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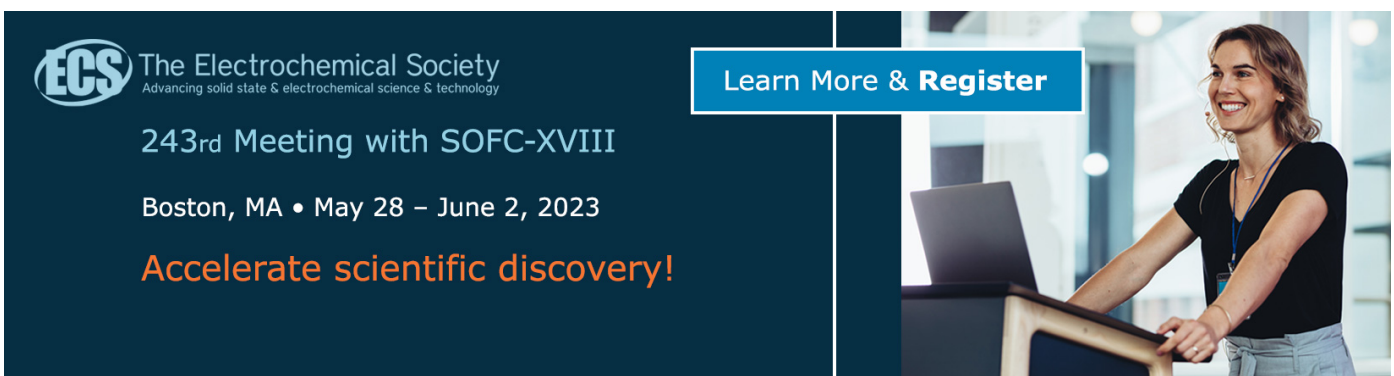
Development of Learning Media for E-Learning Schoology Research Methodology Subjects for Students of the Department of Electrical Engineering Education Faculty of Engineering Universitas Negeri Medan

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Development of Learning Media for E-Learning Schoology Research Methodology Subjects for Students of the Department of Electrical Engineering Education Faculty of Engineering Universitas Negeri Medan

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Abstract. E-learning Schoology learning is one of the Learning Management Systems (LMS) of several existing LMS. The use of Schoology aims to show the effectiveness of e-learning Schoology in improving student learning outcomes. This can be achieved if the learning outcomes of students who use e-learning Schoology can achieve value following the provisions, process skills and student activity are better than learning, not e-learning Schoology. The research subjects were students of the Department of Electrical Engineering Education, Faculty of Engineering, State University of Medan. The sampling technique used is purposive random sampling technique. The research instrument consists of test questions and questionnaires. The research hypothesis was tested by t-test. Research data obtained from questionnaires that have been filled out by media experts, design experts, material experts and students are formulated into scores, which are then interpreted into assessment criteria consisting of Bad, Poor, Doubtful, Good, and Very Good. The result of this research showed that the students who used e-learning schoology media in the Research Methodology course in the Department of Electrical Engineering Education, had higher achievement than those who did not.

1. Introduction

Corona virus epidemic outbreak which has hit 215 countries in the world, presents its own challenges for educational institutions, especially universities. To fight Covid-19, the Government has prohibited crowding, social and physical distancing, wearing masks and always washing hands. Through the Ministry of Education and Culture, the Government has prohibited universities from carrying out face-to-face (conventional) lectures and ordered them to hold lectures or learn online (Kemendikbud Dikti Circular Letter No.1 of 2020). Universities are guided to be able to hold online learning [1].

All academic activities usually carried out on campus during this pandemic must be done from home. Not only students, lecturers and staff (education personnel) are forced to work from home to prevent and accelerate the reduction of the Covid-19 outbreak. Pandemic policies and phenomena that have had an extraordinary impact and occur so quickly have forced the world of higher education to change service work patterns from conventional to online-based services.

The application of e-learning in the era of the industrial revolution 4.0 has answered learning problems during the Covid-19 pandemic. With clear instructions, students can carry out e-learning



well and even independently. Students are also seen to be active in taking lectures online. Students dare to give opinions and respond positively to learning using e-learning. Although e-learning can be used as a solution for learning in the era of the industrial revolution 4.0 to reduce the spread of covid-19, there are obstacles that need attention. These obstacles, for example, weak signals in certain areas and limited internet quotas are disturbing aspects of the application of e-learning in certain areas[2].

In the emergency period of the covid-19 disaster, Universitas Negeri Medan implemented an e learning method for all subjects by utilizing the LMS (Learning Management System). Through the LMS, students can access lecture materials, discussion boards through discussion forums, chatrooms, and access lecture assignments given by lecturers. Lecturers are also encouraged to be more creative in providing learning materials online, namely by making learning videos in the form of tutorials uploaded on YouTube, maximizing the use of Schoology, Edmodo, Google Classroom, Whatsapp Group and video conferencing applications such as Zoom, Skype, Hangouts and Webex[3].

One of the LMS that needs to be considered is Schoology (Fatur, 2013). The use of Schoology is still very few among Higher Education Institutions even though the facilities available in Schoology to support the learning process are very many, but lecturers who use computer facilities connected to the internet for learning activities are still very few. These problems make the lecturer only provide material to students with the lecture method and immediately give assignments to students without any explanation that can be said to be monotonous and boring besides that the lecturer also cannot deliver learning optimally, so that it does not foster stimulation of the enthusiasm for student learning. Low student enthusiasm for learning indicates that the quality of learning by educators is also low. This situation can be found in the Research Methodology course which is a theory course[4].

The Research Methodology course at the Department of Electrical Engineering Education, Faculty of Engineering, Medan State University is one of the subjects that is the basis for achieving key competencies in research methods science. This subject has the basic competence of students being able to practice standard research concepts from making research proposals, conducting field research, processing data, analyzing data and reporting research[5].

The main problem in learning research methodology is the use of learning methods or models in conveying the subject matter appropriately, which fulfills the content of the value order, so that it can be internalized in students and implements the essence of value education in everyday life has not fulfilled expectations as desired. This is related to the public's criticism of research methodology learning materials that do not contain practical values but are only theoretical or rote memorization in the interests of obtaining high grades or GPA. The learning method in the teaching and learning process (PBM) seems very rigid, less flexible, less democratic, and the lecturers tend to be more dominant in the oneway method. The purpose of this study is to develop and use e-learning schoology media for research methodology courses[6].

2. Research methods

The research method used in this research is research and development or better known as the Research and Development (R&D) method. According to Borg in Sugiyono (2012: 9) "Research and development is a research method used to develop or validate products used in education and learning". Development research aims to create a product that can be used in the learning process. The products produced in this study are e-learning schoology learning media. The development model used is the ADDIE development model adapted from William W. Lee and Diana L. Owens (2004). Lee and Owens' model uses several stages, namely (1) analysis or assessment, (2) design stage, (3) development stage, (4) implementation, and (5) evaluation stage. The research and development model chart according to William W. Lee and Diana L. Owens [7].

The validation questionnaire was analyzed using a Likert scale using a scale of 1 to 5 with assessment guidelines such as Table 1. The Likert scale is used to measure a person's attitudes, opinions and perceptions about a phenomenon [8].

Table 1. Criteria for Answers to Likert Scale Instruments

No	Answer	Score
1	Very Good	5
2	Good	4
3	Doubtful	3
4	Poor	2
5	Bad	1

The percentage of data obtained from the results of the validator's research is analyzed by the formula below:

$$x = \frac{\text{The number of scores obtained}}{\text{The sum of the ideal scores of all items}} \times 100\%$$

From the results of calculations using the formula above, a figure is generated in the form of a percent (%). The score classification is then changed to a classification in the form of a percentage (Sugiono, 2011), then interpreted qualitatively as listed in Table 2.

Table 2. Criteria for Answers to Likert Scale Instruments

No	Criteria	Percentage
1	Very Good	$80\% \leq x \leq 100\%$
2	Good	$70\% \leq x \leq 80\%$
3	Doubtful	$60\% \leq x \leq 70\%$
4	Poor	$50\% \leq x \leq 60\%$
5	Bad	$0\% \leq x \leq 50\%$

3. Results and Discussion

This study uses a research and development approach using three stages, namely (1) preliminary studies, (2) planning and preparation of schoolological e-learning media and (3) field testing of developed learning media. The following describes the results obtained from each stage. 1. Description of Preliminary Study Results.

The process of implementing the e-learning schoolology media development is carried out in stages. At the initial stage of this research and development is to determine the courses to be developed. The next stage is to conduct preliminary research in accordance with the syllabus. This study aims to obtain data on the needs required by lecturers and students in the lecture process. The preliminary study aims to determine the needs for media development e-learning schoolology in research methodology courses. Activities carried out at this stage are collecting data about the learning process which has been carried out by means of observation at the university where the research is located.

The trial was carried out in 4 stages, namely: (1) evaluation of material experts, media experts, and design experts, (2) individual trials, (3) small group trials, and (4) field trials.

3.1. Expert validation results

Product validation aims to find out the opinions of material experts, media experts, and learning design experts about the accuracy of the design, aspects of learning and the correctness of the content and learning design.

3.1.1. Material expert validation results. Validation of material experts on the development of e-learning schoolology media in this research methodology course was carried out by two material expert

lecturers. The assessment was carried out to obtain the information used to improve the quality of the e-learning schoology media in the research methodology course. The results of the validation in the form of an assessment score of the components of the learning media of this research methodology on the quality of the learning material can be in Table 3.

Table 3. Score of Material Expert Assessment

No	Aspect	Reviewer		Total score	Mean	Percentage (%)	Note
		1	2				
1	Content eligibility	51	48	99	5	99	Very good
2	Serving Feasibility	45	44	89	4,4	89	Very good
Total score					4,7	94	Very good

According to the material expert, the quality of e-learning schoology media in the research methodology course is worth 4.7 which falls within the very good criteria range (94%) which means "fit for use". From the results of the material expert's validation above, we can see that the quality of content and quality of presentation in this criterion are very good.

3.1.2. Results of media expert validation. The validation of the instructional media expert was carried out by two expert lecturers of learning media.

Table 4. Score of Media Expert Validation

No	Aspect	Reviewer		Total Score	Average	Percentage (%)	Information
		1	2				
1	Information Guide	13	14	27	4.5	89.9	Very Good
2	Operational <i>e-learning schoology</i>	49	40	84	4.5	89	Very Good
3	Media Systematics	14	13	27	4.5	89.9	Very Good
4	Media Aesthetics	20	15	35	4.4	87.5	Very Good
5	Principles of <i>Design e-learning schoology</i>	34	28	62	4.4	88.5	Very Good
Average Total Score					4.5	88,96	Very Good

According to learning media experts, the quality of e-learning schoology media from the aspects of information guidance, operational e-learning schoology, media systematics, media aesthetics, and the principles of e-learning schoology design is 4.5 which is in the range of criteria "worthy of being tested". The percentage of the total score of instructional media experts is 88.96% which is included in the "very good" category.

3.1.3. Design expert validation results. The validation of learning design experts was carried out by two expert lecturers of learning design.

Table 5. Design Expert Assessment

No	Aspect	Reviewer		Total Score	Mean	Prctag (%)	Note
		1	2				
1	Accuracy of Design Use	30	24	54	4,5	90	Very good
2	The Beauty of Physical Appearance	25	20	45	4,5	90	Very good

3	Format Compatibility	5	4	9	4,5	90	Very good
4	Dishes with Target Characteristics	15	12	27	4,5	90	Very good
5	Clarity of Material Exposure	15	12	27	4,5	90	Very good
Total Score					4,5	90	Very good

According to the learning design expert, the quality of e-learning schoology media in the research methodology course is 4.5 which falls within the very good criteria range. The percentage of the total score of instructional design experts is 90% which is in the "very good" category. The results of the validation by the instructional design expert are feasible to use without revision.

3.2 Results of phase I trial of individual trials.

Individual trials were conducted at Medan State University, Faculty of Engineering, Department of Electrical Engineering Education with 3 students consisting of 1 student having high achievement, 1 student having moderate achievement, and 1 student having low achievement. The purpose of this individual trial is to identify deficiencies in learning products after being reviewed by experts.

Table 6. Results of Phase I Individual Trial Questionnaires

No	Aspect	Students			Score	Mean	Percentage (%)	Note
		H	M	L				
1	Information Guide	20	17	15	52	4.3	85	Very good
2	Media Materials	60	57	51	168	4.7	93	Very good
3	Evaluation	25	24	20	69	4.6	92	Very good
4	Design and Facilities	35	33	27	95	4.5	90	Very good
5	Pedagogical Effects	25	24	22	71	4.7	95	Very good
Total score						5	91	Very good

Student responses to individual trials in the Department of Electrical Engineering Education, UNIMED are shown in table 6. It was explained that the e-learning schoology media learning from the aspects of information guidance, media materials, evaluation, design and facilities and pedagogical effects was assessed as a whole including the criteria of "Very Good" with an average score of 91%.

3.3 Results of phase II trial small group trials

Small group trials in which e-learning schoology media are implemented to 9 students in the Department of Electrical Engineering Education, UNIMED, namely 3 high achieving students, 3 medium achieving students, and 3 low achieving students. This small group trial data is used as initial experience before the product is tested in the field.

Table 7. Data on Small Group Trial Questionnaire Results

No	Aspect	Students			Score	Mean	Percentage (%)	Note
		T	S	R				
1	Information Guide	57	52	51	160	4.5	80	Very good
2	Media Materials	171	168	155	494	4.6	80	Very good
3	Evaluation	71	73	64	208	4.6	80	Very good
4	Design and Facilities	102	101	90	293	4.7	80	Very good
5	Pedagogical Effects	70	70	67	207	4.6	80	Very good
Total score						4.6	80	Very good

In table 7 above, it can be seen that the trials conducted in the Department of Electrical Engineering Education, UNIMED were carried out by 9 students, seen from the percentage of the total percentage score was "80%" so it can be said that the e-learning schoology media from the aspects of information guidance, media materials, evaluation, design and facilities, and pedagogical effects are categorized as "very good".

3.4 Results of phase III field trials

Field trials are carried out after individual trials and small group trials are carried out. Field trials were carried out in the Department of Electrical Engineering Education, UNIMED on 47 students of class 2017. Field trials produce data that will later measure the feasibility of the product being developed, as well as to determine the benefits of the product for its use. The results of the field trial evaluation can be seen in table 8.

Table 8. Field Trial Questionnaire Results Data

No	Aspect	Score	Mean	Prcntag(%)	Note
1	Information Guide	846	4.5	90	Very good
2	Media Materials	2585	4.6	92	Very good
3	Evaluation	940	4	80	Very good
4	Design and Facilities	1410	4.3	85	Very good
5	Pedagogical Effects	1081	4.6	92	Very good
Total score			4.4	88	Very good

The results of students on field trials at the Department of Electrical Engineering Education, UNIMED, batch 2018 explained that the e-learning schoology media from the aspects of information guidance, media materials, evaluation, design and facilities, and pedagogical effects were assessed as a whole, each included in the category "Very good". Table 9 shows that the total score percentage from all aspects is 88% so that if it is included in the percentage category according to Sugiyono (2011), the validation of e-learning schoology media is categorized as "Very Good".

In a field trial conducted on 47 students in the Department of Electrical Engineering Education, UNIMED students generally stated that the e-learning schoology media strongly agreed to be used and there were no problems that had to be fixed. Thus there is no revision in the field trial. The results of the assessment of the schoology e-learning media in the field trial of 47 students of the Department of Electrical Engineering Education, UNIMED, batch 2018 showed that the product developed was very good and suitable for use.

3.5 Final Product Assessment

In the early stages of product development, this product is designed and manufactured into an initial product. After the initial product is produced, it is evaluated to experts through validation and tested in various stages. The validation stage is carried out by material experts, media experts and design experts. While the research stage was carried out a series of product testing activities consisting of phase I trials, phase II trials (small groups) and field trials.

The validation process to material experts produces data that can be used to revise the initial product. After the initial product was revised, media validation was immediately carried out by media experts. From media experts, data is obtained, used as the basis for revising the second product. Then the design experts validate it. From design experts, data is obtained, used as the basis for revising the third product. After completing the third revision, a product is produced that is ready to be used for trials. The trial was carried out in three stages, namely the first stage trial, the second stage trial (small group) and field trials. The quality of this product is included in the very good criteria. This statement

can be proven from the results of the assessment analysis: Very good by material experts, very good by media experts, very good by design experts and very good when testing this product.

3.6 Operational Field Trials

Operational field testing or implementation of research and development was carried out on students of the Department of Electrical Engineering Education, Batch 2018, FT UNIMED with a total of 42 students who are currently taking research methodology courses. This operational field test aims to see the efficiency of the e-learning schoology media developed on student learning outcomes. The research was conducted for approximately 8 meetings. Student learning outcomes data from the pre-test and post-test scores. Student learning outcomes data for pre-test and post-test scores. The following is the student learning outcome data.

Table 9. Student Learning Outcomes Data

Class	Lowest Score	Highest Score	Mean
Pre Test	30	74	45.69
Post Test	46	93	64.88

Looking at the results above, it can be concluded that there was an increase in the average value of the Class 2018 Electrical Engineering Education class, FT UNIMED after the provision of schoology e-learning media. So the e-learning schoology media developed was able to improve student learning outcomes in research methodology courses in the Department of Electrical Engineering Education, FT UNIMED.

4. Conclusion

Based on the results and discussion of research and development of e-learning schoology carried out, it can be concluded as follows: The e-learning schoology media for the research methodology course is feasible for the percentage of material expert validation 94% is in the very good category, the media expert validation is 88.96% in the very good category, and the design expert validation 90% is in the very good category. For the first stage trial, the percentage of 91% was included in the very good category, for the second stage trial, the percentage of 80% was included in the very good category and for field trials for all students, the percentage of 88% was included in the very good category.

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