



Character Education Oriented Physics E-Module Development in the Static Fluid Section

Pratiwi Ineke Anwar, Abidin Pasaribu, Melly Ariska, and Hamdi Akhsan
Physics Education Study Program, Faculty of Teacher Training and Education,
Sriwijaya University, Indonesia
hamdiakhsan@fkip.unsri.ac.id

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Abstract

This development research aimed to produce a valid and practical character education-oriented Physics e-module for students Class XI Senior High School. The model used in this research was the development of Rowntree with three stages, namely the planning stage, the development stage, and the evaluation stage. At the evaluation stage, Tessmer's formative evaluation was used, namely, self-evaluation, expert review, one-to-one evaluation, small group evaluation to determine the validity and practicality of the e-module. The characteristics of the developed e-module were oriented in static fluid material on several character values, namely religious, curiosity, discipline, cooperation and communicativeness. The orientation aimed to instill the values of religious character, curiosity, discipline, cooperation and communicativeness in students. At the expert review stage, the average results of content, language, and design validation respectively were 4.5, 4.5 and 5 with very valid categories. In the one-to-one and small group evaluation stage, the average results of the assessment on the use of the developed e-module were 4.05 and 4.35 with practical and very practical categories. The implication of this research was that it can be used as one of the teaching materials used in learning also as a learning resource that aims to motivate students to learn independently.

Keywords: Character Education; Development Research; E-Module; Static Fluid

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INTRODUCTION

Education is the most important aspect of achieving one of the goals of the Indonesian nation. Education is the most important aspect to achieve one of the goals of the Indonesian nation. In the National Education System Law No. 20 of 2003 Article 3 concerning the purpose of national education reads "National education functions to develop capabilities and shape the character and civilization of a dignified nation in the

context of educating the nation's life, aiming to develop the potential of students to become human beings who believe and fear God Almighty, have character noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen. "The goals of national education in Law no. 20 of 2003 Chapter 2 Article 3 shows that in the learning process, teachers must be able to provide character values in every teaching and



learning process (Anggela *et al.*, 2013). Education in Indonesia is not only oriented towards developing thinking skills, but also the development of the behavior or character of students (Zurqoni *et al.*, 2018). Changes in integrated character education are the first target of implementing the 2013 Curriculum in schools (Kemendiknas RI, 2011). Current education is not only aimed at providing subject matter, but emphasizes how to invite students to find and build their own knowledge so that students can develop life skills and be ready to solve problems faced in life (Destianingsih *et al.*, 2016). Teachers are very important in helping the government's efforts in educating students to have the expected national character, in accordance with one of the characteristics of the 2013 curriculum (Puspitasari, 2019).

One of the impacts of the development of globalization in the field of technology. The development of information and communication technology that gave rise to cybercrime and had an impact on the millennial generation, namely a decline in morality called moral degradation (Marufah *et al.*, 2020). However, the effects of globalization itself do not always have a negative impact, depending on how we respond to and bring the effects of globalization into positive things (Budiarto, 2020). This is in line with what Egon, Ismet, and Akhsan (2018) said that the increasingly rapid development of science and technology requires us to improve ourselves and prepare human resources who are strong, competitive and have reliable abilities in their fields. In order to strengthen the spiritual, moral and ethical foundation of nation building, the development of the nation's character must be actualized in a real way as an effort to maintain the national identity and strengthen the unity and rapidity of national unity under the auspices of the Republic of Indonesia

(Damawan & Purbaningrum, 2019). According to Sriwilujeng (2017: 1) strengthening character education refers to five main values, namely (1) Religious character values reflect the belief in God Almighty; (2) Nationalist, which means placing the interests of the nation and the state above the interests of themselves and their groups; (3) Independent means not depending on other people and using energy, thoughts, time to realize hopes, dreams and dreams; (4) Mutual cooperation, a character value that reflects the form of respecting the spirit of cooperation and working hand in hand to solve common problems; (5) Integrity which is an effort to make himself a person who can always be trusted in his words, actions and work. In each value the main character is represented by several aspects. For example, Integrity is represented by Honesty and Discipline; Religious is represented by the Worship and religious teachings; Nationalists are represented by Tolerance, National Spirit, and Care for the Environment; Independence is represented by Curiosity, Hard Work and Responsibility; and Gotong Royong represented by Cooperation, Communication, and Sincerity (Central Education Assessment Team, 2019).

According to Sutopo (Anggela *et al.*, 2013), subjects have the potential to develop students' characteristics, especially regarding positive values, attitudes, and habits in thinking, acting, and interacting with God, nature, and other people. Character education can be integrated into physics learning (Zulaiha *et al.*, 2014). Although not all character elements can be fostered through physics education, of course physics education still has a significant contribution in the effort to maintain the quality of character which by several factors include the capabilities of educators and the learning resources used in the learning process (Hamdi Akhsan *et al.*, 2015). One of the learning resources that is most often used

is teaching materials. According to (Setiawan & Wawan, 2020) the use of teaching materials is to be able to transfer learning messages from teachers to students so that they can stimulate thoughts, feelings, interests and the will of the world of education to challenge educators to innovate more (Akhsan et al., 2021). Rapid and increasingly sophisticated technological advances can be utilized in developing printed teaching materials such as modules that can be presented in digital form or e-modules (Fausih & Danang, 2015). An e-module is a display of information in book format that is presented electronically and can be read using a computer or an electronic book reader that supports individual learning with an attractive appearance so as to facilitate the learning process (Zaharah et al., 2017).

Referring to the results of the needs analysis that had been carried out to 60 respondents who were high school students in Palembang, it was found that 51.7% of students preferred learning using e-modules. 75% of students think static fluid is difficult to understand. Furthermore, it can be seen that respondents are aware of the importance of character education for several reasons, including improving the character of the nation's children, bringing individuals into better individuals and implementing the 2013 curriculum. As many as 96.7% agreed to develop character values in it.

Based on the description above, the researchers are interested in making a teaching material from the current curriculum, namely the 2013 curriculum which contain e-modules in the form of modules in electronic form that are packaged in an interesting and more interactive manner that is oriented towards character education so that they are expected to instill character values in learners. This also includes the utilization of the influence of globalization in the form of technological advances towards

positive things. How to use e-module is very easy, you only need an online android based laptop or cellphone, and making it is also quite easy (Shobrina et al., 2020). The E-module which will be developed also contains HOTS questions related to the concept of static fluids in everyday life. This has a goal that is in line with Thomas and Thorne (2012) in (H. Akhsan et al., 2020) which states that HOTS can be learned and can improve students' skills and character.

Physics learning is not only studying mathematics, but it is important to study physics, namely physics as a product, physics as a process, and physics as an attitude (Febrianti et al., 2019; Nurhudayah et al., 2016). That gives an understanding that in studying physics, it is necessary to be based on a scientific attitude such as curiosity, honesty, responsibility, being objective, open, and also willing to listen to the opinions of others. According to Astutik, Maryani, and Pratiwi (2017) physics as an attitude gives an understanding that in studying physics, it is necessary to be based on a scientific attitude such as curiosity, honesty, responsibility, being objective, open, and also willing to listen to the opinions of others. Therefore, this study aims to produce a valid and practical physics e-module which is oriented in character education for students Class XI Senior High School

METODE

This research was conducted at Senior High School with a development research method through the adaptation of Rowntree product development which, according to Prawiralidaga (2008) consists of three stages, namely, the planning stage, the development stage, and the evaluation uses the Tessmer evaluation model which is carried out in five stages, namely (1) self-evaluation; (2) expert review; (3) one-to-one evaluation; (4) small group evaluation; (5) field test (Tessmer, 2005: 14). The

field test stage in the Tessmer evaluation model was not carried out because this study aimed only to looking at the validity and practicality of the product. This study uses a walk-through data collection technique which aims to involve the validity of the product and a questionnaire in order to see the practicality of the product. The data collection tool used in the walk-through technique is a validation sheet that is given to the expert or validator at the expert review stage to validate aspects of the design, content, and language of the product. This research procedure is shown in Figure 1.

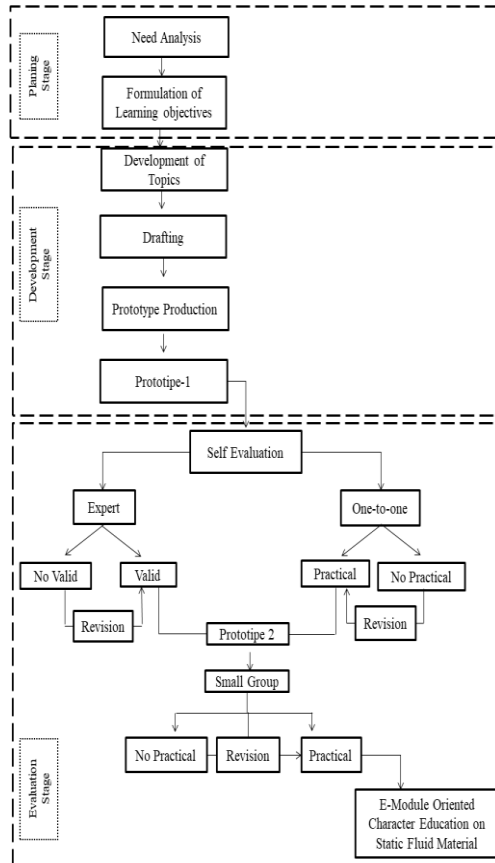


Figure 1 Research Procedure

Validated indicators for content aspects, including the suitability of the material with the latest learning outcomes and indicators, the accuracy of learning materials, learning materials, conformity to e-module needs, and conformity of material orientation with character values religious, curiosity,

discipline, responsibility, cooperative, and communicative, Indicators for the language aspect include readability, clarity of information, conformity with good and correct Indonesian language rules, and effective and efficient use of materials. Indicators for the design aspect, including presentation tools, design illustrations, graphics, images, layouts, and completeness of information. Furthermore, the results of the walkthrough with experts were analyzed descriptively as input for revising the e-module.

The technique of collecting walkthrough data and questionnaires used a Likert scale. Sugiyono (2017) The Likert scale uses 5 categories of Very Good, Good, Fairly Good, Not Good, and Very Bad as shown in Table 1.

Table 1 Likert Scale Questionnaire Expert Validation

| Category | Score |
|-------------|-------|
| Very Good | 5 |
| Good | 4 |
| Fairly Good | 3 |
| Not Good | 2 |
| Very Bad | 1 |

The results of the validation are presented as tables. Next, looking at the average score. Additionally, the resulting average is adjusted to the category shown in Table 2.

Table 2 Category E-Module Based on Expert Validation

| Average Score (\bar{X}) | Category |
|-----------------------------|-----------------|
| $4.2 < \bar{X} \leq 5.0$ | Very Valid |
| $3.4 < \bar{X} \leq 4.2$ | Valid |
| $2.6 < \bar{X} \leq 3.4$ | Valid Enough |
| $1.8 < \bar{X} \leq 2.6$ | Less Valid |
| $1.0 < \bar{X} \leq 1.8$ | Very Less Valid |

(Widoyoko, 2017)

Using the Likert scale used in the one-to-one evaluation and small group evaluation involving students at Senior High School as many as 12 people. This questionnaire aims to see students' responses to the use of the questionnaire

collection technique in the form of a questionnaire for students' responses to the Character Education oriented Physics e-module on Static Fluid material. The questionnaire result data are also presented in the form of a table, then the average practical achievement is calculated. Then the average score is used to determine product practicality criteria, based on the categories listed in the following table 3.

Table 3 Category E-Module Based on Response Students

| Average Score | Category |
|--------------------------|---------------------|
| $4.2 < \bar{X} \leq 5.0$ | Very Practical |
| $3.4 < \bar{X} \leq 4.2$ | Practical |
| $2.6 < \bar{X} \leq 3.4$ | Practical Enough |
| $1.8 < \bar{X} \leq 2.6$ | Less Practical |
| $1.0 < \bar{X} \leq 1.8$ | Very Less Practical |

(Widoyoko, 2017)

Comments and suggestions received on the validation sheet and questionnaire are used as material for consideration in improving the e-module.

RESULTS AND DISCUSSION

Planning Stage

This stage begins with a needs analysis through a questionnaire which is distributed to 60 students who are high school class XII students in several schools in the city of Palembang. The results obtained were 96.7% of respondents agreed that the researcher developed an e-module that contained character values in it. The things that were expected from the e-module in order to help understand static fluids were 53.3% of making abstract content concrete, 76.7% complete with examples of everyday life, and 76.7% and 50% discussion of sample questions the rest can be accessed anytime anywhere. From the questionnaire it was also known that the e-module that students expected was 86.7% equipped with character values. Then the researcher also performs the formulation of learning objectives and character analysis tables on static fluid

material that is adjusted to core competencies and basic competencies. Researchers try to develop teaching materials in the form of E-modules that are oriented towards religious character values, curiosity, discipline, responsibility, communication, and cooperation. Then the researchers determined the software and hardware that will be used in developing the e-module. The e-module was then developed by using Flip PDF Professional.

Development stage

This stage consists of the topic development stage, the preparation of drafts to be used, and the production of prototypes. On the topic development stage, the topic is carried out by determining the appropriate learning material and is followed by an outline of the contents of the e-module which is used as a guide in making. The design and arrangement of e-modules are prepared based on the material obtained from the previously formulated learning objectives. The drafting is done by determining the components that will be included in the e-module. Production prototype starting with the manufacture of prototype-1. The resulting e-module is in the form of an e- physics module with character education oriented towards static fluid materials.

Several views of the e-modules are presented in picture form. The cover page is presented in Figure 2. Cover e-module displays the title and image that shows the material to be studied as a whole. Before entering the learning material, the e-module start page provides learning instructions for students. The learning instructions explain what students have to do in using this e-module. On the start page, a concept map is also presented which contains an overview of the overall material to be discussed. As shown in the following Figure 2.



Figure 2 The Initial Design of The E-Module Cover

At the beginning of the e-module, the learning objectives and instructions for using the module are presented. Contains learning objectives and instructions for using the shown in Figure 3. The next page has a concept map and a table of contents presented in Figure 4 which aims to provide students with an overview of the material and sections to be discussed. A page view that has an enlarged image and a video displayed on the Figure 5 and 6.

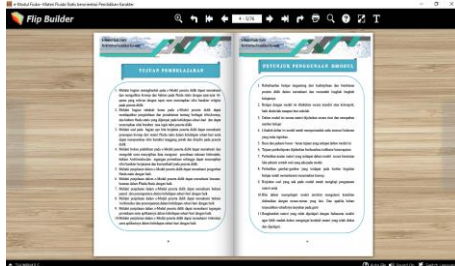


Figure 3 Learning Objectives and Instructions for Using the Module

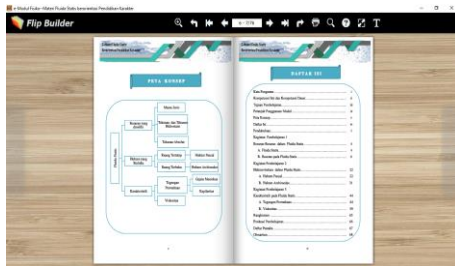


Figure 4 Concept Map and Table of Contents

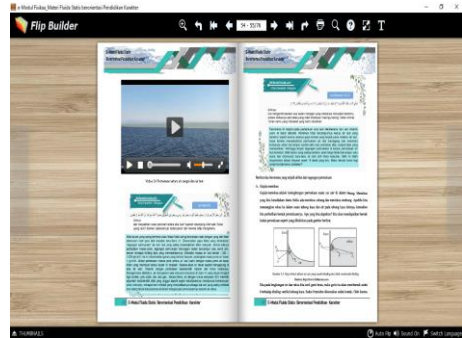


Figure 5 Video Display on The E-Module

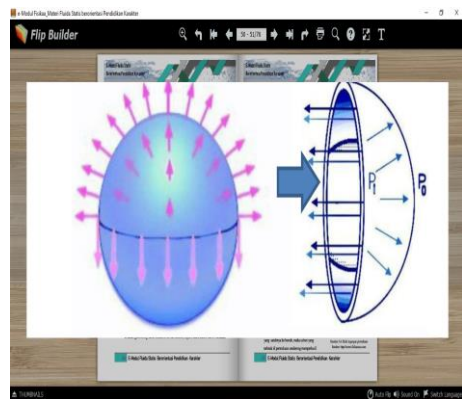


Figure 6 Image Display on E-Module

Character education on e-module is presented in the form of small notes on material related to certain character values. So that in addition to being used as a learning material independently by students, this e-module can also add character values to students. In figure 7 The meditate feature is shown to instill the value of religious character. One indicator of religious value is the aspect of belief by orienting learning by linking learning and relevant Al-Quran verses. So that when the concept of physics is associated with the Qur'an in learning, students feel interested because they get new things that have never been obtained before (Husna *et al.*, 2020). It is hoped that it can attract the attention of students and be able to understand the existing order in the universe that cannot be separated from his power so that more confidence and foster character values religious in students.

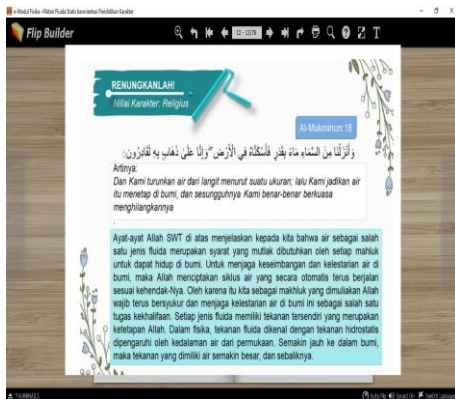


Figure 7 Reflect feature

Another feature is "Did you know", this feature presents interesting and unique articles related to the material being studied. It is hoped that this feature can instill the character value of curiosity in students so that it can help increase students' interest in learning the material. As shown in the following image in Figure 8.



Figure 8 Features Did You Know

Feature On the value of the character of responsibility and discipline, this e-module has a "Come on Do it" feature. Various HOTS questions are presented regarding the concept of static fluids in everyday life so that we can find out the ability and students' insights about the concept of static fluids which states that HOTS can be learned and can improve students' skills and character (H. Akhsan *et al.*, 2020). It is hoped that this feature can instill the character values of responsibility and discipline in students. This feature is shown in Figure 9.



Figure 9 Let's Do it

The last feature is the Practicum column as shown in Figure 10 below. The last feature is the Practicum column as shown in Figure 10 below. This feature contains instructions for student activities linked to the PhET page and and "rumah belajar" website by the Ministry of Education. So that students can understand and process and present data about hydrostatic pressure experiments, Archimedes' law, and surface tension so that they can apply these concepts in everyday life. This activity can be done in groups. It is hoped that this feature can instill collaboration and communicative character values in students.

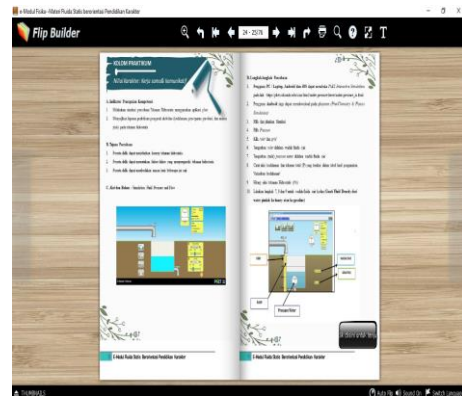


Figure 10 Features of The Practicum Column

At the end of the learning activity of this e-module there is a learning evaluation shown in Figure 11 which contains several questions that students must do to practice understanding and mastery of static fluid material in participants.

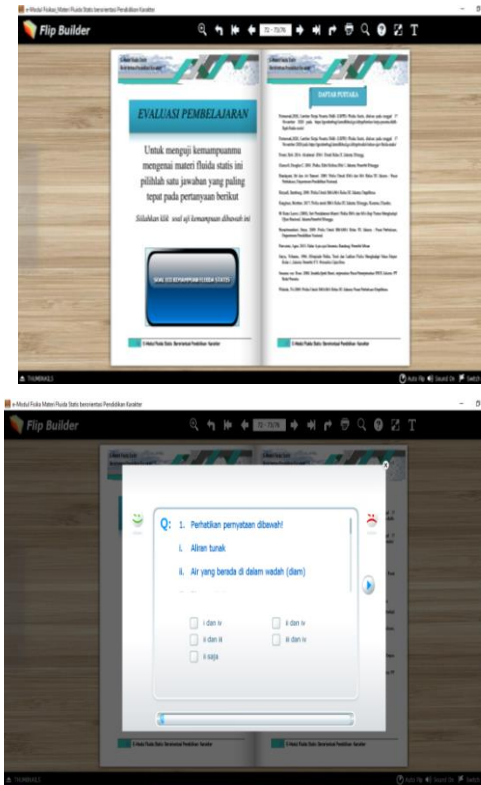


Figure 11 Learning Evaluation

Evaluation Stage

The E-module produced in the development process is then evaluated based on the Tessmer formative stage. In self-evaluation, self-evaluation is carried out independently of the e-module, both in terms of content, design, and language aspects. So that there are several improvements in the following sections: (1). Add to Glossary; (2) Improvements in the learning evaluation section to reciprocity; (3) Embed link on the practicum column link; (4) Publish the product on your smartphone. The next stage is the expert review stage, which involves several experts knowing the validity of the products that have been made. Both in terms of content, language, online form so that it can be opened and design. The results of the validation can be seen in table 4.

The results of the validity test from the experts obtained the validation score results shown in table 4. Based on table 4 it is known that the product generated

from the aspects of content, language, and design. Obtained an average valid result with an average score at the content validation stage of 4.5 with the very valid category, at the language validation stage of 4.5 (very valid), and at the design validation stage of 5 (very valid). E-modules that have been developed and validated by experts are revised based on suggestions, comments, and criticisms that have been given by experts. Based on the results of the validation carried out, it can be concluded that the character education-oriented physics e-module on static fluid material is feasible to be developed and tested with several revisions.

Table 4 Recapitulations of Evaluations Results of the *Expert Review Stage*

| Aspect | Average Score | Category |
|----------|---------------|------------|
| Content | 4.5 | Very Valid |
| Language | 4.5 | Very Valid |
| Design | 5 | Very Valid |

Character education-oriented Physics E-module on static fluid section that has been validated and revised based on the advice of the supervisor and the experts and has been declared valid, then the e-module developed was tested on students to determine the level of practicality in the one-to-one and small group evaluation stages. The instrument used in the one-to-one and small group stages was to use a questionnaire for students' responses to the use of e-modules. At the one-to-one stage, different learning outcomes are chosen, namely high, medium, and low learning outcomes. The results of the student questionnaire responses to the e-module used can be seen in table 5. Based on the table it is shown in the table which shows the average score of 4.05 with the practical category.

After the e-module developed was revised I to the suggestions of students in the one-to-one stage, the e-module was

retested in the small group evaluation stage by nine students with different levels of learning outcomes. The results of the student questionnaire responses to

the e-module used are shown in table 6 showing an average score of 4.35 with the very practical category.

Table 5 Results of Student Questionnaire Responses at The One-To-One Evaluation and Small Group Evaluation Stage

| Indicator | One-to-one | Small Group |
|--|------------|----------------|
| Component e-module | 4.33 | 4.39 |
| Material | 4.17 | 4.33 |
| Suitability of material integration with religious character values | 4.00 | 4.22 |
| Conformity of material integration with curiosity character values | 3.83 | 4.44 |
| Conformity integration of material with the value of the character of responsibility | 4.17 | 4.33 |
| The suitability of material integration with the value of disciplinary character | 3.50 | 4.06 |
| The suitability of material Practical integration with the character Cooperation value | 4.17 | 4.39 |
| The compatibility of material integration with the value of Communicative character | 3.67 | 4.39 |
| Language | 3.67 | 4.11 |
| Design | 5.00 | 4.83 |
| Average score | 4,05 | 4.35 |
| Category | Practical | Very Practical |

Furthermore, improvements are made to prototype 2 in the form of the addition of character values on meniscus symptoms which is the final product. Based on the description and analysis of research data, it is known that the result of e-module product is valid. This can be seen from the validity of the product which shows that the created e-module has been suitable with the established standards (Fadieny & Fauzi, 2021). In practical terms, the e-module physics Oriented Character education in Static Fluid is easy to use, easy to learn, and fun, so it can be concluded that the e-module produced is practical. This can be seen from the positive comments of the students. As Suniasih (2019) said, teaching material is said to be practical if it is easy to use in the learning process.

CONCLUSION

A research entitled Development of physics e-module Oriented in Character education on Static Fluid for Class XI SMA has been successfully carried out. This development research aims to produce a valid and practical e-module physics Oriented Character education on Static Fluid for Class XI SMA. At the expert review stage, it was obtained an average valid result with an average score at the content validation stage of 4.5 with the very valid category, at the language validation stage of 4.5 (very valid), and at the design validation stage of 5 (very valid). In the one-to-one evaluation stage it was stated practical with an average questionnaire assessment result of students' responses to the use of this

teaching material of 4.05. In the small group evaluation trial phase, the average result of the questionnaire assessment of students' responses to the use of the e-module developed was 4.35 with the very practical category. Similar research still needs to be done to determine the effectiveness of the product through the field test stage and the development of a physics e-module oriented towards character education in other materials.

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