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JOURNAL	International Journal of Innovative Technologies in Social Science
p-ISSN	2544-9338
e-ISSN	2544-9435
PUBLISHER	RS Global Sp. z O.O., Poland
ARTICLE TITLE	DEVELOPMENT OF HYDRAULIC COURSE E-MODULES TO INCREASE STUDENTS' LEARNING INTEREST MECHANICAL ENGINEERING EDUCATION
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ARTICLE INFO	Siman, Keysar Panjaitan, Selamat Riadi, Budi Harto. (2022) Development of Hydraulic Course E-Modules to Increase Students' Learning Interest Mechanical Engineering Education. <i>International Journal of Innovative Technologies in Social Science</i> . 4(36). doi: 10.31435/rsglobal_ijitss/30122022/7932
DOI	https://doi.org/10.31435/rsglobal_ijitss/30122022/7932
RECEIVED	15 November 2022
ACCEPTED	12 December 2022
PUBLISHED	21 December 2022
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DEVELOPMENT OF HYDRAULIC COURSE E-MODULES TO INCREASE STUDENTS' LEARNING INTEREST MECHANICAL ENGINEERING EDUCATION

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DOI: https://doi.org/10.31435/rsglobal_ijitss/30122022/7932

ARTICLE INFO

Received 15 November 2022

Accepted 12 December 2022

Published 21 December 2022

KEYWORDS

Engineering; E-Module;
Hydraulic; Learning.

ABSTRACT

The development of printed module teaching materials in the form of hard copies into electronic-based modules with an android system or better known as Android-based E-Modules, with this electronic media it can attract students' interest in reading because it makes it easier for students without connecting to the internet continuously. This electronic module can also help students study independently and is a good choice for developing a module. Electronic modules are innovative media that can increase interest in learning. Digital E-Module development uses a research and development (R&D) approach, which is a process used to develop and validate products. Data collection techniques in validating learning material products are carried out by distributing questionnaires. This research was designed in three stages, namely (1) Research in the form of planning and formulation of learning objectives. (2) Development in the form of making E-Modules (3) Formative evaluation and revision by material experts, media experts, and learning design experts as well as one-to-one evaluation, small group, and field trial. With these three stages of research and development, it is hoped that the resulting E-Module is feasible to implement and can attract students' learning interest to produce student knowledge in hydraulics not only in the field of education but also in the industrial sector.

Citation: Siman, Keysar Panjaitan, Selamat Riadi, Budi Harto. (2022) Development of Hydraulic Course E-Modules to Increase Students' Learning Interest Mechanical Engineering Education. *International Journal of Innovative Technologies in Social Science*. 4(36). doi: 10.31435/rsglobal_ijitss/30122022/7932

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Introduction.

The learning process in the classroom is influenced by several things, namely lecturers, student activity, facilities, infrastructure, methods, and learning media (Wibowo, 2016). The use of less varied methods, the lack of use of learning media, and learning that always emphasises student learning outcomes without paying attention to the learning process can cause the learning process to seem monotonous and less creative (Sujarwo et al, 2020). The purpose of using media in the learning process is to streamline and streamline the learning process (Ayuningtyas, Fadhilah, & Arifin. 2018). Teachers

are required to be able to choose and present appropriate and efficient learning methods and media because they are very influential on success in achieving learning objectives.

Students want new learning media that can make it easier for students to understand the material. The subject of hydraulic systems is one of the subjects that must be mastered by every student majoring in mechanical engineering. The material for hydraulic systems is quite difficult when studied with ordinary printed modules, because students need a real picture that explains the basics in hydraulic systems such as working principles and the basics of hydraulic circuits (Hidayatullah, 2020).

According to Perdana & Sarwanto, (2017) an electronic module is a form of presenting self-study material that is systematically arranged into smaller learning units to achieve certain learning objectives which are presented in an electronic format where there are animations, audios, navigations that make users more interactive with program.

Electronic modules (e-modules) are almost the same as e-books. The difference is only in the content of the two. The Encyclopedia Britannica Ultimate Reference Suite explains that an e-book is a digital file containing text and images suitable for electronic distribution and display on a monitor screen similar to a printed book. E-module or electronic module is a module in digital form, which consists of text, images, or both containing digital electronic material. Electronic modules (e-modules) can be defined as a form of presentation of materials self-study that is systematically arranged into learning units to achieve certain learning objectives, which are presented in an electronic format that is learning activities in it with links as good navigation make students interactive with the program, equipped with video presentations tutorials, animations and audio for a learning experience (Gunadharna, 2011)

Electronic modules are innovative media that can increase interest in learning. A learning process in order to be able to improve the achievement of learning outcomes needs to be supported by the right learning guide. This is because face-to-face time is very limited when compared to the volume of material that must be completed. Therefore, a learning guide is needed that is able to activate students in learning. Among the learning guides that allow for improving student learning outcomes and prioritizing students' active independence are electronic modules. This is in line with the results of research from Ruslan & Rauddin (2022) which shows that with the use of e-modules students can learn to easily absorb or accept and understand the material presented by the lecturer so that students' abilities are more improved than before. E-modules are also practical and effective media used in independent learning.

The use of E-module can be used as a support for teachers in teaching and learning activities and teachers can apply a combination of face-to-face learning at school and distance learning. Students can learn independently by using e-modules without being limited by space and time. (Ahmadi, 2022)

The objectives of the research to be carried out are: Developing E-Modules in hydraulics courses, Knowing the effectiveness of developing E-Modules in hydraulics courses to increase student interest in mechanical engineering. Get a higher score on hydraulic learning outcomes using E-Modules.

Changes in learning activities will be seen, attention to learning that will be carried out will affect learning outcomes. So that the development of e-module media is expected to increase or increase student interest in learning. With the condition of progress, how technology is a problem or an increase in changes in conventional learning activities to technology-based learning can increase student interest in learning in hydraulics courses and make learning easy to reach. With the development of e-module media, it can provide encouragement for students to learn independently.

This product development research is directed to produce a product in the form of learning media that is used to improve the learning process and student interest in learning so that it affects learning outcomes.

Method.

The development of learning materials that are used as the basis for this research and development is the Dick and Carey development model, considering that the steps for developing this model are more complete and specific, a research flow chart that describes the research steps, as for the following: Literature study, field study, development of learning materials, validation, feasibility test and finally effectiveness test.

The data in this study were analyzed qualitatively, and the data collection instruments developed in this study were related to the data collection techniques carried out at each stage of the study, namely: Questionnaires, used to ask questions and observations in the development and expert validation stages,

as well as tests learning outcomes in the form of objective tests and action tests are used to measure the increase in student competence.

The next process is to collect various data or information that can be used for product planning. This activity is expected to be carried out so that the media produced does not deviate from the learning objectives. This study shows that there is a difference in the effect of using hydraulic e-modules on student learning outcomes that show the highest scores than before. Therefore, the resulting media needs to be analyzed first with a feasibility test in order to know the feasibility level of the E-Modul before being tested on students.

Result and Discussion.

The first step is to analyze and obtain the results of media product development, where the first step is the validation process, and then to the next stage. This validation aims to determine the quality of the material. The assessment is carried out by material expert validators. The results of the validation are in the form of an assessment score for the material aspects with learning media. Based on data obtained from material experts, 88.75% Very Good. As input for improving the quality of the material.

To determine the quality of material presentation in the development of digital learning media. Where the assessment puts forward the instructional system of learning objectives and how the developed E-Module can provide students' understanding of the problems/topics being studied. Based on data obtained from learning design experts on the assessment of learning design, 89.17% is very good. Media expert validator by assessing the suitability aspects of the developed E-Module media. Based on data obtained from media experts, 89.31% is very good for the feasibility of the Hydraulic E-Module learning media. The recapitulation and analysis of the material expert's assessment is as follows:

Table 1. Average Percentage of Expert Validation Assessment Results on Media E-Module Learning in Hydraulic Course

No.	Aspect	Average Percentage	Category
1.	Material Expert Validation	88,75%	Very good
2.	Learning Design Expert Validation	89,17%	Very good
3.	Media Expert Validation	89,31%	Very good
Average Amount		89,08%	Very good

Shows that respondents stated that the E-Module learning media in the Hydraulics course at the expert validation stage stated "Very Good" to increase student interest in learning and was suitable for use in the learning process. The next stage is the group feasibility test.

Table 2. Average Percentage of Test Result Assessment Against Media E-Module Learning in Hydraulic Courses to Improve Student Interests

No.	Aspect	Average Percentage	Category
1.	One to One	89,92%.	Very good
2.	Small Group	91,55%	Very good
3.	Field Group	93,06%	Very good
Average Amount		91,51%	Very good

Shows that the respondent's value of digital learning media in the engineering mathematics course states "very good" where the average value of each aspect is 91.51%, then this value states that the E-Module learning media in the Hydraulics course is very good if it is a medium which is used during the learning process which is currently included in the digital world and the virtual world.

The research phase is testing the effectiveness of the product or media. After processing the data, the maximum, minimum, average, standard deviation and variance data will be obtained. To find out the learning outcomes of students before using the Hydraulic E-Module learning media.

To find out student learning outcomes after using the Hydraulic E-Module learning media where the media can be said to be effective or not to be used in increasing student interest in learning so that an analysis is carried out after using the media.

Table 3. Pretest and Posttest Normality Test Results

No	Uji	<i>x²hitung</i>	<i>x²tabel</i>	Conclusion
1	Pretest	-25,25	2,85	Data is normally distributed
2	Posttest	-23,37		Data is normally distributed

Hypothesis testing is done by conducting a t-test of research data. Independent sample t-test is one way to find out whether two sample groups have a significant difference in average or not.

Table 4. Hypothesis Testing (t hitung)

t hitung	t tabel	Conclusion
2,27	1,71088	Significant (There is an increase in learning outcomes)

Based on the table above, it can be seen that the results of the calculation of the statistical t-test obtained the t-count value of 2.27 and the t-table value of 1.71. This means that t-count > of t-table means that Ho is rejected and Ha is accepted. These data prove that there is a significant influence of learning media to improve learning outcomes.

This is in line with the research results of Ramadhani & Yudiono (2020) that quality learning E-modules help improve student learning outcomes. This research is with relevant research from Herawati & Muhtadi's (2018) research. The results show that interactive electronic modules (e-modules) for class X SMA according to material experts, media experts are in the appropriate category. In general, the application and use of e-modules can be carried out with appropriate categories and receive positive responses from students. There is a difference in learning outcomes between the pre-test results before using the e-module and the post-test after using the e-module with sig < 0.05.

In line with that, Sidiq & Najuah (2020) mention that the results of the Emodule Development research are that it can build, trigger, strengthen student interest in learning independently and the learning process is more effective, efficient so that there is an increase in the quality of learning. This proves that the e-module learning media is suitable for use in the learning process at school and independently.

Conclusions.

The results of the Feasibility of Media Products, obtained results from expert validators, for material experts obtained 88.75% results, for learning design experts obtained 89.17% and media experts 89.31%, so it can be stated that the E-Module learning media hydraulics are suitable for use in the learning process. The results of the Group Trial obtained results from the three groups, namely the one to one trial of 89.92%, then the small group group of 91.55% and the field group group of 93.06%, and obtained an average of 91.51 %, it can be stated that the hydraulic E-Modul learning media is feasible to be used to increase student interest in mechanical engineering education at the Faculty of Engineering, Unimed.

The increase in learning outcomes was obtained before and after using the hydraulic E-Modul learning media (pretest-posttest). The average of each test is 63.81 and 88.54. Having each value normally distributed, based on the t-test calculation, tcount = 2.27 and ttable = 1.71088 at = 5% with dk = 26-1 = 25, so it can be concluded that there was a significant increase between the pretest and posttest using the E-Modul Hydraulic course.

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