E-Module Development of Network Systems With Tutorial Model on Motorcycle Technology

Dwi Jatmoko[1], Aci Primartadi[2]
dwijatmoko@umpwr.ac.id[1], aci@umpwr.ac.id[2]

Automotive Engineering Education, Faculty of Teacher Training and Education,
Universitas Muhammadiyah Purworejo, Indonesia[1,2]

Abstract. The purpose of this research is to design, create, and test the feasibility of e-module learning media that is correct and understandable, and is used as support for learning Motorcycle Technology. The research approach used was the creation of an e-module, located in the Automotive Engineering Education Study Program, Teaching and Education Faculty, Muhammadiyah University Purworejo. The object of this research is the creation of an e-module learning media with a motorcycle technology tutorial model. Data collection was carried out using a questionnaire, while the method used to analyze the data was an experimental analysis technique. The stages in this research consist of: (1) needs analysis, (2) development of learning design, (3) development of product design, (4) product evaluation, (5) implementation and evaluation of revised products. The results of this study are the validation score done by one material expert 82% and the score of the media expert 83%. The trial subjects consisted of: three students received an average score of 79%, an average score of eight students for the small group trial of 80%, and a score of twenty-five students for the large group trial getting 82%. From the results of the research conducted it can be concluded that the e-module media is effective for the use of motorcycle technology learning.

Keyword: website, e-modules, tutorial learning methods, motorcycle technology

1 Introduction

The need for breakthroughs in the world of education is also evidenced from the results of a survey of some students on the campus of the University of Muhammadiyah Purworejo automotive engineering education program that there is a tendency to decrease the level of learning due to lack of variation in learning methods [1]. Referring to the need for the importance of making e-modules at this time, lecturers are required to be more prepared in preparing their students to master the knowledge of motorcycle technology competence. If students can master the knowledge of motorcycle technology competency well, after graduating they will be able to easily get a job. Because of the high need for a competent workforce in motorcycle technology. If this can be implemented well then the objective of vocational education as described above can be realized [2].

The reality in the field shows that the existence of a website or e-book tendency is only used, functioned, and prepositioned as a measuring instrument in the tertiary level of accreditation. Other treatment of facilities and infrastructure as well as facilities is a favorite symbol of whether or not the university, other symbols and other statuses that only prioritize quantity, without questioning the extent of product quality and the extent of contribution and urgency of facilities and infrastructure as well as facilities valuable learning and contribute to the educational process and provision for graduates to enter the next level of education and life in society [3].

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Achievement of learning outcomes of course there are many factors that influence it, such as mastery of the material by lecturers, methods, and learning strategies, completeness of facilities and the effectiveness of the use of learning facilities that are still less than optimal. Based on this, there is a need for research to be able to solve the problem. The development of media in the learning process is an effort to improve the quality of the learning process, which in turn can improve the quality of student learning outcome [4]. One of the learning media that can be used is computers as a media based on information and communication technology. Computers can be used as aids in preparing teaching materials and in the learning process to be more effective and efficient. Software on the computer used in the development of this learning media is Portable Document Format (Electronic Module or E-Module) based on online [5]. This program can display information in the form of written material, steps for motorbike work practices, and 2D component drawings, which are in the network or published online, so students can be more interested in attending motorcycle technology courses. Based on the description above, the authors are interested in conducting research on the development of the E-Module Online System with Model Tutorials on motorcycle technology courses at Muhammadiyah University Purworejo in the Automotive Engineering Education study program [6].

This research aims to develop learning modules Motorcycle Technology is taught by a tutorial method which is then uploaded via the website. This E-Module was created by first conducting a feasibility test to the Motorcycle Brand Agent and website media expert judgment. After being evaluated and given input by experts the Discussion Forum Group is then conducted and uses modules in practical learning, through a tutorial approach. The material discussed in this e-learning module is motorcycle technology. So that this module product is expected to be a learning medium in implementing website-based motorcycle practices [7].

2 Methods

The method used in this study uses a research and development approach. Research and manufacturing methods are research methods used to produce certain products, and to be able to produce these products use research that is needs analysis. The research and development phase is carried out by developing products that are carried out in the media validation stage by media and material experts. As well as responses to student response sheets in small group tests. For the implementation phase, a student assessment of website-based e-modules is carried out using the tutorial method. Finally, a large group test or evaluation phase aims to measure the validity and effectiveness of the learning media developed.

The development of e-module learning media for motorcycle technology is raised from the problem that students feel confused about what they want to do so that when taught using the tutorial method using modules, students can actively work on the practice, in addition to that happening students can also know the steps and operational standards workshop work. The selection of e-modules as learning media is done because there is a tendency for students to like modules that have guidance or practice guidelines. And the data obtained from the analysis conducted that most students have an Android phone. So it is expected that with the motorcycle technology module material that is entered into the website, students will at any time want to learn motorcycle practice materials by reading on their own cellphones and students feel happy and accustomed to the existence of motorcycle technology modules in

which there is a standard work size. It is hoped that in addition to learning motorcycle technology by using this e-module students also learn and read articles on the internet.

Stage of making software (website and e-modules)

Design Analysis of Testing Implementation. The following is a diagram of a research method diagram created to make it easier to create E-Module Online Learning media with Model Tutorials on Motorcycle Technology courses:

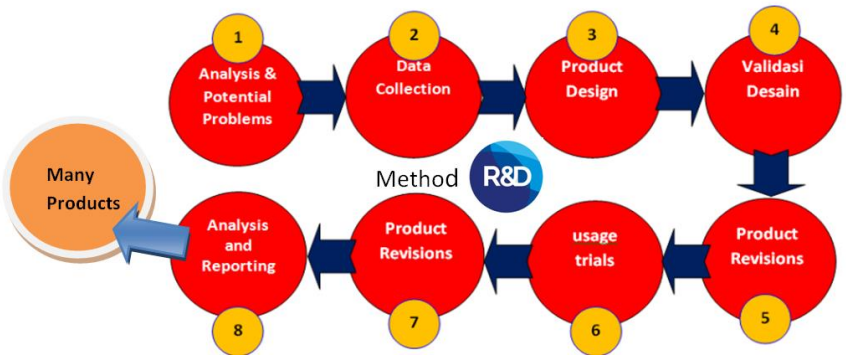

Fig. 1. Research and development method [8]

The research of making E-Module Online Learning media making with Tutorial Model in the Motorcycle Technology course was carried out in the Automotive Engineering Education Study Program, Faculty of Teacher Training and Education, University of Muhammadiyah Purworejo for 12 months. The object of research is the creation of E-Module Online Learning media with Model Tutorials on Motorcycle Technology courses. Furthermore, e-module learning media with the tutorial model is uploaded on the internet through the website.

Data collection techniques are done through the collection of documents and using a questionnaire, which is used to design the making of media and assess the suitability of the media developed with the objectives set and determine the feasibility of the e-module learning media. Respondents involved in data collection were instructional multimedia experts, material experts, and users. The results of the study were then analyzed and described.

Data analysis technique

1. Analysis of data for the media

The data analysis technique that was carried out in the first stage was to use quantitative descriptive, which was to explain the engineering product after it was implemented in software, to test the level of validation and the feasibility of the product to be implemented in the Industrial Metrology course[9]. Furthermore, communicative data is processed with the expected amount and obtained a percentage, or can be written with the following formula.

$$\text{Percentage of eligibility (\%)} == \frac{\text{Observedscore}}{\text{Expected score}} x\,100\ \%$$

Appropriate aspects of the learning media developed using the following table:

Table 1. Percentage Scale Table

Percentage	Achievement	Interpretation Value Scales
76 - 100 %	4	Very decent
56 - 75 %	3	Eligible
40 - 55 %	2	Enough
0 - 39 %	1	Inadequate

2. Analysis for media effectiveness
   a. Prerequisite Test
      According to, the normality test aims to determine whether or not the normal data to be analyzed so that the results can be known using the Chi square test (X^2).
   b. Hypothesis testing
      This test serves to test the difference in the average post-test, increase learning outcomes and learning completeness between the experimental group and the control group used the t test.

3 Result and Discussion

The need for applicative learning media is needed in an effort to facilitate the teaching and learning process, as well as motorcycle technology learning modules [10]. The motorcycle technology learning module is intended as a learning aid in the form of modules. Development is carried out through several stages in accordance with planned procedures. The results of research into the development of motorcycle technology modules are:

At this stage, identification of (1) less varied learning processes, one of which is because the media is not used to strengthen student responses, motivation, and concept strengthening so that the effectiveness of learning objectives can be achieved, (2) learning media has not been developed. In compiling a learning medium, it is necessary to analyze the objectives and contents of the program about learning, so that the preparation of the media has definite objectives and the contents of the material are in accordance with the syllabus [11]. The composition of the material and the formulation of objectives to be achieved after learning must also be considered. The instructional objectives to be achieved from the motorcycle technology learning media are so that students can understand about motorcycle technology.

In general the design of media products uses the principles of media development design [5]. This media design also refers to cognitive theory, which was stated by Piaget. This study uses six kinds of data, namely: data from the validation of material experts, data from the results of the validation of media experts, data from the results of small group trials, and data from large group trials. The data obtained in this study are data in the form of assessments from material experts, media experts, and students as well as documentation of students when using media developed by researchers, supplemented with observation data to students to explore information directly about student responses of the media that was used.

Data obtained from the results of the validation by the material expert are converted into a scale of 4. Based on the results of the processed data, from items validated by the material expert, the assessment criteria on aspects of material quality and usefulness aspects are included in the criteria very well. To provide a clearer picture of the quality of motorcycle technology learning module products according to the assessment of the material experts can be seen in the following diagram:

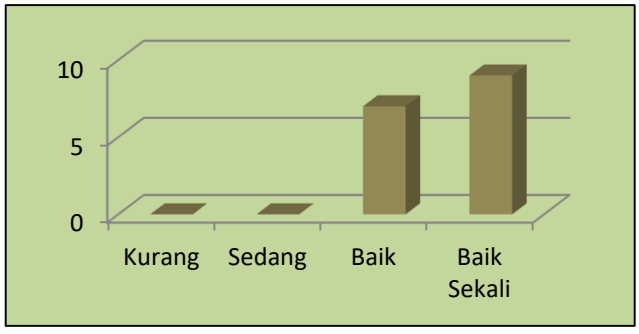

Fig. 2. Graphic assessment of the quality of learning module products by material experts

Thus it can be said that the results of the validation of the material experts, regarding the quality of computer-based learning media for motorcycle technology courses in the automotive engineering education study program developed, in terms of material aspects are very good. Nevertheless, this learning media still needs improvement based on suggestions for improvement from the material experts. Improvements can be seen in the revision section.

Furthermore, the results of the expert data validation are conducted to see the extent of the feasibility of the media developed in this study to be tested in the field.

Next the results of the data obtained from the results of validation by media experts. Based on the results of the processed data, from items that are validated by media experts, the evaluation criteria on the media aspects are included in the criteria very well. Information regarding expert assessment of the material can be seen in the picture below:

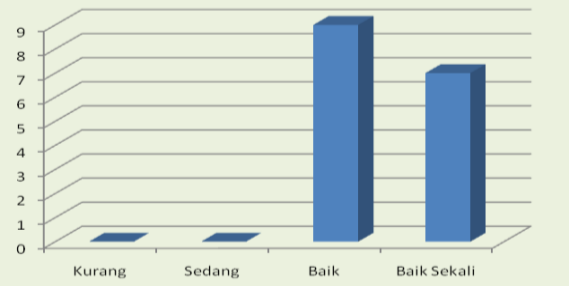

Fig. 3. Graphic assessment of media experts

Thus it can be said that the results of the validation from media experts, regarding the quality of website-based learning media for motorcycle technology courses developed, in terms of media aspects are good. Even so, this learning media still needs improvement based on suggestions for improvement from media experts [12].

The electronic learning module of motorcycle technology is said to be feasible, from the judgment of expert judgment from material and media experts, which states that the media has the criteria of "feasible". The average percentage score of 82% from material experts who stated the media was feasible, and from media experts obtained data with an average percentage score of 83%, from media experts stated that the media was feasible to use. From both media and material experts, on average they get an average percentage score of 82.5%. Based on the assessment of the material and media experts it can be concluded that the electronic media of motorcycle technology modules is of reasonable criteria. The assessment

is concluded from the aspects of the presentation of material, pictures, writing, content or content, grammar and implementation in learning.

E-module for motorcycle technology is said to be effective, if the material expert and the media expert declare that the media is suitable for use with revisions or without revisions. In this study the material expert stated that the media can be used with revisions, with input plus the procedure step using a motorcycle scanner. For media experts, it is stated that media can be used appropriately with revisions, by making the website menu more effective and making it easy to download e-module material. Based on the results of research conducted, e-modules of motorcycle technology are categorized as effective [13].

The motorcycle technology learning module is said to be effective [6] based on media response criteria, teaching methods, usage in learning, material, time, student activity, and infrastructure facilities. Discussion to plan learning the tutorial method and get the design draft and learning method In the trial module of motorcycle technology practice, it was found that student data in the small group test got a score of 79% with very decent criteria with the number of respondents three students and for the group test was getting a score of 80 % with very decent criteria with a total of eight student respondents, for the large group test a score of 82% with very decent criteria with a total of 25 student respondents.

The results of research on automotive engineering education students in the two class groups or the final stage of the test are the experimental and control classes from the use of e-modules of motorcycle technology learning and conventionally there are positive differences when using e-modules and conventionally from both class data values obtained sig 12,6 < 18,493 (table chi) for the experimental class and for the control class the value of sig 11.4 < 18.493 (table chi) then the data concluded by the two classes are normal. And for homogeneity test get a score of 2.87 < 3.3 (f table) from these data it can be concluded homogeneous. Furthermore, from this study the results of paired sample t-test were obtained, namely t-count 0.98 and sig value. (2-tailed) 0,000. So it can be concluded that if t-hit < t-table then there is a difference or with this media an increase in the effectiveness of motorcycle engineering practices. t value of 0.98 < 1.69 (t table). From the two data above, it can be concluded that the motorcycle technology learning module has effective criteria. The development of e-modules for learning motorcycle technology is said to be feasible based on feasible and effective criteria [14]. From the results of the research described in the previous point, it can be concluded that the e-module of learning motorcycle technology meets the criteria of being feasible, and effective. So the e-module of motorcycle technology learning has the criteria "Eligible" to be used as a medium for learning motorcycle technology.

This motorcycle technology learning module was developed based on a preliminary study based on the needs analysis outlined in the planning. The manufacturing process is technical, by gathering relevant references for material development. As for media development, using pdf is included on the website. Product validation goes through several stages, namely material validation and media validation, by selecting validators who are academically and professionally competent in their fields, so that comprehensive input is obtained for the feasibility of the media if tested [15]. After receiving recommendations the media are tested in the field through two stages, namely small group tests and large group tests.

Based on the results of media evaluation in operational tests it is known that the media developed by this researcher is effective and efficient for classical learning and can be used as a source of independent learning. This can be seen from the assessment of indicators related to delivery strategies, usability, website design, and operations, all of which show very good

ratings. In the operational tests of large groups as a whole get an evaluation that is converted into qualitative data, then a good media evaluation will be concluded [16].

The effectiveness of the use of instructional media is concluded through observing the indicators on the material components of the delivery strategy, this is because the delivery strategy of the material is related to indicators in assessing the effectiveness of the use of the learning module. Material delivery strategies in operational tests show valuations which indicate that component evaluations of shipping strategies can be concluded as well [17].

4 Conclusion

Starting from the background of the problem, and analyzing the needs and materials, it is known that automotive engineering education students need guidance on learning the practice of motorcycle technology which is a basic material that is considered quite difficult, then developing an e-module of motorcycle technology that contains the standard operational procedures for the workshop, after that The e-module was validated by material experts, material experts and the Forum Guide Discussion as well as small, medium and large group trials[18],[19]. Based on the results of the study, e-learning modules meet the proper criteria obtained from the average percentage of material expert scores by 82%, and media experts by 83%, and an average of two media experts is obtained by 82.5%. So that it was concluded that it fulfilled the valid criteria or was appropriate to be used. Furthermore, to meet the effectiveness criteria is shown based on student responses in the small group test to get a score of 79 percent, for the group is getting a score of 80 percent and a large group test with an average percentage of 82%.

In addition e-module learning technology motorcycle received a positive response to the normality test to get a normal score, and the homogeneity test to get homogeneous data. Furthermore, the research results obtained paired sample t-test results, namely t-count 0.98 and sig. (2-tailed) 0.000. So it can be concluded that if t-hit < t-table that is the value of t count 0.98 < 1.69 (t table), then there is a difference or with this media an increase in the effectiveness of motorcycle engineering practices[20],[21].

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