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DEVELOPMENT OF E-MODULE LEARNING BASICS SURVEY AND MAPPING DEPARTMENT OF CIVIL ENGINEERING FACULTY OF ENGINEERING UNIVERSITAS NEGERI PADANG

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ABSTRACT

The implementation of learning the basics of surveying and mapping has not been optimal. One of the causes is the lack of use of innovative learning media that can motivate students to learn. E-modules can be one of the solutions in complementing the right learning strategies in this digitalization era. The purpose of this study was to develop an E-Module Learning the Basics of Surveying and Mapping in the Department of Civil Engineering, Faculty of Engineering, State University of Padang. The type of research used is research and development, with a 4-D (Four-D) development model, which consists of four main stages, namely defining, planning, developing, and distributing. (disseminate). The test subjects in this study were students majoring in Civil Engineering, Faculty of Engineering, Universitas Negeri Padang (UNP). Based on the results, it was found that the design of media and materials was valid in terms of didactic, construction, and technical aspects as well as in terms of the quality of content, learning interaction, and display. This e-module also includes a very practical category based on teacher and student responses from the aspect of ease, the effectiveness of time and use, and from the aspect of time, ease, and usability of media based on student responses. Based on the assessment of student learning outcomes, it was found that this e-module is effective in improving student learning outcomes. So, it can be concluded that this e-module is valid, practical, and effective to be applied in learning interactions and displays. This e-module also includes a very practical category based on teacher and student responses from the aspect of ease, the effectiveness of time and use, and from the aspect of time, ease, and usability of media based on student responses. Based on the assessment of student learning outcomes, it was found that this e-module is effective in improving student learning outcomes. So, it can be concluded that this e-module is valid, practical, and effective to be applied in learning interactions and displays. This e-module also includes a very practical category based on teacher and student responses from the aspect of ease, the effectiveness of time and use, and from the aspect of time, ease, and usability of media based on student responses. Based on the assessment of student learning outcomes, it was found that this e-module is effective in improving student learning outcomes. So, it can be concluded that this e-module is valid, practical, and effective to be applied in learning it was found that this e-module is effective in improving student learning outcomes. So, it can be concluded that this e-module is valid, practical, and effective to be applied in learning it was found that this e-module is effective in improving student learning outcomes. So, it can be concluded that this e-module is valid, practical, and effective to be applied in learning.

Keywords: Development, E-module, basics of surveying and mapping.

INTRODUCTION

The Survey and Mapping Basics course is one of the mandatory courses that must be taken by students of the Civil Engineering Department. This course is an important course that must be followed by students of the Civil Engineering Department, because this course

is related to their work in the field of civil engineering, which includes works for all development projects, such as planning and constructing buildings, bridges, roads, and construction projects. irrigation canal. All these things require mastery and skills regarding Surveying and Mapping Fundamentals. Therefore, students must be able to understand this course well (Wicaksono et al, 2019).

However, several problems often arise in this Basic Survey and Mapping course, namely, the students doing other activities while the lecturer explains the material, the learning system is less effective due to limited media in the learning process, the lack of learning media that can be interesting and motivating. students to study. The low value of students is one of the identified factors because there are no learning media that attract students' interest in the Basic Survey and Mapping course material.

For the Basic Survey and Mapping lecture material to be better understood by students, the lecturer must be able to prepare good and interesting teaching materials. The form of teaching materials used in the world of education, one of which is a module. According to Fausih (2015), a module is a teaching package that includes a concept unit of teaching materials. In line with Anggraini (2016) also explains that the module is a complete teaching package that stands from a series of learning activities that are structured to help students achieve several goals that are formulated specifically and clearly. The module can overcome the limitations of time, space, senses, both students and lecturers. In addition, the module allows students to study independently, so that,

Therefore, lecturers must be able to develop modules that are not only by standards but also modules that are interesting and by the time to attract students' interest in learning. Currently, the demands of the times have entered the era of the Industrial Revolution 4.0. In this era of the industrial revolution 4.0, the challenges faced by education involve cultivating new technologies. Therefore, conventional modules have not met the current learning achievements that have led to digitalization. In the current era of the Industrial Revolution 4.0, the use of conventional modules is not enough, because this can reduce students' motivation to learn (Sakti & Sukardi, 2020). Therefore, the use of e-modules can be a solution in completing appropriate learning strategies in this digitalization era, the selection of e-modules is because e-modules are effective in improving learning outcomes based on previous research, many studies have been conducted on the effectiveness of the application of e-modules. -modules in learning, and the results show that e-modules have a positive effect on learning, such as in electrical engineering (Amarin et al., 2011), electronic engineering (Getuno et al., 2015), and computer networks (Alias & Hasim, 2012).

The purpose and benefits of the e-module that will be developed is as a tool in the learning process that can stimulate students' thinking, attention, feelings, abilities, and skills so that they can encourage an effective learning process. The material in this e-module is easier to understand, then the e-module that will be developed is equipped with not only text-based material but also pictures that interest students to learn. Based on the existing problems, the purpose of this research is to develop an E-Module for Learning the Basics of Surveying and Mapping in the Department of Civil Engineering. Based on the phenomena that occurred above, it can be seen that there is a gap that occurs, where lecturers still use conventional modules that have not attracted students' interest in learning. Therefore, researchers need to contribute to researching the development of the E-module Learning the Basics of Surveying and Mapping in the Department of Civil Engineering. So the purpose of this research is to develop an e-module in the subject of Surveying and Mapping Fundamentals of Civil Engineering Department.

METHODS

Research and Development (R&D) is a research method used by researchers. According to Sugiyono (2016), Research and Development research is a research method that functions to test, develop and create products so that the products that have been developed become more effective and efficient products. According to Sukmadinata (2005), research and development Research and Development is a step or process in developing a new product or developing an old product that can be accounted for.

The e-module development research procedure uses a modified 4D model development model. The development model consists of four stages, namely Define (defining), Design (design), Develop (development) and Disseminate (dissemination) but at the disseminate stage (dissemination) is carried out in a limited manner, namely only to students of the Building Engineering Education Study Program, Civil Engineering Department, Faculty of Engineering. UNP is the subject of product trials.

The subjects for the learning e-module trial in this study were students of the Building Engineering Education Study Program, Civil Engineering Department, Faculty of Engineering, UNP who took the Survey and Mapping Basics course.

The validation sheet is used to determine the validity of the developed product which consists of several aspects of the assessment of the e-module component. The validation sheet is in the form of a questionnaire filled out by the validator, whose preparation consists of making a questionnaire grid and determining the number of question items, and compiling question items based on indicators. This practicality questionnaire is used to determine the practicality of developing the designed learning e-module. This questionnaire contains responses to assessments by lecturers and students who take the Survey and Mapping Basics course. Aspects of the practicality assessment of this e-module consist of aspects of appearance, presentation of material, and benefits of learning e-modules. Effectiveness is measured by student learning outcomes who study using e-modules. The effectiveness sheet is a comparison of student learning outcomes before and after using e-modules. In this class, treatment is given in the form of e-module learning the Basics of Surveying and Mapping

RESULTS

3.1 Defining Stage

In the results of observations made in the Civil Engineering department, Padang State University in the Basic Survey and Mapping course, it is also seen that the procurement of learning media is still limited so that lecturers have not found the right way in presenting material that cannot be presented so that students can what else to learn independently during a pandemic like this. The use of existing learning media does not support teaching materials, PowerPoint media is used by lecturers in the learning process as additional media in classroom learning and student independent learning. However, the media used has a drawback in that it only contains learning material without any other supporting things such as exercises/quizzes in it.

At the student analysis stage, it was found that the age of the subjects of this study ranged from 18-20 years. Characteristics of students at that age tend to like contrasting colors, besides that they also like interesting characters or pictures. Combining color components and student creativity in learning with fun can foster student motivation in learning. Therefore, the images contained in the e-module media can help students

understand the concept of the material so that it is easier for students to understand.

Based on this curriculum analysis, it refers to the KKNI for the Basic Survey and Mapping course, in this development an e-module is being developed for the Survey and Mapping Fundamentals course. In this study, what was analyzed was the concept of the Basic Survey and Mapping course studied by students majoring in Civil Engineering, Faculty of Engineering, State University of Padang. Based on the concept analysis, the learning objectives and indicators of the courses that will be presented are then developed.

3.2 Design Stage

In this study, researchers only developed formative tests on the e-module and also pretest and posttest tests, where the formative tests will be displayed in each learning activity. In this e-module there will be a formative test for each learning activity, this aims to evaluate students' understanding after they study the material in the learning activity.

Media selection is done to identify the right learning media to present the material presented. In this study, the e-module media was chosen, this e-module contains learning content and the presentation of material in the learning. The format chosen is writing material in the form of media that is presented starting from learning objectives, material descriptions, and evaluations. The prototype design or initial design of this e-module is a design that must be made before validation and field research. At this stage, the thee-module framework is prepared in the form of a module display design. The initial page view of this e-module can be seen in Fig 1 below.

Figure 1. Cover view

The cover page is the initial screen when the e-module is opened for the first time. On the first page, there is the text of the course name. The first page also contains the author's name.

3.3 Development Stage

At this stage of development, validity, practicality, and effectiveness tests were conducted. The validation of this material was carried out by three experts on the Basics of Surveying and Mapping learning materials. The purpose of material expert validation is to determine the accuracy and suitability of the material content aspects of the developed product whether it is by learning needs. Validation assessment data is obtained after the validator provides an assessment of the learning materials contained in the e-module, the data is calculated for its validity value, the results of the validity value of the material can be seen in Table 1 below.

Table 1. Results of material validation assessment

No	Rated aspect	V	Category
1	Content Quality	0.681	Valid
2	Quality of learning	0.650	Valid

Based on Table 5 above, it can be seen that the average value of Aiken's V given from the validator is 0.681 from the aspect of content quality and 0.650 from the quality of learning which is included in the valid category, so it can be concluded that the learning materials in this e-module belong to the in the valid category. Media validation is a validation of the resulting product design. Media validation was carried out by three media expert validators. This media validation has three aspects of requirements, namely didactic requirements, construction requirements, and technical requirements. After doing the validation, the researcher will revise this e-module based on the suggestions given by the media expert validators, after that the researcher can conduct experiments. The results of the media validation assessment by the validator can be seen in Table 2 below.

Table 2. Media validation assessment results

No	Rated aspect	V	Category
1	Didactic Aspect	0.736	Valid
2	Construction Aspect	0.778	Valid
3	Technical Aspect	0.755	Valid

Based on Table 2 above and shows the average value of Aiken's V obtained from the validator is 0.736 from the didactic aspect, 0.778 from the construction aspect, and 0.755 from the technical aspect, which is included in the valid category, so that the e-module can be declared valid and included in the category of the validator. very high valid category. So it can be concluded that the e-module in the Basic Survey and Mapping course is a "Valid" media. Before conducting experiments or testing of field products, researchers must make revisions by suggestions for improvement that have been given by validators of media experts and material experts. After that, a field test was conducted to determine the level of practicality of the e-module that had been developed. Practical test data were obtained from filling out the e-module practicality questionnaire. Respondents who assessed the practicality of the e-module were lecturers and students in the Survey and Mapping Basics course. The practicality of the e-module used can be assessed by practitioners, practicality data is obtained through a questionnaire filled out by lecturers of the Survey and Mapping Fundamentals such as. The results of the lecturers' responses can be seen in Table 3 below.

Table 3. Results of the assessment of lecturer responses to the practicality of e-modules

No	Practical aspects	Total score	Percentage (%)	Category
1	Convenience	19	76	Practical
2	Time Effectiveness	11	73.3	Practical
3	Media Usage	14	70	Practical

Based on Table 3 above, shows the average percentage of each e-module practicality indicator for the Survey and Mapping Basics course based on the responses given by the lecturer through a practicality questionnaire. Based on the assessment data in Table 8 above, the percentage obtained is 76% for the aspect of convenience with practical criteria, 73.3% for the aspect of time effectiveness with practical criteria, and 70% for aspects of using media with practical criteria. These results indicate that this e-module is "practical" and can facilitate lecturers in implementing the learning process and assisting lecturers in implementing the concept of learning materials. This practical data was obtained after learning was carried out, through a questionnaire given to students. The practicality assessment data that has been given to students is then calculated to determine the practical value of the e-module. The study was conducted in one class, namely the Department of Civil Engineering, Faculty of Engineering UNP with 16 students as respondents. This data was obtained through the distribution of questionnaires given to students after learning. The overall research data can be seen in Table 4 below.

Table 4. Results of assessment of student responses to the practicality of e-modules

No	Practical aspects	Average score	Percentage (%)	Category
1	Convenience	67.5	84,375	Practical
2	Time required	63	78.75	Practical
3	Media usability	67.3	63,125	Practical enough

Table 4 above shows that the aspect of ease of use of e-modules with percentages is 84.375% in the aspect of convenience in the practical category, 78.75% in the aspect of time required in the practical category, and 63.125% in the aspect of media usability with the category quite practical. , this shows that the e-module developed is "practical" and can make it easier for students to understand the learning material. The effectiveness of the e-module is obtained from the completeness of student learning outcomes after using this e-module. Learning outcomes were obtained from the pretest and posttest of 16 students. The test subjects of the pretest and posttest were students of the Department of Civil Engineering, Faculty of Engineering - UNP. The results of the t-test can be seen in Table 5 below.

Table 5. Student Effectiveness Test Learning Results

Independent Sample t-test	
T	Exact Sig. [2*(1-tailed Sign.)]
31,234	0.000

Based on Table 5, it can be seen that the difference in learning outcomes after and before using the e-module, which was tested using a paired sample t-test where the p-value is less than 0.05 [p-value = 0.000], this means that there is a significant difference. significant student learning outcomes before and after using this e-module. Based on the results of the pretest and posttest, it can be seen that students after using the e-module got better learning outcomes than before using the e-module.

3.4 Dissemination Stage

The e-module that has been developed is a valid, practical, and effective e-learning module. This conclusion was obtained from the results of the validity, practicality, and effectiveness of the e-module at the development stage. Then this e-module is distributed to classes taking the Basics of Surveying and Mapping lectures and to lecturers in the Department of Civil Engineering, Faculty of Engineering - UNP who also teaches the Basics of Surveying and Mapping courses. This deployment stage is carried out to know the implementation of the use of e-modules.

CONCLUSION

Based on the results of the validity test, it can be concluded that the media design is valid. While the results of material validation also show that the material on the media is valid. Based on the results of the practicality test, it can be concluded that this e-module is very practical from the aspect of convenience, and the aspect of use is based on the assessment of the lecturer. In addition to the assessment from the lecturers, the practicality of this e-module was also assessed based on student responses, and the results revealed in the student response questionnaire that this e-module was very practical from the aspect of time, aspects of the ease and usability of the media. Based on the assessment of student learning outcomes from the pretest and post-test, the student's score after using the e-module was higher than the student's score before using the e-module. The implications of this research are as follows: 1) This development research has produced an e-module in the Survey and Mapping Basics course that is valid, practical, and effective. This research can provide input to education providers because the developed e-module can improve student learning outcomes; this e-module can be used as a learning resource for students in learning the Basics of Surveying and Mapping; 2) The process of using this e-module which is easy for both lecturers and students can increase the effectiveness in the learning process so that learning will be easy to implement, interesting and fun for students. Thus, this e-module can be used as a consideration for lecturers in implementing the learning process in the Survey and Mapping Basics course; 3) The findings of this study will contribute to existing knowledge, particularly in developing e-modules. The e-module used is also useful for future research or teaching and learning purposes, especially for students of civil and building engineering education at universities; and 4) The results of this study imply that the student learning process should be fun rather than boring listening to lectures. Students must participate enthusiastically in the learning process and engage in multi-dimensional learning activities. Students should also be given autonomy and freedom in making decisions so that they can gain confidence and make independent learning more effective.

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