IJIER 1(2) (2025)

Indonesian Journal of Innovation in Education Research

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Contextual-Based E-Module Development Using Flip PDF Professional Application on Static Fluid

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Received: 29 May 2025
Revised: 30 June 2025
Accepted: 01 July 2025

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DOI:
https://doi.org/10.63980/ijier.v1i2.56

Abstract: This research was based on students' need analysis at SMAN 1 Kahayan Kuala and found that they faced difficulty learning physics, mainly static fluid material. There was a high need for an alternative teaching material that could be understood independently and more attractive and contained phenomena or occurrences related to the physic and the surrounding environment. Because of that, this research aims to know 1) the Procedure of the E-module based on contextual using PDF Flip Professional application on static fluid material. 2) Quality of E-module based on contextual using PDF Flip Professional application on static fluid material. 3) Students and teachers' responses on this e-module. This study used Research and Development in short R&D and 4D models. Phases were defined as design, development, and dissemination. But in dissemination phase was limited only to the research place. Results showed that 1) Procedure in developing an e-module involving students' need analysis, designing the product, validating by design, material and learning experts and testing on small groups. 2) Quality of the e-module was tested through validity by media experts and was obtained at 92.95%, stated as very feasible. Next, validity from media experts was obtained at 95,9%, stated as very feasible. Then validity from learning experts was obtained 89,30% stated as very feasible. 3) Students' response on e-module was obtained 95,09% stated as very good, and teachers' response was obtained 92.8 stated as very good.

Keywords: E-Module; Flip Pdf Professional; Static Fluid; Contextual.

Introduction

The development of science and technology in the 21st century is closely related to physics. Physics as a science that studies natural phenomena and their relationship to everyday human life, is also influenced by advances in science and technology. In physics learning, the use of technology and effective learning methods can provide a fun experience and encourage students to be active, creative, and independent (Pilendia et al., 2020). In this context, science and technology can provide a new approach to teaching and learning physics, through the use of applications and technological tools that support the understanding of physics concepts interactively and practically. However, the challenge is the perception that physics is difficult to learn, which can be overcome with the right learning approach and in-depth understanding of concepts. In the era of science and technology, understanding physics is becoming increasingly important because it is closely related to everyday life situations and the technology used (Yuniani et al, 2019).

Physics learning which is dominated by theories and formulas makes it difficult for students to understand the material. Students tend to consider physics as reading material and only memorize formulas without understanding the objectives and concepts (Ongkohardjo et al., 2016.) The success of physics learning is highly dependent on the methods and teaching materials used by educators. An educator needs to act as a facilitator who is able to create effective

How to Cite:
Aprilia, A., Rohmadi, M., & Syar, N. I. (2025). Contextual-Based E-Module Development Using Flip PDF Professional Application on Static Fluid. *Indonesian Journal of Innovation in Education Research, 1*(2), 39-44. https://doi.org/10.63980/ijier.v1i2.56

learning, facilitate the teaching and learning process, and inspire students to develop independent learning abilities. In addition, an educator must also understand the core knowledge and skills of physics and be able to explain physics concepts and their applications in everyday life (Rahmah & Masyikuri, 2017).

Based on the results of interviews with physics teachers at SMAN 1 Kahayan Kuala related to the learning process that usually takes place, several problems were obtained, including: the implementation of current physics learning, namely Face-to-Face Learning (PTM). The obstacles experienced by educators in teaching physics material are demonstrating and explaining the material to students. Sometimes to explain physics material, educators use Power point (PPT) media, textbooks and the internet as learning resources for students. Educators have never created or used contextual-based e-modules.

The results of providing a needs analysis questionnaire to Class XI students at SMAN 1 Kahayan Kuala, this questionnaire was distributed online with the Google Form platform. This questionnaire was filled out by 24 students, the results obtained were that students had difficulty understanding the static fluid material. 95.8% of students do not have a physics guidebook to study at home. Students need teaching materials that can be understood independently. 70% of students have never used electronic modules (e-modules) in physics learning. 75% of students do not know and want to try learning using electronic modules (e-modules). 91.7% of students need electronic modules (e-modules) that can relate physics materials to the surrounding environment or daily life in static fluid materials. Students also like it when e-module teaching materials are developed which contain images, videos and animations that can make it easier for students to understand and master physics concepts independently.

From the description above, it can be concluded that most students still face difficulties in learning static fluid material. Therefore, the right step to improve and enhance understanding in learning, especially in static fluid material, is to choose appropriate teaching materials. In addition, the use of e-modules also allows innovation in classroom learning, especially if the e-module can be accessed by students outside the classroom.

E-modules or electronic modules are teaching materials that use technology in 21st century learning. Initially in the form of printed modules, e-modules change their presentation into electronic format (Effendi & Wahidy, 2019.). Its advantages lie in the interactive nature that facilitates navigation, contains images, audio, video, animation, and tests/quizzes with automatic feedback (Redy Winatha et al., 2018). E-modules provide benefits in increasing the effectiveness and attractiveness of learning, can be accessed anytime and anywhere, used independently by students at school or at home, and improve the quality of learning. (Komang Priatna et al., 2017) E-module development requires a focused, structured, and systematic approach, method, and model. (Syafutri & Pramudya, 2019). Therefore, this study combines e-module development with a physics learning approach.

Physics learning requires a learning approach that can connect facts, concepts, and problem solving with the surrounding environment (Yuniani et al., 2019.). One approach used is the contextual approach. The contextual approach allows educators to link subject matter to real-world situations of students, and encourages them to apply knowledge in everyday life as part of the family, school, community, and country. The goal is to provide relevant meaning from the subject matter in the lives of students (Sagala, 2013).

Development research by Astiti (2019), has conducted the development of contextual-based teaching materials. The results of the study show that contextual-based teaching materials have the potential to improve students' cognitive abilities and conceptual understanding. The development of contextual-based physics teaching materials can be applied widely, both in schools and at home, so that students can learn independently.

Teaching materials in the form of contextual-based e-modules will be created using the Flip PDF Professional application. Flip PDF Professional is software that allows the creation of interactive book pages with multimedia integration such as images, videos from YouTube, audio, hyperlinks, quizzes, flash, and others (Nurbaiti et al., 2021). This application has various advantages, one of which is ease of use and its ability to be published in HTML format and can be accessed online. This advantage is supported by research conducted by Indah Sriwahyuni et al. (2019) which shows that the use of Flip PDF Professional media in physics learning has several advantages, such as building understanding of physics concepts and student interests through an attractive appearance, the presence of learning videos and interactive quizzes. In addition, this media can be used as an independent learning tool that can be accessed online and flexibly anytime and anywhere. With the development of this e-module, it is hoped that students can easily improve their understanding, master the material, face problems, and achieve optimal results in learning.

Method

The type of research is a type of development research or R&D that uses a 4D development model. This study uses a 4D development model (four D model) consisting

of 4 stages, namely the stages are definition, design, development, and dissemination. However, at the dissemination stage, the dissemination is limited only to the place where the research takes place, not to the effectiveness of the product. At the definition stage, an analysis of student needs is carried out, design is designing the product to be developed, development is writing material, making and editing text, and validation by experts and producing contextual-based e-modules after small-scale trials. The quality of the e-module is tested through the validity of the e-module by experts and the attractiveness of the responses of educators and students is measured. The following is a schematic diagram of the development model.

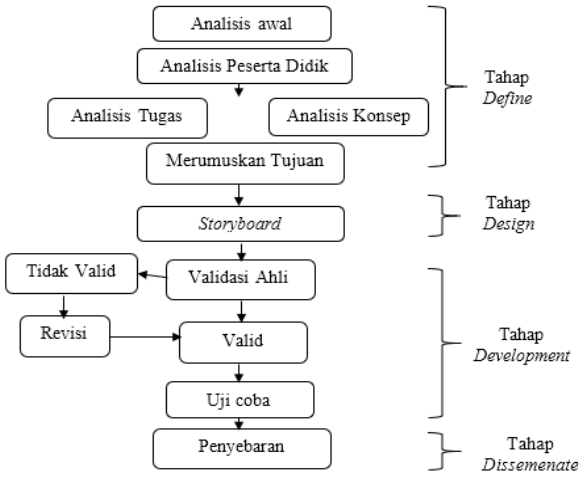


Figure 1. Development Model Scheme

Test the feasibility of this product using a research instrument, such as a validation questionnaire. The questionnaire will be given to the validator with an assessment method using a checklist (√) in the assessment column. Information on qualitative categories can be found in Table 1.

Table 1. Assessment Score

Score	Answer Options
4	Very good
3	Good
2	Not good
1	Very bad

After the validity value is obtained, adjust it to the validation criteria:

Table 2. Eligibility Criteria

Interval	Category
76% < x ≤ 100%	Very Valid/Eligible
51% < x ≤ 75%	Valid/Eligible
26% < x ≤ 50%	Not Valid/Eligible
0% ≤ x ≤ 25%	Very Invalid/Eligible

Product trials in the form of responses given by educators and students. The educator and student questionnaires in this study used a Likert scale, with assessment scores can be seen in the following table:

Table 3. Assesment Score

Score	Answer Choices
4	Very good
3	Good
2	Not Good
1	Very bad

After the validation value is obtained, adjust it to the assessment criteria:

Table 4. Assesment Criteria

Interval	Category
76% < x ≤ 100%	Very good
51% < x ≤ 75%	Good
26% < x ≤50 %	Not Good
0% ≤ x ≤ 25%	Very bad

Result and Discussion

E-Module Development

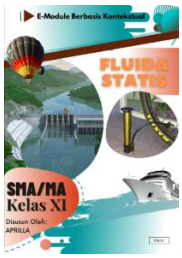
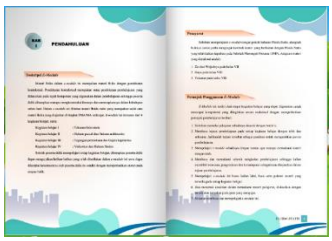
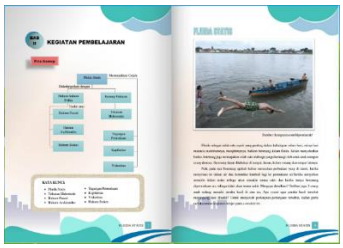
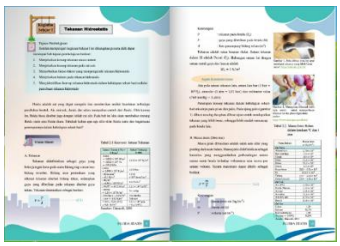
Development is carried out in stages to produce quality products that can be used well in the learning process. In the initial stage called define or the definition stage, an analysis of the needs of teaching materials is carried out through several methods. School observations are used to understand the situation and conditions of the school and the facilities available. Interviews with physics subject teachers aim to understand the usual learning process, the characteristics of students and the media that are often used. In addition, filling out the needs questionnaire is carried out by students to find out the difficulties faced by students and the needs of students individually.

Based on the results of the needs analysis carried out on students, it was found that students faced difficulties in understanding the static fluid material. Not all students have teaching materials to learn independently at home or at school and it is also known that students need alternative teaching materials that can be used more easily and interestingly that can link physics material to the surrounding environment.

Next, in the second stage, namely the design stage, it begins with the selection of materials according to needs, namely static fluid material. Furthermore, the preparation of learning objectives is based on the formulation of competency achievement indicators and basic competencies. Then determine the components of the e-module content, which include the cover, foreword, table of contents, chapter I introduction containing a description of the e-module, prerequisites, instructions for using the module, Basic Competencies (KD), Core Competencies (KI) and indicators of basic competency achievement. In the content section there is

chapter II, namely learning activities containing concept maps, learning objectives, material descriptions, summaries, formative tests, self-assessments. In the closing section there is chapter III, namely the final evaluation containing questions, answer keys, glossary, bibliography. After that, collect references, select image icons, musical instruments and animations adjusted to the concept of the material.

Table 5. E-Module Display Components

Komponen Tampilan *E-Module*	
Cover E-Module	
Chapter I. Introduction	
Chapter II Learning Activities	 
Chapter III Final Evaluation	

Komponen Tampilan *E-Module*	
Glossary	
Bibliography	

The contextual-based input stage is carried out in the materials section and student worksheets, where in each part of the material there is a contextual component which can be seen in Figure 2 below:

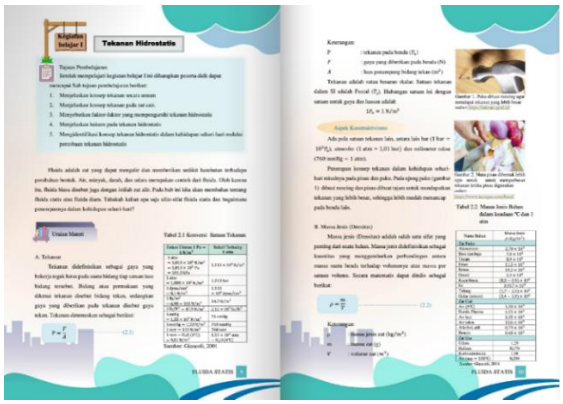


Figure 2. Contextual Components in the Material

This e-module is created by providing many images that reflect the application of static fluid material contained in everyday life so that students can more easily understand the material to be studied. This e-module has a non-print format with portrait orientation and uses Comic San MS, Times New Roman, Andulus, and Tempus Sans ITC fonts. This e-module was created using the Flip PDF Professional application. One important part of this e-module is the presentation of contextual aspects which include a description of the material, starting with initial knowledge and phenomena that are commonly encountered or carried out by students. Then there are questions or problems that are intended to be available to students. After being inspired by the questions, the material is presented, each of which contains example questions and practice questions.

In development, an e-module product is made. The initial product produced is then validated to determine the feasibility of the e-module, during the validation process improvements are made based on input and suggestions from the validator. Validation includes media validation, material validation and learning validation. Furthermore, in this stage, the researcher also conducted a trial by asking for an assessment from teachers who teach physics subjects and students who are studying physics. The trial was conducted to find out the responses of students regarding the usefulness of the e-module that had been developed. This e-module was created using the professional flip PDF application and produced a product with an HTML 5 extension that can be run on computers and mobile phones online.

At the disseminate stage, the e-module product packaging process is carried out using the Flip PDF Professional application to add images, animations and videos. After that, the e-module can be uploaded to the website and downloaded on the website page provided https://aprillia.website.

E-Module Quality

The assessment conducted by experts on the developed e-module to determine the validity of the E-module. This validation was conducted by media design experts, material experts and learning experts at the school. The results of the assessment by these experts were used as a reference to improve and perfect the e-module before being tested on small groups. The assessment conducted by two media experts involved four aspects which included aspects of graphic feasibility, aspects of presentation feasibility, and aspects of programming. Validation by the first media expert was conducted twice and the second media expert was conducted once. The results of the validation that had been conducted can be seen in Table 6 below.

Table 6. Media Expert Validation Results

Aspect	Percentage
Graphics	92,85%
Presentation	91,66%
Programming	91,34%
Average Percentage	91,95%

Based on table 6, it shows that the assessment of media experts is 91.95% with a very feasible category. Therefore, the contextual-based e-module has achieved good quality and is relevant for use in the learning process.

Validation of the material by two validators was carried out to validate the material with an assessment covering four aspects. These aspects include the feasibility of the content, the feasibility of the presentation, the feasibility of the language and the aspect of the suitability of the e-module with the context. The data on the results of the material assessment by the validator can be seen in table 4.

Table 7. Results of Material Expert Validation

Aspect	Percentage
Graphics	95,00%
Presentation	91,66%
Programming	98,33%
E-Module Suitability with Contextual	98,61%
Average Percentage	95,9%

Based on table 7, it shows that the assessment of material experts obtained a percentage of 95.9% with a very feasible category. Thus, it can be concluded that the contextual-based e-module has achieved good quality and is relevant for use in the learning process.

Validation of learning experts is carried out by one validator to assess the level of feasibility of contextual-based e-modules in the context of classroom learning activities. The assessment of learning experts includes four aspects, namely the aspect of content feasibility, the aspect of presentation feasibility, the aspect of language feasibility and the aspect of e-module suitability with contextual. The results of the validation can be seen in Table 5 below.

Table 8. Results of Learning Expert Validation

Aspect	Persentage
Content	95,83%
Presentation	81,94%
Language	93,33%
E-Module Suitability with Contextual	86,11%
Average Percentage	89,30%

Based on table 8, it shows that the assessment of learning experts obtained a score of 89.30% with a very feasible category. Thus, the contextual-based e-module product is good and relevant for use in the learning process.

The next stage is to conduct a trial of the e-module product by educators and students. The trial was conducted at a school that had previously been the place of pre-research. This trial aims to observe the responses of educators and students to the product, and involves small group trials.

Table 9. Results of Educator Responses

Aspect	Persentage
Content/Material	93,75%
Media Quality	96,42%
Average Persentage	95,09%

Measuring the level of practicality of the e-module that has been developed by researchers, an

assessment was carried out by educators using a questionnaire that covers several aspects, including aspects of content and media quality. This assessment was carried out by an educator who obtained a percentage of 95.09% with a very good category.

Table 10. Student Response Results

Aspect	Persentage
Aspect of Attractiveness	92,68%
Aspect of Usefulness	92,93%
Average Persentage	92,81%

This small-scale trial was conducted to see the response of students and involved 24 students of class XI IPA. Data collection from students was carried out by filling out an offline questionnaire. The questionnaire used covered several aspects of assessment including the attractiveness and usefulness of the developed e-module. The percentage of student responses was 92.81% with a very good assessment category.

Students showed a positive response to the developed e-module. This is in line with research by Muh. Jalaluddin, Muh. Yuris and Sayahdin Alfat (2019) who obtained a final student trial score of 81.2%. With this percentage, the contextual-based e-module using the Flip PDF professional application on Static fluid material is very suitable for use in physics learning because it has been declared valid and practical. The contextual-based e-module using the Flip PDF professional application on static fluid material developed by researchers. Kiki Andila (2020) stated that the response from users (students) is included in the very good category for the development of contextual-based e-modules. Therefore, the resulting e-module is worthy of being used as a learning support.

The e-module that has been developed has certain advantages and disadvantages. The advantages of this e-module include the fact that it is an e-module that can be accessed via an Android smartphone, providing more flexibility in terms of time and location of access. This e-module also provides learning videos to support understanding of the material, sample questions along with their discussions, and a quiz feature. However, the weakness of this e-module is that the scope of the material is limited to static fluids. In addition, the distribution of this e-module requires online access, so it still requires an internet connection.

Conclusion

The development of e-modules conducted by researchers is based on the 4D model, which includes defining, designing, developing, and disseminating. However, at the disseminate stage, dissemination is limited to the place where the research takes place. At the definition stage, an analysis of student needs is carried out, design is designing the product to be developed, development is writing materials, creating and editing texts, and validation by experts and a contextual-based e-module is produced after a small-scale trial. The quality of the e-module product developed from the side of the two media experts obtained a score of 92.95% with a very feasible category. Validation from the two material experts obtained a score of 95.9% and validation from learning experts obtained a score of 89.30% with a very feasible category. The response of educators to the e-module obtained a score of 95.09% with a very good category. And based on the results of the student trial, a score of 92.81% was obtained which stated that the developed e-module was very good.

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