



## E-Module Based Guided Inquiry: Business and Energy for Senior High Schools

Darwita Hendriyani<sup>1</sup>

<sup>2</sup>Department of Physics Education, Universitas Jambi, Jambi, Indonesia

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### ABSTRAK

**Research Objectives:** This study aims to develop a Guided Inquiry-based Physics module on work and energy material for class X SMA and to find out students' perceptions of the media being developed.

**Methodology:** This research is research development (Research and Development) using the 4D development model (Define-Design-Development-Dissemination). However, this research was only carried out up to the Development stage. The research instrument used was a student needs questionnaire. Data were analyzed using descriptive statistical analysis techniques. The subjects of this development research were students of class X IPA 3 in 2018. The resulting media has specifications in the .exe format which can be operated on a computer/laptop without installing PageFlip Professional 3D software.

**Main Findings:** The results of the development trial show that the Physics electronic module can increase students' interest in the Physics learning process in the material of work and energy. Based on the results of the research, it can be concluded that the Guided Inquiry-based Physics electronic module on work and energy material for class X SMA that was developed is suitable for use as an independent or additional learning medium in the learning process of students.

**Novelty/Originality of Research:** The importance of innovation in learning is to attract students' interest and motivation in learning, therefore, the need for new innovations carried out by teachers in learning that they are capable of teaching.

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### Corresponding Author:

Darwita Hendriyani,  
Physics Education, Universitas Masumus, Papua Selatan, Indonesia,  
Jl. Kamizaun Mopah Lama, Rimba Jaya, Kec. Merauke, Kabupaten Merauke, Papua 99611, Indonesia  
Email: [darwitahen2911@gmail.com](mailto:darwitahen2911@gmail.com)

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## 1. INTRODUCTION

The purpose of education is to realize the process of developing the personal qualities of students who do not only intend to form intelligent Indonesian people, but also have personality or character, so that later generations of nations will be born who grow and develop with useful characters [1]. Character education in order to help students not only to become smart but also to become good [2]. In the formation of this character, the teacher is the main key that helps build character in students through the learning process. The success of the learning process is influenced by the quality and way of teaching a teacher [3]. Educators act as facilitators who regulate class management so that the learning process can run well.

Learning is a system that has components for interacting and working together in achieving learning goals. The development of information and communication technology has had a major impact on various lives, including the field of education and learning. Information and communication technology (ICT) is a collection of

technological devices and resources used to communicate, create, disseminate, store and process information or technology [4]. In the process of learning activities in schools, technology has a role as a means of supporting or supporting learning activities. (quote learning technology). Based on the explanation above, learning media is needed in accordance with the latest technological developments. The learning media in question can be in the form of electronic learning media.

Learning media is a tool in the learning process both inside and outside the classroom. Learning media is useful for complementing, maintaining and even improving the quality and ongoing learning process [5]-[7]. Learning will be easier to understand with learning media. One example of software that can be used to develop learning media is 3D PageFlip Professional. 3D PageFlip Professional is a software for converting PDF format files into 3D book animations which can include music, videos, pictures, buttons and animations. In the world of education, this software can be used to create learning media in the form of e-books with 3D effects.

According to Suyadi, Inquiry Learning is learning that involves all students' abilities to the maximum to seek and investigate systematically, critically, logically, and analytically, so that students can formulate their own findings with confidence [8]. According to Amri and Ahmadi, Guided Inquiry is a learning process that provides opportunities for students to work on formulating problems and hypotheses, analyzing results and drawing conclusions independently, while topics, questions and supporting materials are facilitated by educators [9]. One of the advantages of Guided Inquiry learning strategy is to provide space for students to learn according to their learning style. Physics is a natural science with the scope of knowledge that exists in nature [10], in the process of learning physics as much as 80% of students find it difficult to understand learning physics. Therefore, learning media is needed that helps students to understand the material [11], [12].

Based on the problems that have been described, the researcher is interested in conducting research with the aim of developing Guided Inquiry-based Physics electronic modules on work and energy material for class X senior high school. And to find out the responses of students to the use of Guided Inquiry-based Physics electronic modules with Professional 3D PageFlip applications on material for work and energy for class X high school. This research can provide supporting or additional learning media for students in physics learning, providing opportunities for students to learn independently and reduce dependence on educators. And makes it easier for students in the learning process because students have additional learning media in the form of electronic modules with the Professional 3D PageFlip application that can be used independently.

## 2. RESEARCH METHOD

In accordance with the problems and research objectives, this research is classified as research and development or also called Research and Development. Sugiyono states that research and development methods are research methods used to produce certain products, and test the effectiveness of these products [13]. The product being developed is an electronic module based on Guided Inquiry on work and energy material for class X SMA.

The development model used in this study refers to the 4-D development model. According to Mulyatiningsih, the 4D model stands for Define, Design, Development, and Dissemination which was developed by Thiagarajan in 1974. The 4-D development model consists of four stages [14]. The first stage is defining, the second is design, the third is developing, and the fourth is disseminating. In this study only up to the development stage (develop) only.

Validation is a measure that shows the levels of validity of an instrument [15]. Media validation is carried out to find out whether the learning media developed is in accordance with predetermined indicators. At the media validation stage, the assessment consists of 11 (eleven) indicators which are summarized in 23 questions.

Development trials were carried out to determine students' perceptions of the learning media that had been developed. This is done by distributing perception questionnaires to students to provide an assessment of the learning media that has been developed. The try-out of learning media products for business and energy materials was carried out by class X MIA 3 students at SMAN 11 Jambi City. The trial was carried out as a material consideration for assessing the electronic modules that were made.

The instrument used by researchers is a questionnaire. In this research process, researchers used closed questionnaires. A closed questionnaire is a questionnaire prepared by providing complete answer choices so that the respondent only has to mark the selected answer [16]. Closed questionnaires in learning media development research are used to obtain data from media validators, material validators and students' perceptions as materials for evaluating the developed learning media. The media evaluation questionnaire consists of 11 indicators with alternative answers (1) Very Good, (2) Good, (3) Not Good, (4) Very Bad, and added a comment column. Meanwhile, the material evaluation questionnaire consists of 9 indicators with the same alternative answers as in the media evaluation questionnaire, and a comment column is added.

### 3. RESULTS AND DISCUSSION

Following are the results of the material expert validation in stage I of the Physics Electronics Module:

Table 1. Results of Material Expert Validation Phase I of the Electronic Physics Module

No.	Indicator Rating	Questions	Score	Comments
1.	Conformity of the material description with core competencies (KI) and basic competencies (KD)	1. Is the learning concept in the electronic module in accordance with core competencies (KI) and basic competencies (KD)?	4	Feasible
2.	Material depth	2. Is the depth of the material in the module good?	4	Feasible
		3. Is the adequacy of the material in the module good?	4	Feasible
3.	Clarity of presentation of the material	4. Is the clarity of presentation of work and energy material in the module good?	4	Feasible
4.	Material description	5. Is the clarity of the material elaboration of work and energy in the module good?	3	Feasible
		6. Are the concepts and definitions in the work and energy material in the module correct?	4	Feasible
5.	Material accuracy	7. Are the procedures for work and energy materials in the module correct?	3	Feasible
		8. Are the examples, facts, and illustrations for work and energy materials appropriate?	4	Feasible
		9. Are the questions for work and energy material correct?	4	Feasible
6.	The relationship between the material and the questions	10. Is the relationship between the material effort and energy with the task or exercise good?	4	Feasible
		11. Can the tasks or exercises contained in the module encourage students to seek further information?	4	Feasible
7.	Accurate selection of images, simulations, and videos	12. Is the accuracy of the selection of images and videos regarding the material for work and energy good?	3	Feasible
		13. Does the appearance and arrangement of the material in the module motivate students?	4	Feasible
8.	Accurate use of language	14. Is the use of language in the module easy for students to understand?	4	Feasible
		15. Is the sequence, blend, and simplicity of the language in the module good?	4	Feasible
9.	Typography	16. Is the suitability of the shape of letters and numbers and the size of letters and numbers good?	4	Feasible
<b>Total Score</b>			<b>61</b>	

Based on Table 1, the results obtained were that the expert validation of the electronic module physics based on Guided Inquiry on work and energy material for SMA class X stage I obtained an overall score of 61 which was categorized as very good. The score for the suitability indicator for the material description with core competencies (KI) and basic competencies (KD) in the Physics electronics module is 4 which is categorized as very good. The score for the material depth indicator is 8 which is categorized as very good. The score for the indicator of clarity of presentation of the material is 4 which is categorized as very good. The score for the material description indicator is 3 which is categorized as good. The score for the material accuracy indicator is

15 which is categorized as good. The score for the indicator of the relationship between the material and the questions is 8 which is categorized as very good. The score for the accuracy of the selection of images, animations and videos is 7 which is categorized as very good. The score for the indicator of accuracy in using language is 8 which is categorized as very good. Then finally the score for the typography indicator is 4 which is categorized as very good.

The following is the result of the Media validation Phase II of the Physics Electronics Module

Table 2. Results of Media Expert Validation Phase II of the Electronic Physics Module

No.	Indicator	Statment	Score	Comment
1.	Accuracy and conformity of design	1. Is the shape of the electronic module good?	3	Valid
		2. Is the module layout (images, videos, and animations) good?	3	Valid
2.	Audio usage	3. Is the sound/audio clarity included in the module heard clearly?	3	Valid
		4. Are the images, videos and animations included in the module clearly visible?	4	Valid
		5. Is the module display design good?	3	Valid
3.	Layout/visual display	6. Is the module cover design, which includes the attractiveness of the letters, font sizes, and the use of colors, is good?	3	Valid
		7. Can the shape and size of the letters be read properly?	4	Valid
		8. Is the alignment of the font in the module good?	3	Valid
		9. Is the variation of letters in the module good?	3	Valid
		10. Can the text in the module be read properly?	3	Valid
		11. Is the module content design good?	4	Valid
		12. Is the suitability of the layout of the module components including the placement of accessories and titles good?	3	Valid
4.	Content layout design	13. Are the images/videos displayed easy for students to understand?	3	Valid
		14. Is the color combination with the background good?	3	Valid
		15. Is the combination of pictures and videos good?	3	Valid
5.	Product usability	16. Is this module easy to operate?	4	Valid
6.	Interactive	17. Is the use of interactive layouts (navigation buttons) good?	3	Valid
		18. Is this module interactive?	3	Valid
7.		19. Can this module be used independently?	4	Valid
8.	Independent learning (Self Instructional)	20. Is the completeness of the contents of the module good?	4	Valid
9.	Complete (Self Contained)	21. Does this module not depend on other parties (media/teaching materials, people/facilitators)?	3	Valid
10.	Stand alone (Stand Alone)	22. Is this module in accordance with the development of science and technology?	4	Valid
11.	Adjusting to development (Adaptive)	23. Can this module be used easily?	4	Valid
<b>Total Score</b>			<b>77</b>	

Based on Table 2. the results obtained were that the validation of the Guided Inquiry-based Physics electronic module media expert on work and energy material for class X high school stage II obtained an overall score of 77 which was categorized as very good. The score for the accuracy and suitability of the design indicators in the Physics electronic module is 6 which is categorized as good. The score for the audio usage indicator is 3 which is categorized as good. The score for the layout/visual display indicator is 23 which is

categorized as very good. The score for the content layout design indicator is 16 which is categorized as good. The score for the product usability indicator is 4 which is categorized as very good. The score for the interactive indicator is 6 which is categorized as good. The score for the self-instructional indicator is 4 which is categorized as very good. The score for the complete (self contained) indicator is 4 which is categorized as very good. The score for the stand alone indicator is 3 which is categorized as very good. The score for the adaptive indicator is 4 which is categorized as very good. The score for the easy-to-understand (user friendly) indicator is 4 which is categorized as very good.

Based on the description of the results of the research described earlier, the steps for developing learning media are based on the 4-D development model through three stages. The three stages in question are defining, designing, and developing. After going through these three stages, a product in the form of a Guided Inquiry-based Physics electronic module was obtained on work and energy material for class X SMA. The Physics electronic module was validated 2 times by the material expert validator and 3 times by the media expert validator. Every time the validation process is carried out, suggestions and input as well as constructive comments from the validator are used as a reference for making product improvements so that they can be better than before.

The Physics electronic module contains several components, namely cover, author profile, preface, table of contents, instructions for using the module, core competencies, basic competencies, indicators, activities I, II, and III with each stage according to the learning model used, motivational pages, and equipped with an evaluation page. In addition, each activity in the electronic module is equipped with videos and animations that can help students in the learning process. The font type used in the Physics electronic module is Arial with a size of 20 points. The use of this Physics electronic module is as a supporting learning media, or in other words as an additional medium in the learning process, especially on work and energy material for class X SMA. The following is the final design of the Guided Inquiry-based Physics electronic module on work and energy material for SMA class X after being validated.

#### 4. CONCLUSION

This research produces an electronic physics module that can be used for self-learning media regarding work and energy materials. This electronic module is based on the revised 2013 curriculum syllabus with the Guided Inquiry learning strategy. In the module manufacturing process, the software used is 3D PageFlip Professional. From the trials that have been carried out by the physics electronic module, the material validator and media validator said it was feasible with a score of 61 and 77 respectively which were categorized as very good. In addition, in this study, data were collected on students' perceptions of the modules that had been made. The feasibility score obtained from students' perceptions was 53.7 in the very good category.

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