



Development of flip pdf corporate-based e-module in learning physics of work and energy material for Class X Students of Madrasah Aliyah

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ABSTRACT

This research was conducted with the following objectives: 1) developing an e-module based on Flip PDF Corporate on learning physics in work and energy materials for class X students, 2) investigating the feasibility of an e-module based on Flip PDF Corporate in learning physics of work and energy material, 3) investigating teachers' responses to the Flip PDF Corporate based e-module on work and energy material produced in this research, 4) investigating students' responses to the Flip PDF Corporate-based e-module on work and energy materials produced in this study. This development research refers to the five steps of the ADDIE development design (analysis, design, development, implementation, and evaluation). The product has been validated by material experts, media experts, linguists experts. Data collection used interview guidelines, expert validation sheets, teacher response sheets and student response sheets. This research produced a product in the form of an e-module based on Flip PDF Corporate and it was very feasible to use with eligibility criteria including media experts 89%, material experts 93%, and linguists experts 97%. Teachers and students gave very good responses to the use of the e-module product developed in this study.

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INTRODUCTION

Basically the meaning of education itself in the National Education System Law number 20 of 2003 is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual strength, religion, self-control, personality, intelligence, skills and noble character needed by himself and society. Education is the capital to move to a better stage and as a provision to survive in the future. This is in accordance with the expression (Nurseto, 2011) which explains that learning activities require reducing the lecture method and replacing it with the use of media that is in accordance with advances in educational technology and learning technology because now the role of learning

media is becoming increasingly important. The role of the education unit is very dominant in determining the quality of education. The quality of education can certainly be improved through an effective learning process. Therefore, every school should be able to design and prepare the learning process carefully and always pay attention to the needs of every student in the school concerned (Melindawati, 2016).

Learning is an opportunity given to students to construct knowledge in their cognitive processes so that they really understand and can apply knowledge for themselves and strive to realize their ideas. Because the learning process is essentially a communication process, namely the process of delivering messages from the source of the message through certain media to the recipient of the message. The message to be communicated is teaching materials according to the curriculum (Sadiman et al., 2010). Physics is a part of science that focuses its studies on matter, energy, and the relationship between the two. In learning physics students are faced with many physics concepts that are interconnected with one another. One important thing that needs to be considered in supporting physics learning so that the delivery of concepts can be better, namely the availability of learning supports, one of which is in the form of learning media (Gunawan et al., 2015; Saprudin et al., 2018).

With advances in information technology, educators can pursue this by looking for teaching materials or those that can help educators' creativity in teaching, such as the use of printed teaching materials into digital teaching materials that have quality, attractive appearance, and are economical. One of the learning media that is expected to create an interesting and conducive learning atmosphere is the use of Flip PDF Corporate. In the current era, the right module in the learning process is an electronic module or e-module (Saprudin et al., 2021; Saprudin et al., 2022; Marinda et al., 2023; Wahab et al., 2023). E-module is an electronic module whose access is carried out through electronic devices such as computers, mobile phones, tablets. The e-module is considered more innovative because it presents the material in full, especially now that students often open their cellphones rather than books. With the e-module students can use their cellphones to study. Another advantage of e-modules is that they can provide information in the form of images or even videos, thus making students more enthusiastic about learning. Following are some of the advantages of e-modules compared to conventional modules, namely e-modules are considered more attractive because they are equipped with pictures, videos and so on, more interactive because students can evaluate independently, paper-free because they are electronic, multi-platform because they can be used via computers, laptops and cellphones (Partono, 2019).

Based on the results of preliminary research on the application of instructional media conducted at one of the Madrasah Aliyah in the City of Tidore Kepulauan in class X IPA physics learning, information was obtained that there were adequate facilities in schools to support the implementation of learning activities in class, but teachers had not used them optimally. In the learning process, the teacher still uses lecture methods and less varied media such as print media and PowerPoint presentations, showing video shows and several practical tools. Students who stated that they liked physics subjects were only 30%, the rest of the students said they did not like physics subjects. This is because as many as 70% of students find it difficult to understand the material. The lack of use of interactive learning media causes the physics learning process to become less interesting and less enjoyable. The development of e-modules is very much needed as an effort to provide learning resources with a more varied, more interactive presentation of subject matter and of course it makes it easier for students to understand the subject matter. In addition, the existence of this e-module is expected to motivate students to be able to learn so that it can have an impact on increasing student learning outcomes, especially in the material of work and energy.

RESEARCH METHODOLOGY

This development research follows the ADDIE stages which include the stages of analysis (Analysis), design (Design), development (Development), implementation (Implementation), and evaluation (Evaluation). Data collection for e-module product validation based on Flip PDF Corporate has been carried out through validation sheets involving media experts, material experts and linguists. The implementation phase was carried out by involving 21 students of class X IPA at one of the Madrasah Aliyah in the City of Tidore Kepulauan, North Maluku, Indonesia. Types of data, data collection techniques and instruments used in this study are shown in Table 1.

Table 1.

Types of data, data collection techniques and research instruments		
Data Type	Data collection technique	Instrument Type
Flip pdf corporate product validation data for e-modules	Non test	Validation sheet
Teacher response	Non test	Questionnaire
Student response	Non test	Questionnaire

In this development research the type of data used is qualitative and quantitative data. The validation questionnaire uses a Likert scale with five choices of assessment scores, namely 1 = Strongly disagree, 2 = Disagree, 3 = Fairly good, 4 = Agree and 5 = Strongly agree (Sugiyono, 2016). Each score is calculated by a formula. The formula used to calculate the data from the validation test results of media, material and language experts is the percentage analysis technique (Ernawati & Sukardiyono, 2017).

$$\bar{X} = \frac{\sum X}{N} \times 100\% \quad (1)$$

Table 2.

Interpretation of eligibility criteria		
No	Score in percent (%)	Eligibility Category
1	<21	Very Unworthy
2	21-40	Not feasible
3	41-60	Decent Enough
4	61-80	Worthy
5	81-100	Very Worth it

Student and teacher response questionnaires were used to find out responses to the media developed by researchers. The response questionnaire contains 13 statements regarding the Flip PDF Corporate-based e-module developed by researchers, using a Likert scale. Scores obtained from student and teacher responses were then converted into percentages (Putri et al., 2020).

Table 3.

Assessment of teacher and student responses		
No	Category	Mark (%)
1	Very good	81.25 ≤ score ≤ 100
2	Good	62.50 ≤ score ≤ 81.25
3	Not good	43.75 ≤ score ≤ 62.50
4	Not very good	25 ≤ score ≤ 43.75

RESULTS AND DISCUSSIONS

Findings at the analysis stage

Results analysis curriculum on work and energy material for class X even semester. Basic Competency 3.9 namely analyzing the concept of energy, work, the relations of work and energy

changes, the law of conservation of energy, and its application in everyday life. The material for work and energy is one of the materials that is considered difficult for students to understand because the atmosphere seems boring and the learning media used is not very attractive.

The results of the literature review found that in the development of e-modules for learning physics, much has been done on the subject matter of the photoelectric effect and X-rays (Nurasni et al., 2023), fluid dynamics (Liana et al., 2022; Nikita et al., 2018), heat and temperature (Himma, 2019; Wahab et al., 2023), Newton's laws (Amelia, 2022), vector (Mauwarni & Sinuraya, 2022), Newton's law of gravity (Lumban Gaol, 2020), sound and light waves (Elfa, 2022; Saprudin et al., 2022; Marinda et al., 2023), solar system (Mabruroh, 2022), elasticity and hooke's law (Erlina et al., 2022).

The results of preliminary observations at one of the Madrasah Aliyah in Tidore Kepulauan City which were carried out by filling out a questionnaire obtained the following information: 1) there are facilities owned by the school to support the learning process, 2) students still consider the material work and energy difficult, 3) lack of media learning used by the teacher in the learning process, 4) learning media are needed that can make students easily understand the material conveyed by the teacher, namely using learning media that can present subject matter in the form of text, images and videos and can be learned at home or at school .

Findings at the Design Stage

At this stage the e-module product storyboard design for work and energy material is generated, in the form of a Word document and converted into a PDF document which will then be designed for e-module products using the Flip PDF Corporate edition 2.4.9.18 application. In preparing the design which contains the cover (main view), preface, concept maps, core competencies, basic competencies, indicators and learning objectives for work and energy materials, examples of summary quiz questions, evaluations, pictures and learning videos.

Findings at the Development Stage

At this stage, an e-module product based on Flip PDF Corporate has been designed with the initial product still in the form of a word document and converted into PDF form, then it is designed using the Flip PDF Corporate edition 2.4.9.18 application. The results of the e-module product validation developed are shown in Tables 4, 5 and 6.

Table 4.
Media expert validation data

Aspect	Component	Percentage
graphics	E-module size	92%
	E-module Cover Design	89%
	E-module Content Design	89%
	Display Design (Presentation Design)	89%
E-module application	Ease of Interaction (Interaction Usability)	87%
	Accessibility	87%
	Compliance Standards	87%
Average		89%

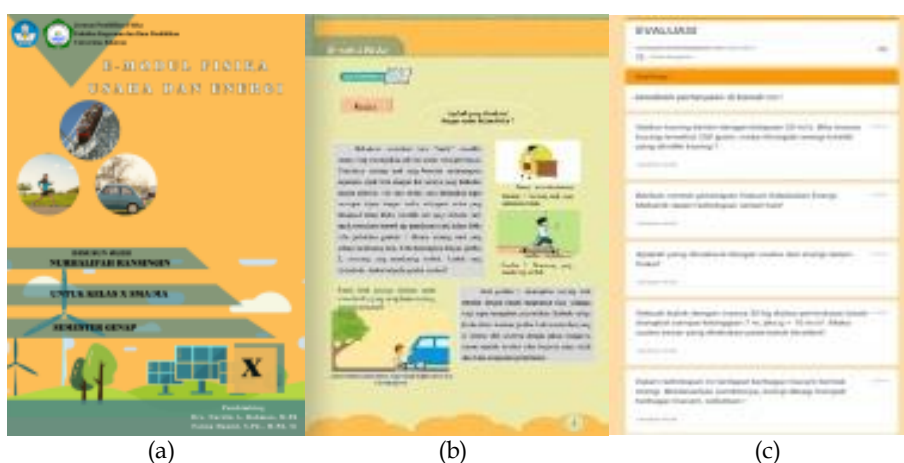
Table 5.
Material expert validation data

Aspect	Component	Percentage
Content	Appropriateness of the Material	94%
	Description	94%
Eligibility	Material Accuracy	92%
	Material Update	98%
Eligibility of Presentation	Serving Technique	93%
	Presentation Support	88%
Average		93%

Table 6.
Data validation results of linguists

Aspect	Component	Percentage
Language	The accuracy of the use of language	97%
	Communicative	93%
Eligibility	Suitability with the development of students	100%
Average		97%

Tables 4, 5 and 6 show that the developed Flip PDF Corporate based e-module product is stated to be very suitable for use in learning.



Gambar 1. Display of E-module based on Flip PDF Corporate (a) Cover/main view, (b) Material, (c) Evaluation

Findings At the implementation stage

The implementation phase was carried out by involving 1 physics teacher and 21 students of class X on science program at one of Madrasah Aliyah in the City of Tidore Kepulauan. Implementation is carried out using e-module products developed in physics learning. After the implementation is done, the teacher and students were given a questionnaire to explore their responses to the e-module product developed in this study.

Findings in the Evaluation Stage

At this stage, an evaluation of the results of the implementation of the use of e-module products used in learning is carried out. The results of the teacher and student questionnaire analysis showed that teachers and students gave very good responses to the use of the Flip PDF Corporate based e-module product developed in this study. For more details, teacher and student responses are shown in Tables 7 and 8.

Table 7.
The results of the teacher's response

Assessment Indicator	Score obtained	Maximum Score	Percentage
Compatibility with KD	20	20	100
Material update	19	20	95
Material accuracy	46	50	92
E-module quality	77	80	96
Total number		162	
Maximum amount		170	
Average		96	
Criteria		Very good	

Table 8.
Results of student responses

Assessment Indicator	Score obtained	Maximum Score	Percentage
Material compatibility	300	315	95
Interest	300	315	95
Material accuracy	195	210	93
E-module quality	510	525	97
Total number		1305	
Maximum amount		1365	
Average		96	
Criteria		Very good	

The drawback of the e-module product developed in this study is that it requires media that require an internet network to be able to access, namely evaluation so that a stable network is needed, and not yet equipped with student worksheet (LKPD). The advantages of this e-module are that it can help students learn independently, the learning atmosphere is not boring, and students become more active in answering questions. This e-module can be accessed via mobile phones, laptops or computers to be studied.

CONCLUSION

Flip PDF Corporate-based e-module on work and energy material products have been successfully developed in this research. The validation results of media experts, material experts, and linguists stated that the resulting e-module products were very suitable for use in physics learning. The implementation results show that teachers and students provide very good responses to the use of e-module products produced in this study. Through the development of e-Modules in this study, work and energy materials can be presented in a more varied form in terms of text, images, video, audio, quizzes, simulations, and automated assessments assisted by Google Forms. However, the limitations of the resulting e-module lie in features that can only be accessed with an internet network such as automated assessments assisted by Google forms.

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