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DEVELOPMENT OF SHARED-TYPE INTEGRATED E-MODULE WITH THEME "MOTION OF OBJECTS AND LIVING THINGS IN OUR ENVIRONMENT" FOR SECONDARY SCHOOL SCIENCE LESSON

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ABSTRACT

This study aims to develop a shared-type integrated e-module with the theme "Motion of objects and living things in our environment" for secondary school science lessons. Plomp model is used in this Research and Development study, which consists of three stages namely: preliminary research, prototype stage, and assessment stage. A set of questionnaires was prepared to test the validity and practicality of the product. A validity test was conducted involving three lecturers from the Science Education department, and a practicality test was conducted involving 9 students and 3 science teachers at SMPN 1 Kampar. The validity test resulted in a value of 89.79%, placing it in the highly valid category. Results of the practicality test with students yielded values of 90.74% and 93.75%, respectively, which are both highly practical.

Keywords: E-Module, Shared-Type Integrated Science, Motion of Objects and Living Things in Our Environment, Science Process Skills, Research and Development, Plomp Model

INTRODUCTION

The current digital era which is marked by the integration of technology has an impact on all sectors of life, one of which includes advances in the field of education. Education 4.0 is a response to the 4.0 industrial revolution by promoting education with the use of technology-based tools and resources (Dito & Pujiastuti, 2021), (Sharma, 2019). In facing these challenges, it takes a learning innovation that integrates technology and can facilitate students to be active, creative, innovative, and think critically in accordance with the characteristics of the industrial revolution 4.0.

One attempt to integrate technology into education is by providing electronic teaching materials. Among the various electronic teaching materials, the use of e-modules is considered suitable in the current pandemic conditions where teachers are still limited in

carrying out face-to-face learning activities in the classroom. E-modules can help mastery of instruction materials for both teachers and students (Kemendikbud, 2017), (Sugiani et al., 2019) and as a source of independent learning for students in realizing an integrated science learning process (Indraningrum et al., 2017).

In Pedoman Pengembangan Kurikulum (Guidance for Curriculum Development) 2013 stated in Permendikbud No. 65 Tahun 2013 tentang Standar Proses Pendidikan Dasar dan Menengah, it is stated that secondary school science should be carried out in an integrated way. For that, it is necessary to pay attention to the cohesiveness proposed by Robin Fogarty (1991) to support integrated science learning. From some of Fogarty's integration models, there are four potential models to be applied in integrated science learning, namely connected, webbed, shared, and integrated (Wilujeng, 2017).

The e-module designed in this study was expected to improve students' competencies in accordance with Curriculum 2013, in which students are encouraged to develop thinking skills and develop their skills. One of the skills in science learning is called science process skills. By practicing scientific process skills, students find it easier to understand complex and abstract concepts when accompanied by concrete examples. That way students can develop process skills in obtaining concepts (Semiawan et Al., 1987).

Science Process Skills (SPS) are the ability of students to apply scientific methods in understanding, developing science, and discovering knowledge (Lestari & Diana, 2018). Science process skills are skills that can be used to find a concept, theory, or principle in developing a previous concept that already exists or in proving an invention (Fatmawati, 2012). By developing e-modules that support students in developing science process skills, students will easily find and develop science facts and concepts independently.

Observation at SMPN 1 Kampar revealed that there is still a lack of availability of teaching materials that support integrated learning. Teachers only use the Kemendikbud science textbooks assisted by LKS (students' worksheets) as learning resources. Science learning is still mainly taught through direct exposure to teachers so learning focuses on the teacher. Thus, science material becomes knowledge provided by the teacher for students, not as knowledge built by the students themselves. When working on science problems, students tend to be fixated on the worked-sample questions given by the teacher, so students have difficulty when given challenging questions. Based on the analysis that has been described, the researcher conducted the title "Development of Shared-Type Integrated E-Module with Theme "Motion of Objects and Living Things in Our Environment" for Secondary School Science Lesson". Therefore, we decided to develop a valid and practical Shared-Type Integrated E-Module with the Theme "Motion of Objects and Living Things in Our Environment" for the Secondary School Science Lesson. The formulation of the problems contained in this study is "How is the validity and practicality Shared-Type Integrated E-Module with Theme "Motion of Objects and Living Things in Our Environment" for Secondary School Science Lesson?"

METHOD

This type of study is a Research and Development (R&D). The model used is Plomp (2013) consisting of 3 stages, namely (1) preliminary research, (2) prototyping stage, and (3) assessment stage. The preliminary research stage was carried out by collecting initial data. This stage aims to analyze problems that occur in the field related to the e-module that will be developed. This stage consists of several analyzes, including needs analysis, curriculum analysis, concept

analysis, and student analysis.

After obtaining the results of the analysis at the preliminary research stage, a shared-type integrated e-module with the theme "Motion of objects and living things in our environment" for secondary school science lesson design was compiled as prototype I. At the prototyping stage, namely the e-module design followed by the formative evaluation activity proposed by Tessmer (1993). Formative evaluation begins with self-evaluation based on a checklist of product design characteristics to complement the completeness of the e-module to produce prototype II. The next stage is an expert review in the form of assessment activities and suggestions for the product being developed. Three validators as experts gave a review of the prototype by filling out a validation questionnaire. Once this expert review had been completed, prototype II has also been evaluated by a one-to-one evaluation which sought input from three students with various levels of knowledge high, medium, and low who were asked to provide their opinion. The results of the expert review and one-to-one evaluation showed the level of validity of prototype II. The evaluation results of prototype II of the expert review activity and one-to-one evaluation were revised to produce prototype III. The resulting prototype III was evaluated through a small group test on 9 students and 3 science teachers of SMPN 1 Kampar with different levels of knowledge. Finally, prototype IV was produced which would be tested through a field test at the assessment stage.

The instrument used in this study was the form of 2 questionnaires, consisting of a product validity questionnaire by the validator in the form of e-module validation results and a product practicality questionnaire by teachers and students regarding the practicality of the product being developed. Determination of the validity and practicality values is written in the following formula:

$$N = \frac{S}{SM} \times 100\%$$

Note:

N = practicality score

S = obtained score

SM = maximum score

(Adapted from Riduwan, 2012)

RESULT AND DISCUSSION

The results of the needs analysis show that SMPN 1 Kampar has implemented the 2013 curriculum. The learning process is carried out using a scientific approach, however, the teaching materials used are still limited and have not helped students in building concepts and developing thinking skills and skills of students. In addition, during the pandemic, face-to-face learning activities can only be done with a limited time so students need teaching materials that can help them learn independently.

Furthermore, the results of curriculum analysis are obtained in the form of Basic Competence (KD) analysis. KD that will be taken consists of KD 3.1, 3.2, 4.1, and 4.2. From the curriculum analysis, it can be seen that the material movement of objects and living things in the environment is understanding, calculating, and practicing which are considered difficult to understand. Nurdin (2019) & Sulhan (2020) state that the curriculum contains learning objectives in the form of competencies that students are expected to achieve after completing the learning process.

Based on the results of concept analysis, it was found that the main concepts that students must master include straight motion, differences in distance and displacement, differences in speed and velocity, acceleration, the definition of force, resultant force, law I Newton, law II newton, human

skeletal function, the kinds of bones that make up the human skeleton, understanding and types of joints in humans, understanding muscles, types of muscles, working nature of muscles, motion in plants and animals and concept analysis of the material are presented in the form of concept analysis tables that help make map concepts of the material.

From the analysis of students, it was found that the ages of class VIII students ranged from 14-15 years old. During the learning process, students only receive the knowledge provided by the teacher. Therefore, students have difficulty working on questions that are more challenging than the example questions given by the teacher. With motivation and good techniques in providing material, the teacher will attract students to learn more about the material being studied (Seja et al., 2021).

The value of the validation process for teaching materials in the form of e-modules is obtained from the average predetermined component. The results of the three components of the aspects analyzed, respectively get a value of 92.94%, 83.52%, and 89.41%. The results of the validity assessment can be seen in Figure 1.

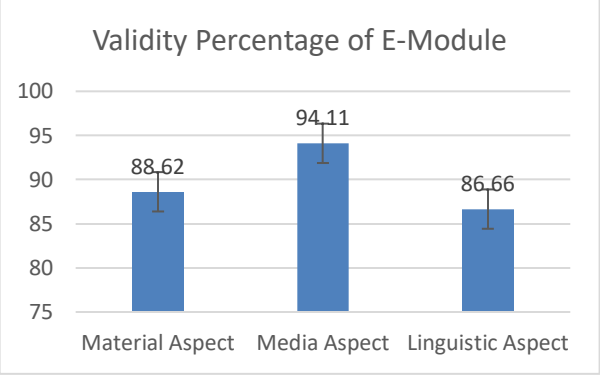

Figure 1. Validity percentage by the validator

The components of the material aspect show the suitability of the modules that have been systematically arranged. This can be seen from the preparation of the components according to the guidelines from the Ministry of Education and Culture (2017) as well as the presentation of material, models, video presentations, virtual lab experiments, and practice questions that are by the presentation developed, namely with a scientific approach. The average value obtained during the validation process was 89.79%. This shows that the validity value of shared-type integrated e-module with the theme “Motion of objects and living things in our environment” for secondary school science lessons is in the very valid category, but there are some that are corrected according to the suggestions given by the validator. The following fixes are made according to the suggestions of the validator.

1) Addition of material descriptions to each learning activity that was previously only in the form of introductory material at the beginning of the chapter.
2) Change the video thumbnail so that the video clip can be viewed on the e-module page.
3) Replacing the Open answer sheet and virtual lab buttons to make them stand out from other charts or pictures.
4) Replacing writing errors such as "Newton's Law 1" to "Newton's First Law" to overcome misconceptions.
5) Replacing some questions in evaluation activities can doubt students and lead to misinterpretation.

The validation results obtained are in line with the research which states that the developed module is suitable for use in the next stage based on the results from material experts, material experts, and language experts (Agung et al., 2022), (Pratama et al., 2021), (Seja et al., 2021).

After obtaining the results of the e-module validation, the assessment was continued to the one-to-one evaluation stage. Based on the results of the interviews that have

been carried out in the one-to-one evaluation of prototype II, it has not changed because according to the opinions of prototype II students, it is good and easy to understand. After the revision stage of input to the expert review evaluation, the shared-type integrated e-module with the theme "Motion of objects and living things in our environment" for secondary school science lessons has been produced in the form of prototype III and can be continued to find out its practical level.

The practicality test results will later be used as a determinant of the practical value of using a shared-type integrated e-module with the theme "Motion of objects and living things in our environment". The developed product is said to be practical if (1) the developed product can be applied in the field or school; (2) the developed product can attract respondents to learning; (3) the material contained in the developed product is easy to understand (Fitria et al., 2017). There are three components analyzed, namely the appearance, presentation of the material, and the benefits of using e-modules. The results of the practicality component assessment of students can be seen in Figure 2.

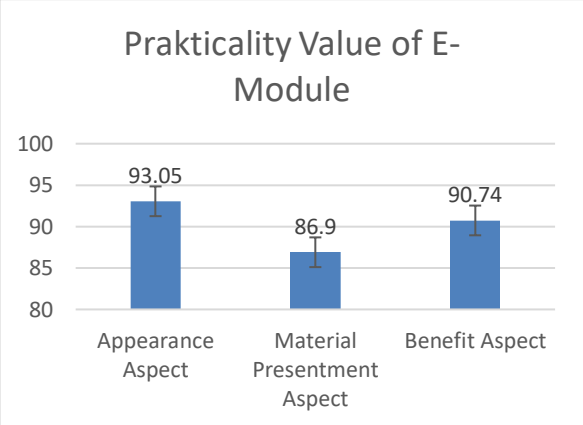

Figure 2. Practicality percentage by students

The average value of the three aspects obtained during the practicality test process by students on the use of this e-module is 90.74%. The data obtained as a whole show that prototype III produced both in terms of appearance, presentation of material and practical benefits for students is in the very practical category. Previous research states that the response from users (students) is included in the very good category so that the science e-module produced is suitable for use in supporting learning (Herawati & Muhtadi, 2018).

Practicality test scores were obtained from 3 science teachers and obtained from the average value of the predetermined components. There are three components analyzed, namely the appearance, presentation of the material, and the benefits of using e-modules. The results of the assessment of the practicality components of the teacher can be seen in Figure 3.

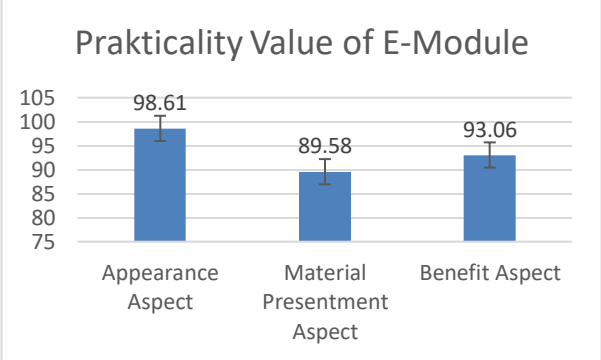

Figure 3. Practicality percentage by teachers

The average value obtained during the practicality test process by the teacher on the use of this e-module is 93.75%. This shows that the use of teaching materials in the form of an integrated science e-module with the theme of the motion of objects and living things in the surrounding environment is in the very practical category.

The results that have been obtained in the practicality test by teachers and students show that the use of e-modules is highly practical to use without experiencing changes in revisions because students and teachers in the small group stated that the product was good and easy to understand. With interactive features on the e-module in the form of

images, video, audio, animation, and virtual lab, it is hoped that it can help students master learning material independently. In addition, this e-module also allows students to learn independently (Afriyanti et al., 2021), (Seruni et al., 2020). And the use of e-modules can be a realization in independent learning according to the abilities of different students (Sudjana and Rivai, 2003). To be widely used by students, it is necessary to test the effectiveness of using e-modules (Amin et al., 2020), (Mago et al., 2022), (Sunaringtyas et al., 2015).

CONCLUSION

Based on the research that has been done, get the following results:

1. E-Module for Shared-Type Integrated Science Lesson on Motion of Objects and Living Things in Our Environment Theme in Secondary School has been produced with a highly valid category, namely the percentage value of 89.79%.
2. E-Module for Shared-Type Integrated Science Lesson on Motion of Objects and Living Things in Our Environment Theme in Secondary School has been produced by having a highly practical category, namely the percentage value of 90.74% of the practicality test by students and 93.75% of the test practicality by science teachers.

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