an average of 84.5 included in the value category significant enough. Based on the results, effectiveness has

increased. There are four aspects used to measure the effectiveness of eLearning through study lessons consisting of:

#### 3.2.1. Quality of Teaching

The quality of teaching is the extent to which the presentation of information or the ability to help students learn learning material quickly. The quality of education gets a score of 84.5%, which is quite significant. In electronic-based learning, the material presented is technology-based, UpToDate, complete, and fun. Teaching materials are always associated with research and technology developments. Interactively packaged material is fun for students. The presentation of material can strengthen students. Primary school mobile learning (m-learning) can improve students learning and facilitate students assignments even though it is not available in school [21]. The Frog Virtual Learning Environment

(Frog VLE) tool is useful and practical for learning [22]. The quality of teaching is seen from suitability between educator activity and student activity. In e-learning through lesson study, the learning process is designed in

an interactive, holistic, integrative, and collaborative manner so that learning outcomes are categorized. Learning quality can facilitate the students' thinking of learning as a thinker [23].

**Table 5.** Data effectiveness of eLearning through lesson studies

No	Identity	Score Without LS	Score LS 1	Score LS 2
1	Item 1	79.2	99.2	95.2
2	Item 2	80	86.4	88.8
3	Item 3	81.6	85.6	82.4
4	Item 4	82.4	85.6	80.8
5	Item 5	71.2	74.4	95.2
6	Item 6	81.6	85.6	95.2
7	Item 7	82.4	77.6	87.2
8	Item 8	88	87.2	84
9	Item 9	78.4	76	81.6
10	Item 10	77.6	70.4	83.2
11	Item 11	85.6	79.2	83.2
12	Item 12	79.2	72	78.4
13	Item 13	83.2	79.2	67.2
14	Item 14	83.2	69.6	80.8
15	Item 15	79.2	84.8	64.8
16	Item 16	71.2	84	83.2
17	Item 17	69.6	76	87.2
18	Item 18	70.4	72	68
19	Item 19	70.4	94.4	90.4
20	Item 20	69.6	85.6	80
21	Item 21	69.6	63.2	73.6
22	Item 22	81.6	87.2	84
23	Item 23	80	70.4	68.8
24	Item 24	84	76.8	86.4
25	Item 25	80.8	82.4	82.4
26	Item 26	80.8	99.2	82.4
27	Item 27	70.4	69.6	98.4
28	Item 28	82.4	86.4	93.6
29	Item 29	76	84	94.4
30	Item 30	75.2	69.6	79.2
31	Item 31	80	83	77.6
32	Item 32	79.2	89.6	98.4
33	Item 33	84.8	96	98.4
34	Item 34	69.6	69.6	97.6
35	Item 35	80	80	80.8
36	Item 36	76.8	88	89.6
37	Item 37	70.4	77.6	95.2
38	Item 38	68.8	92.8	89.6
39	Item 39	68.8	84.8	100
40	Item 40	62.4	75.2	82.4
41	Item 41	64	85.6	87.2
42	Item 42	56	57.6	72.8
43	Item 43	60.8	72	78.4
44	Item 44	60	69.6	78.4
45	Item 45	58.4	64.8	75.2
Average		75.2	80.0	84.5

### 3.2.2. The Right Level of Instruction

The teaching level is the extent to which educators ensure that learners are ready to learn a new lesson. The teaching level earns a score of 82.33%. This value means it is quite significant. With e-learning implementation through students, study lessons can first access materials in the LMS before a study meeting in class. While learning directly with teachers in the classroom, students are well prepared to understand even developing learning. Students' readiness like this is the same on flip learning models. Flipped classes require students' readiness before entering class to gain learning potential in the classroom [24].

### 3.2.3. Incentives

Incentives are the extent to which educators ensure that learners are motivated to perform teaching assignments and study the presented ingredients. Incentives are seen in educators' activities to encourage learners. The incentive rate earns a score of 84.98%. This value means it is quite significant. Teaching materials are packaged in the form of video, audio, text, and graphics. This material facilitates various student learning styles, such as kinaesthetic, audio-visual, and auditory. Students can learn anytime with fun and motivated students to learn. Intrinsic motivation refers to the willingness of students to do more. Exciting, fun, and enjoyable learning activities will keep students motivated to learn because they are very interested in these tools [25].

### 3.2.4. Time

The student's time is time to study the ingredients being taught. Learning can be said to be effective when learners can complete education according to the allotted time allocation. The time rate gained 85.33%. This value means it is quite useful in this research time, differentiated over three learning segments: preparation, implementation, and cover. In the preparatory session, students learn the LMS material independently. During the student's implementation sessions, developed teaching materials with discussions, and collaborations in the classroom. In the closing session, students evaluate learning by working on the task following the task's assessment at the LMS at the specified time. Thus, the time designed in learning becomes useful.

## 4. Conclusions

It is concluded that eLearning design with instructional learning affects the creation of an effective learning environment. Learning communities that are proactive in planning, doing, seeing make teachers challenged to carry out professional and quality learning. E-Learning design with lesson study influences an effective learning environment. A learning community that is proactive in

planning, working, seeing can impact teachers on carrying out professional and quality learning. Students can increase readiness in education, be motivated to do assignments, and complete the learning process according to the allocated time allocation. Therefore, to implement eLearning through learning, it requires active support from all parties, including school leaders, faculty teams, parents.

## Acknowledgments

The author would like to thank Research Grants PNBPNBP 516/UN27.21/PP/2019, Research Management Centre, and UNS for its support and fund.

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