Analysis of E-learning Program's Role in Physical Learning

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ABSTRACT

This study aimed to determine the application of e-learning programs, the role of e-learning programs, and how important the e-learning program's role in Physical learning was. This research used descriptive study using 80 students of the odd semester in 2016/2017 and 2017/2018 academic study program. The data obtained by questionnaires then analyzed based on the specified categories. From the data processing, it was proved that e-learning programs could be applied through e-learning modules. The program's role was in the "moderately contribute" category with a 3.44 score (scale 1 -5). The relation of e-learning program with its role in Physical learning based on the theoretical (based on calculations using formulas) mean that for the moderate, high/strong, and very high/very strong category was equal to 91.25%, for low/weak category was equal to 8.75%. Based on the data, it means that for moderate, high/strong, and very high/very strong category was equal to 76.25%, whereas for low/weak and very low/very weak category was equal to 23.75%.

1 Introduction

Information Physics is an abstract, empirical, and mathematical science. Therefore, some students are less interested in and let the students were not mastered by physics philosophy. The students have used physics formulas without understanding the concept (Sutrisno, 1993).

It causes the students to have learning difficulties. These three physical properties make the computer play a role in physics learning and physical development. The computer can turn abstract concepts of physics become real with visualization, animation, and simulation, making it more interesting and motivating students to learn (Mayub, 2011). In line with the above explanation and based on the experience of the writer as a lecturer for fundamental of physics course in the study program of Chemistry Education, it was obtained student learning outcomes for fundamental of physics course at two periods of learning (odd semester of 2016/2017 and odd semester of 2017/2018) had not shown optimal results either qualitatively or quantitatively. It was caused by many factors, including the delivery of teaching materials that were less representative due to lecturers' limited ability in managing the learning process, so that students have less role in learning.

Computers were facilitated with an e-learning program that shows an interactive multimedia system. It was served as a facilitator of teaching material. With an e-learning program, the students can study actively or passively. The reality in the field showed that students were less interested in studying Physics and were difficult to understand. These facts were caused by students who are less content to study with physics lecturers, and sometimes the lecturers cannot teach in time due to certain reasons (Paul, 1997). These problems can be solved by using an e-learning program that allows for individualization in learning, teaching materials, and exercises prepared according to the tastes of students. Besides, the limited ability of lecturers in the managing learning process can be assisted by utilizing ICT-based learning facilities (Nawaz, 2013).

E-learning is formal and informal learning performed through electronic media, such as the Internet, CDROM, tape, DVD, TV, Cell phone, PDA, etc. Information technology-based education is an education system whose learning process takes place by utilizing information technology (Mutakinati *et al*., 2018). CD-ROM E-Learning-based allows learning materials to be brought by students in the form of CD-ROM, which can be studied on the computer. Besides, research shows that Virtual Classroom is able to provide some more interesting options if implemented with the right approach (White, 1999). Virtual learning is much in demand because its potential has been felt to make the learning process to be effective (Haryono & Alatas, 2012).

Assessment of the development and delivery of e-learning is also necessary to advance our understanding of meaningful and worthwhile e-learning (Garrison, 2011). Furthermore, research on the use of Interactive 3D e-learning at SMP No.151 and MTs No.77B/95 Bandung shows that Interactive 3D e-learning is favored and highly favored as a learning medium by 74%, enhances cognitive ability by 83%, attractive and easy to use by 77 %, motivate and attract learning interest by 78%. (Sianipar, 2010).

Along with recent research findings above is characterized by cyber-shaped learning format (e-learning) through computer and the internet (Kim, 2015). Online classes tend to be successful when based on pedagogical science and proper teaching of teaching materials. E-learning enables students to learn independently, be flexible, understand the abstract, and perform virtual lab (Wahyuni, 2011). Students' physics learning is palatably consumed when packed with the good and the right animation (Perkins *et al*., 2006). The use of computers can create meaningful learning, efficient learning management, and student administration is more effective (Brekke & Hogstad, 2010).

Other research on the role of multiple intelligence in e-learning shows that the impact of multiple intelligences on the e-learning model shows tight integration (Mankad,2015). Correspondingly, other researchers concluded that online education is multimodal has the ability to support multi literation. Therefore, some intelligence can be tracked and facilitated through the analysis of multimodal learning in online models (Perven, 2018). To maximize students' potential in South Africa can be done with learning that uses multiple intelligence-based e-learning programs (Gouws, 2008). Other findings say that students who study in off-line and online mode through adaptive learning and Adaptive Smart E-Learning systems successfully classify learners with 85% accuracy (Swaminathan, 2014). It also found that schools and colleges can use the E-Learning Technology Acceptance Model to help minimize dropout rates from distance learning courses and promote overall student success (De Gennaro, 2010). The relationship between multiple intelligences and online education shows how multiple intelligence impacts on different categories can help instructors and students create a conducive learning environment to deliver beneficial educational outcomes (Riha & Robles-Piña, 2009). The use of the e-learning Program in Physics Learning can reduce student misconceptions by 71%, from 91.7% to 20.7% (Mayub, 2017). In line with that, the influence of the use of e-learning program on student motivation in the category is motivated enough (Score 3.52 from the range of score 1-5). There is a significant relationship between the e-learning program and the learning motivation (Mayub, 2015).

Based on the above description, the Physics learning problem will be resolved when the available software e-learning for Physics learning acts as a "lecturer"/transmitter of teaching materials. That role includes apperception, motivators, evaluators, problem-solvers, finders, inventors, self-developers, place of learning while working, learning individually, informers, facilitators, and demonstrators. Based on the previous description, the problem was formulated as follows; "*What is the role of e-learning programs in Physics Learning and how much was the role of e-learning in learning physics learning in Two-Dimensional Motion material."*

To answer the questions in the above problems, it is necessary to set the objectives of the study, namely to determine the role of e-learning programs in Physics Learning and how much the role of an e-learning program is in learning Physics. This finding is expected to be a new input for teachers in order to improve the Physics Learning process.

2 Methods

This research is a descriptive study using 80 students of the odd semester 2016/2017 and 2017/2018 academic study program. Data is obtained by using questionnaires then analyzed based on the specified categories. Questionnaires contain e-learning programs that are made with the stages of analysis, design, coding, and testing.

2.1 Stages of Making E-Learning Programs

2.1.1 Needs analysis of e-learning

In order for e-learning to act as a "transmitter of teaching materials/lecturers" which serves as media presentations in the form of text, graphs, tables, simulation, animation, exercise, quantitative analysis, feedback, active, reactive, provide individualized instruction in accordance with the progress of learning, etc., are required modules of learning, namely material content module, demo, analysis, and module of exam practice test and examination materials.

2.1.2 Role analysis of e-learning

The role of e-learning includes role perception, motivators, students' focus, as problem solvers, as finders, as inventors, self-developers, place of learning while working, place of learning individually, as informers, as demonstrators, as evaluators, and as facilitators.

2.1.3 Design of e-learning

For the e-learning program to play a good role, an e-learning module must be made consisting of material modules, demo modules, analysis modules, Practice test modules, examination modules, Program Help modules, and problem answer modules.

2.1.4 Writing the Program

The program that used in writing was Macromedia Flash, Action script and etc. Button was used to test the interactively of this program.

2.1.5 Trial System of e-learning

The Trial System aimed to prove the e-learning Program and implementation on the Physical Learning process. The trial was included running the program interactively and the program's validation (conformity with the concept of Physics).

2.2 The Role Test of E-Learning

The role test was carried out to look at the role of e-learning as a "transmitter of teaching materials" when the students were learned without the lecturers.

2.2.1 Population and Sample

The study population included all odd semester 2016/2017 and 2017/2018 chemistry students. The sampling used in the current study was the total sampling technique. The researcher set the samples of chemistry students on odd semester enrolled 2016/2017 and 2017/2018 as many as 80 people.

2.2.2 Variable

the role of test variables consists of the independent variable and the dependent variable. The independent variables consist of the use of e-learning programs and questionnaires. The questionnaire serves as a revealer of the role of e-learning courses in the study, while the dependent variable is the e-learning program's role.

2.2.3 Instrument and Questionnaires was Named the Scale of E-learning Program's Role

This scale aimed to prove that the e-learning program's role in the students' learning of physics has been significant (Azwar, 2003). To ensure the scale of role program of e-learning is quality and standards-based, it required a validity test, reliability test, and homogeneity test (Imam, 2006). While

the validity is tested using product-moment Person (rix) And homogeneity uses; Fh = (S12/S22) (Sudjana, 1995).

2.2.4 How to Collect, Process, and Analyze the Data

Data for revealing the role of e-learning programs is obtained by using a questionnaire with 72 item numbers. Each item's ranges are 1-5 or 72-360 (Mayub, 2011). To see how small the role of e-learning is to score the research questionnaire using a Liker scale (Sugiyono, 2013) as shown in Table 1.

Table 1. Criteria roles and role-scale e-learning program

No	Range Value x	Range Value x		Category	∑student		∑ (%)	
		realistic	theoretical		R	T	R	T
1	X ≤ - 1,5 σ	<201,5	<163,5	Very low	6	-	(7,508%)	-
2	-1,5 σ< X ≤ - 0,5 σ	201,5 - 238,5	163,5 -200,5	Low	13	7	(16,25%)	(8,75%)
3	-0,5 σ< X ≤ +0,5 σ	238,5 - 275,5	200,5 -237,5	Moderate	28	14	(35,00%)	(17,50%)
4	+0,5 σ< X ≤ +1,5 σ	275,5 - 312,5	237,5 - 274,5	High	19	27	(23,75%)	(33,75%)
5	+1,5 σ< X	>312,5	> 274,5	Very high	14	32	(17,50%)	(40,00%)
	μ_r= 20571/80 = 257,13 = **257**			= μ_t = 73 X 3 = **219**σ = **37**				

3 Results and Discussion

Program module of physics e-learning, e-learning program can be implemented into the module of material content, demo, analysis, and examination material modules of practice test and examination, which is the modification of the model that has been developed by Afrizal Mayub as shown in Figure 1 (Mayub, 2011).

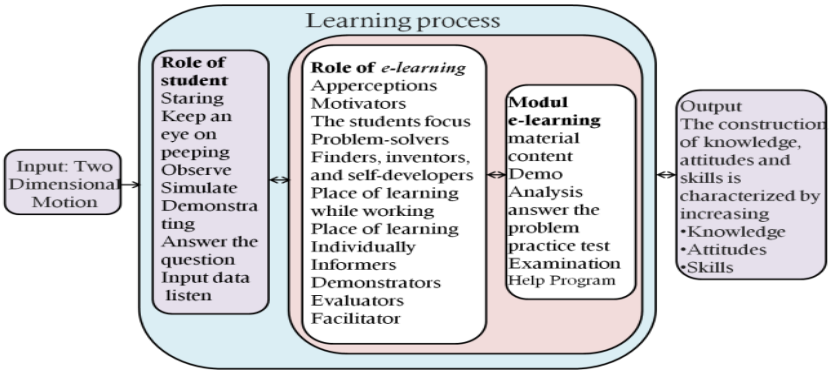

Figure 1. The e-learning model used in learning

Role of e-learning, test on the program includes the role as apperceptions, motivators, the students focus, problem-solvers, finders, inventors, and self-developers, place of learning while working, place of learning individually, informers, demonstrators, evaluators, and a role as a facilitator as described in Table 2 and Table 3.

Table 2. Score scale of the role of e-learning program

No	Category	Σ student		Σ (%)	
		R	T	R	T
1	Very low	6	-	(7.5%)	-
2	Low	13	7	(16.25%)	(8.75%)
3	Moderate	28	14	(35.00%)	(17.5%)
4	High	19	27	(23.75%)	(33.75%)
5	Very high	14	32	(17.50%)	(40.00%)
μr = 20571/80 = 257.13 = 257					
μt = 73 X 3 = 219 σ = 37					

Based on the above description, it turns out that e-learning program acts as a "transmitter of teaching material," include as apperception, motivators, informers, facilitators, demonstrators, and evaluators, the students' focus, problem-solvers, finders, inventors, self-developers, place of learning while working, place of learning individually. The empirical data in the field supported this finding. Table3 shows that the use of an e-learning program in learning basic physics is "Quite in contributing" with a score of 3.44 (scale 1-5). While the relations between the e-learning program to its role in basic physics learning based on theoretical mean for the category moderate, high/strong, and very high/strong amounted to 91.25%, while the category of low/weak at 8.75%.

However, when based on the mean realistic for the category of medium, high/strong, and very high/strong amounted to76.25%, while the category of low/weak and very low/weak amounted to 23.75%. Physics e-learning program was able to act as a "transmitter of teaching materials" that can attract the attention of students, explaining the material, showing symptoms of physical, virtual experiments, analyze, ask questions, provide feedback, and motivate students. Functioning as a school/class, an e-learning program is able to bring students into a fun and non-boring learning environment.

Table 3. Summary of role score of an e-learning program

No	Type of Role of an e-learning program	Scores
1	Apperceptions	3.47
2	Motivators	3.52
3	Focusing attention	3.48
4	Problem solvers	3.35
5	Finders, inventors, self-developer	3.35
6	Learning while working	3.39
7	Learn individually	3.53
8	Informers	3.46
9	Demonstrators	3.47
10	Evaluators	3.47
11	Facilitators	3.31
Amount		37.8
The average score of role of e-learning program		3.44

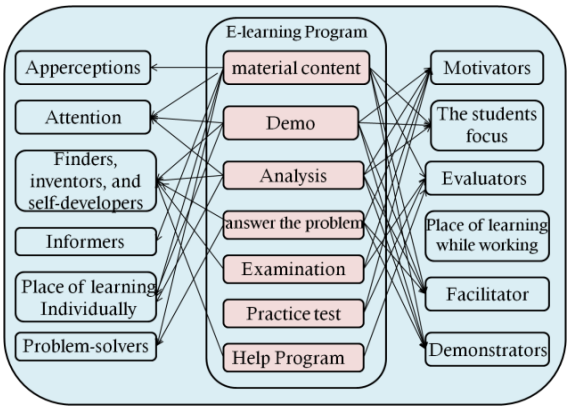

Figure 2. Relationship between module and e-learning role

Arrows (→) Shows the role that can be played by a learning module; for example, an analysis module can act as attention, individual place of learning, motivators, the student focus, facilitators, demonstrators, and finders, inventors, and self-developers.

Questionnaire data shows that e-learning programs contribute to the "Quite in contributing "category with a 3.44 score (scale 1-5). This means that the students felt comfortable in absorbing physics concepts that explain animation and changes that occur in e-learning programs. Animation and simulation were made the abstract concepts be real through the demo program and virtual experiment.

This e-learning program is equipped with several features so that it can play a role as above, and features consist of material modules that display text, graphics, curves, formulas, and demos. See Figure 3.

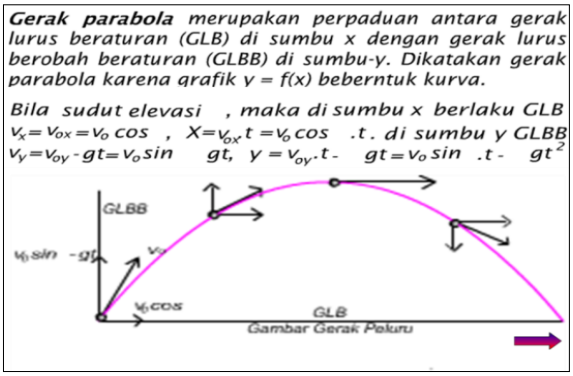

Figure 3. Content on the e-learning program

The demo module contains animated material, students can input data, and the program will display reactions to student data input. See Figure 4.

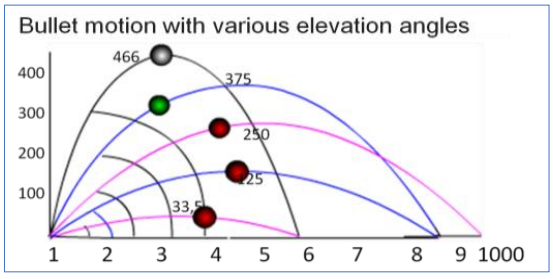

Figure 4. Animation of bullet motion with various elevation angles on the e-learning program

Analytical modules produce animations that are equipped with quantitative data on the problems posed by students. Module practice tests are in the form of multiple choices; each student's response

is directly responded to by the program by displaying "wrong" or "correct." The examination module serves to measure students' final learning outcomes. The problem answer module is a module that displays the answers to e-learning programs to the problems asked by students. The program help module is a module that contains answers to questions in the Practice Test module accompanied by a complete explanation. See Figure 5.

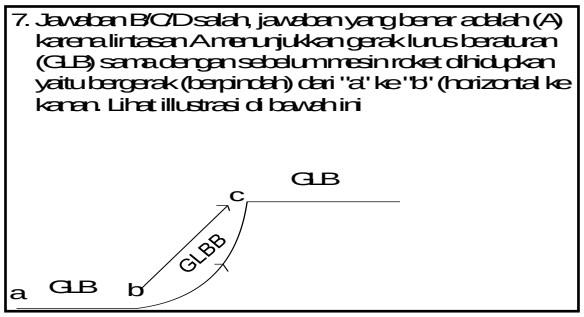

Figure 5. The program module helps on the practice

The above findings are in line with other researchers' findings, including through media E-learning students can develop mathematical abilities with a fun and meaningful learning atmosphere (Fitriana, 2018).

The results showed positive effects of e-learning on learning, so it was suggested that the development of e-learning programs be used in education (Somayeh *et al.,* 2016). The role of e-learning in the teaching and learning process in varied higher education institutions provides benefits and needs to be implemented (Arkorful *et al.,* 2014). The pedagogical dimension of e-learning stands out because it can provide learning and teaching in all forms, so that it needs to be implemented in learning (Jethro *et al*., 2012). Learning effectiveness using the E-learning Program in the experimental group was twice as good, while the learning strategy with the e-learning program was superior to traditional learning, especially in terms of learning motivation (Lin *et al*., 2014).

Likewise, other findings that say; Experts in Thailand concluded that the MILA model (Multiple Intelligences Learning Activities) has appropriate factors and is in a very good category for use in teaching and learning activities (Tangwannawit *et al.,* 2008). The activities and student learning achievements in web-based real analysis courses in the form of e-learning increased, and student learning completeness was achieved at 92.5% (Kurniati *et al.,* 2014). The study results decided that the e-learning Learning Management System using ANP analysis was used to improve the teaching-learning process at Bandar Lampung High School 10 (Hidayati, 2010). Moodle E-learning according to appropriate media experts and experts is used with a good category of 3.98 and based on beta tests including excellent categories with a score of 4.15, product testing includes good categories with a score of 3.90 and effectively improving student learning outcomes by 13.24 (Zyainuri *et al*., 2012). E-learning assisted by a virtual laboratory is valid to use, as evidenced by experts' scores for material aspects of 91.67%, media aspects of 96.75%. Student questionnaire scores for online practicum 81.30%, for the small group stage 81.50%, and are very practical to use (Agustine *et al*., 2014).

4 Conclusion

E-learning program for physics learning can be implemented through modules of e-learning. E-learning programs act as apperceptions, motivators, focusing attention, problem resolver, finders, inventors, self-developers, place of learning while working, place of learning individually, informers, demonstrators, evaluators, and as facilitators.

The e-learning program in basic physics learning is "Quite in contributing" with a score of 3.44 (scale 1-5). At the same time, the relations between the e-learning program to its role in physics learning based on theories for categories moderate, high/strong, and very high/strong amounted to 91.25%, while the category of low/weak at 8.75%. However, when based on the mean realistic for the category of a medium, high/strong, and very high/strong amounted to 76.25%, and the category of low/weak and very low/weak amounted to 23.75%.

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