IJELLACUSH
Vol.1, No.2 May 2023
e-ISSN: 2962-8725; p-ISSN:XXXX-XXXX, Hal 146-151

Analysis Of Latest And Contextual Aspects Of Physics E-Module Based On T-Pack Momentum Impulse Materials For Class X Students

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Abstract. *Learning media can be defined as an important element in a learning process. One example of learning media is teaching materials in the form of Emodules which in Emodules in this study use momentum and impulse material. One of the materials studied in physics is momentum and impulse. Momentum is a vector quantity so it has both magnitude and direction. Impulse itself is a force event that acts on an object in a short period. This type of research uses Research and Development (R&D) in the Tessmer development model which is also contained in the appendix. The stages are divided into two, including self-evaluation which is a determinant of the design features or specifications of the module. Prototyping where there are teaching modules will later be validated, evaluated, and revised. From the results of the module validation carried out by the examiners as experts, a review was carried out and a score was given to the module, namely, 91.2% consisting of image actualization of 75 points, in the aspect of modernity of the library, a score of 100 was obtained.*

Keywords*: E-modul, validation, library update, contextual, T-Pack.*

INTRODUCTION

Education is a continuous and never-ending process so that through a continuous process a future human figure can be formed that is rooted in cultural values and Pancasila. Education functions to develop abilities and form a dignified character. The implementation of education required learning. Learning is very important to always be carried out so that education is guaranteed (Sujana, 2019). One of the lessons needed by students is learning physics.

Learning physics is part of a branch of science, in the implementation of learning physics a thorough understanding of physics concepts is needed, so that students can easily and quickly solve a physics problem they are facing (Hidayatin et all 2022). lack of understanding of students can occur because students are less active in carrying out the learning process. In addition, this can also happen because the learning process is still teacher-centered (Yudiafarani et all, 2022). In carrying out the physics learning process, the components that must exist are learning tools, because learning that does not use the right tools and methods will be difficult to achieve the learning objectives themselves (Hidayatin et al 2022).

Received March 30, 2023; Revised April 02, 2023; Accepted May 01, 2023
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Learning media can be defined as an important element in a learning process. Learning media is one of the learning resources that can help educators broaden the horizons of students. The use of learning media can also foster students' interest in learning new things in learning material that will be delivered by an educator so that it can be easily understood by students. Learning media can also be used as a tool in teaching and learning activities. As a teacher or educator, you must be able to choose suitable and appropriate learning media to use so that the learning objectives set by the school can be achieved, one of which is the e-module.

E-module is one of the learning media in the form of electronics which consists of text, images, graphics, animation, and even videos that can be accessed via electronic media. The e-model is expected to be used as a learning resource and directs students to carry out learning independently. E-modules can also be interpreted as learning aids in the form of visualization, so several components can assist in using e-modules such as electronic infrastructure, both computer and mobile devices. In carrying out the learning process using e-modules, you can usually use the TPACK approach

The TPACK approach is a science related to the use of appropriate technology in the right teaching process, both knowledge and content correctly. By using appropriate technology, it is hoped that it can be an illustration for improving and increasing the ability of teachers or educators. Improving and increasing the ability to teach staff, is an integrated effort, namely through the TPACK approach, teaching staff can master and integrate pedagogic, knowledge, and technological competencies so that learning is effective, innovative, and can improve student learning outcomes**.**

THEORETICAL

Physics itself has a lot of material that needs to be studied, one of which is momentum and impulse. In the material of momentum and impulse, there are still many students who do not understand the concept of the occurrence of momentum and impulse. One of the materials studied in physics is momentum and impulse. Momentum is a vector quantity so it has both magnitude and direction. The momentum of an object is in the same direction as the object's velocity. If viewed from a one-dimensional movement, the direction of momentum to the right is indicated by a positive sign, whereas if the direction of momentum is to the left, it is indicated by a negative sign (Eveline and Suparno, 2020). Impulse itself is a force event that acts on an object in a short time. so that Impulse can be interpreted as an event of the working force in a very short time (Shofi and Astuti, 2015).

There are several examples of the application of momentum and impulse in everyday life, namely the event of a ball being kicked, a tennis ball being hit, two cars colliding with each other, billiard balls, the working principle of a rocket, and so on. In this application, it cannot be done directly in the class. In this case, the movement of objects in the event of momentum and impulses takes place quickly, so that when students make observations of objects they become out of sync and cause misconceptions in students. If the misconception persists, this will affect the understanding of the concepts of momentum and impulse, so that learning will not be achieved optimally. Therefore, an effective learning media is needed.

METHOD

This type of research is carried out using development or Research and Development (R&D) in the Tessmer development model. The attached teaching module development plan is described as follows. The purpose of self-evaluation is to determine design features or learning module specifications. At this stage, the specification of the teaching module and the design of the teaching module are determined. In this phase, the specifications for the teaching modules to be developed are determined based on the needs of students, the scope of the curriculum, and the shortcomings of the current teaching modules. Teaching modules are designed based on the specifications provided. During planning, draft teaching modules are made. The design of the teaching modules that will be made is based on the guidelines for the results of the specifications that have been formulated previously to create teaching modules that meet students' needs, are interesting to read, and cannot be separated from the needs of students and are in accordance with the curriculum and have aspects that are different from existing teaching modules.

Prototyping is the second design phase. In this phase, the teaching module is validated, evaluated, and revised. The prototyping process includes three parts of the test group, namely expert evaluation, individual evaluation (one-on-one evaluation), and small group evaluation. In this article, we will discuss the problem of expert review testing to determine eligibility criteria. Expert evaluation testing is part of the prototyping process where Prototype 1 is validated by experts with the subject of development research carried out being media experts as validator 1 (V1), and material experts as validator 2 (V2). expert validator. Data analysis techniques are used to calculate validation points (table 1) and the calculation results are combined with the validity criteria in Table 1. using the formula adopted by (Afriyanti et al., 2018) as follows.

$$x_i = \frac{\sum s}{s_{max}} \times 100\%$$

Explanation :

x_i = eligibility percentage

$\sum s$ = total score

s_{max} = maximal score

Furthermore, the percentage of eligibility obtained is adjusted to the validity value criteria adopted and modified (Haking & Soepriyanto, 2019), which can be seen in Table 1 below.

Table 1 Category of validity values

No	Criteria Value Validity	Category
1	76 < V ≤ 100	Valid
2	51 < V ≤ 75	Moderately valid
3	26 < V ≤ 50	Less valid
4	0 < V ≤ 25	Invalid

Sumber : Haking & Soepriyanto, 2019

RESULT AND DISCUSSION

The validation process in this study was carried out at the testing stage by expert review. At this stage, the experts reviewed and scored the T-PACK-BASED PHYSICS E-MODULE ON MOMENTUM AND IMPULSE MATERIALS. In the validation process, the average score/level of validation assessment obtained is compared with the validation table that has been prepared to determine the level of validity of the E-Module that we have created.

In this study, the aspects of validation that were focused on were the aspects of Material Updating and Contextual aspects. In both aspects, this module gets a validity value of 91.2%, where this validity level is between the range of values 76<V≤100 so this E-Module is included in the module with a valid category. In the Material Updating aspect and the Contextual aspect, 3 aspects are assessed, including the suitability of the material with the latest scientific developments, image actualization, and Library up-to-date.

In the aspect of suitability of the material with the latest scientific developments, a score of 100% is obtained, this proves that the T-PACK-BASED PHYSICS E-MODULE ON MOMENTUM AND IMPULSE MATERIALS is in the very good category or has been validated that the material in the module is in accordance with developments. latest science. Based on research conducted by Arraman and Hazmi (2018), the suitability of the material with

the latest scientific developments includes the depth of the material, the accuracy of the material, and the stimulus that is appropriate to the current situation.

In the image actualization aspect, a score of 75% is obtained. This proves that T-PACK-BASED PHYSICS E-MODULES ON MOMENTUM AND IMPULSE MATERIALS fall into the quite valid category. The image actualization value may be slightly smaller than the other aspects, but this does not reduce the eligibility of the E-Module that has been made. Because the actualization of the image that has been applied has already been substantiated in the E-Module that has been made.

In the aspect of updating the library, it gets a score of 100%. This proves that the T-PACK-BASED PHYSICS E-MODULE ON MOMENTUM AND IMPULSE MATERIALS is in the very good category or has been validated that this module has the latest libraries. Based on research conducted by Maulidyah and Sutarji (2018), the updating of the literature can be proven by the suitability of the content of the material with the literature used, and the references used come from the primary literature and secondary literature with the latest level of literature being the last 10 years.

From the several assessments above, the validity of the E-Module as a whole has been assessed as having very good validity. This can be proven and seen based on the assessment score of all aspects of the assessment. In addition to giving assessment scores from several aspects, the E-Module is also given input by validation experts. The input given by the experts is to improve the image actualization section, in the sense of adding several images to the E-Module to make it more interesting and to be able to visualize momentum and impulse events, so that this E-Module can easily increase students' understanding of learning Momentum and Impulse. This input will be used as reference material in revising the E-Module so that it is of higher quality, both in terms of material suitability, image actualization, or library updates.

CONCLUSION

From the results obtained through review by the examiner or validator, it is known that the T-PACK-BASED PHYSICS E-MODULE ON MOMENTUM AND IMPULSE MATERIALS is an E-module that is feasible to use and has a validation value of 91.2%, which value consists of image actualization. of 75 values and at the latest Library of 100 values. In its continuation, the E-module will be repaired in the image actualization section so that it can be used more optimally and can achieve learning targets.

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