DEVELOPMENT OF E-MODULE BASED ON CONTEXTUAL APPROACHES ON WORK AND SIMPLE MACHINES FOR SECONDARY SCHOOL

Efendi, A[1 a)], Yurnetti[2]
[1,2]Department of Science Education, Universitas Negeri Padang

[a)]E-mail : annisa.efendi31@gmail.com

ABSTRACT

The education system is required to be able to follow the development of science and technology to prepare a generation that is ready to deal with the challenges of this era. The current curriculum is curriculum 2013. In curriculum 2013 students are required to be active and able to learn independently. The procurement of teaching materials at SMP Negeri 7 Padang is considered not to be able to support independent learning, especially during this online learning period. This study aims to produce science e-module for SMP/MTs based on a contextual approach on work and simple machines to valid and practical. Type of research is Research and Development (R&D) using the Plomp model which consists of three stages, namely the preliminary research, the prototyping stage, and the assessment phase. The research subjects were 3 lecturers of Science Education, FMIPA UNP, teachers and students of SMP Negeri 7 Padang. The instrument used is a questionnaire of validity and practicality. The research data is processed using the kappa moment formula. Based on the results of data analysis, the results of the validity test, the results of the practicality test based on the teacher's response, and the practicality test based on the student's responses were 0.85, 0.87, and 0.83 with very high category. It can be concluded that the e-module for SMP/MTs based on a contextual approach on work and simple machines has been valid and practical for use in class VIII SMP/MTs.

© Department of Science Education, Universitas Negeri Padang

INTRODUCTION

The development of science and technology is currently in the industrial revolution 4.0, there is a transfer of functions from manual to digital or technology systems. That's why 21st century education requires human resources who are broad-minded and responsive to the environment (Al Attas, 2009). The purpose of the education system is to ensure equal distribution of education,

improve the quality of education, and prepare the next generation to deal with the challenges in this era. In order to achieve these goals, educational programs are implemented in accordance with the applicable curriculum. The current curriculum in Indonesia is the curriculum 2013.

The demands on the curriculum 2013 are that students asked to be more active, creative, innovative and independent, it means that students are able to find learning resources and even be able to understand concepts independently (Ernica, 2019). For this reason, the teacher acts as a facilitator, it means that the teacher is responsible for facilitating students in the learning process to help students learn actively and independently (Mulyasa, 2012).

The learning process can be supported by creating innovations in learning such as making the presentation of the material more interesting. There are various challenges faced by teachers in creating innovations in science learning, especially in the last year caused by the covid-19 pandemic. This condition causes the learning process turned into distance learning or online learning. Based on the results of observations by interview 2 teachers at SMP Negeri 7 Padang and distributing questionnaires via google form to students, it is known that the procurement of teaching materials in the form of printed teaching materials is included in Work and Simple Machines. The teaching materials are considered to still have weaknesses to help students to learn independently in these conditions.

Based on this condition, the innovation that can be given to help the learning process is the procurement of electronic-based teaching materials. One form of teaching material that is commonly used is a module.

Modules are teaching materials that are systematically arranged containing materials, learning activities, and evaluations that can be used by students independently to achieve the expected competencies (Anwar, 2010). With current development of technologi, modules can be made in electronic form known as electronic modules (e-module). A possible opportunity for the procurement of this e-module is the ease of use of applications assisted by available devices such as smartphones and computers.

E-module is expected to be able to provide direct and meaningful learning experiences for students, because a meaningful learning process will make the material received by students last longer in memory. One approach that helps to create a meaningful learning is the contextual approach. The point in contextual approach is that learning is not just memorizing but how to form concepts in the minds of students according to the experience received (Putra, 2013). Therefore, the e-module will be designed based on a contextual approach. The E-module is designed for Business and Simple Planes in Daily Life.

This study aims to produce e-module based on a contextual approach on work and simple machines to valid and practical for the secondary school. The formulation of the problems contained in this study "How is the validity and practicality e-module for based on a contextual approach on work and simple machines for student in the secondary school"

METHOD

This type of study is Research and Development (R&D). The model used in this study is Plomp model consisting of 3 stages, namely preliminary research,

prototyping stage, and assessment phase (Plomp, 2013). In this study, the e-module will be tested sor its the category of validity and practicality. The subjects in this study were lecturers in the Science Education Department FMIPA UNP, teachers and students at SMP Negeri 7 Padang.

In the preliminary research stage, several types of analysis were carried out such as needs analysis, teaching materials, curriculum, students, and concepts as guidelines in designing e-modules based on contextual approaches in work and simple machines.

At the prototyping stage consists of prototype I, prototype II, prototype III, and prototype IV. Based on the results of the analysis of the preliminary research stage, a design called prototype I was produced. Then a self-evaluation of prototype I was carried out using a checklist of the components contained in the e-module. If there are still deficiencies in the components of the module, then revisions are made so that prototype II is produced. Next, an expert review was conducted with 3 experts and one-to-one evaluation by interviewing 3 students on prototype II. The suggestions at this stage are used as the basic for improving the e-module so that prototype III is produced.

In the assessment phase, a field test was conducted for teachers and students to see the practicality of prototype IV. Teachers and students are asked to give an assessment by filling out a practicality questionnaire.

The instrument used in this study is a validity questionnaire and a practicality questionnaire. The data obtained will be analyzed using the following Cohen kappa formula.

$$Moment\ kappa\ (k) = \frac{Po-Pe}{1-Pe}$$

Information:
K = Moment kappa
Po = Realized Proportion
Pe = Unrealized Proportion

The assessments that have been obtained are then interpreted according to the following categories:

Table 1. Category Validity Based on Moment Kappa (k)

No.	Interval	Category
1	0.81-1.00	Very high
2	0.61-0.80	High
3	0.41-0.60	Medium
4	0.21-0.40	Low
5	0.01-0.20	Very low

(Boslaugh, 2008)

RESULTS AND DISCUSSION

The results of the needs analysis were obtained from observations and interviews with two teachers at SMP Negeri 7 Padang. The analysis is carried out to find problems or obstacles faced in the learning process.

Based on the results of the analysis, it is known that SMP Negeri 7 Padang is already using the curriculum 2013. In this Covid-19 pandemic condition, the learning system turned to online learning. The obstacle faced is the limitation on the procurement of teaching materials that will be used for helping student to learning independently. This condition causes students result in students have difficult to understanding the learning material. For this reason, teachers need more effective teaching materials to help students during online learning that is not accompanied by a teacher directly.

In this stage an analysis was also carried out on six teaching materials that were available, both printed and digital. From the results of the analysis obtained data that in general teaching materials do not contain contextual content in the delivery of material and are also incomplete. In terms of appearance, some teaching materials have been designed with attractive colors, while three of them have not used attractive color combinations. Especially for digital teaching materials, it is also seen the complexity of the media loaded, it is known that the three digital teaching materials only contain text and images, none of them contain animations and also learning videos as support in explaining the material.

Furthermore, the results of the curriculum analysis for work and simple machines are in the basic competencies. 3.3 Explaining the concept of work, simple machines, and their application in daily life including muscle work on the human skeletal structure. and 4.3 Presenting the results of an investigation or problem solving about the benefits of using simple machines in daily life.

The next analysis is the analysis of students which is carried out through observation, interviews with teachers and students of grade VIII SMP Negeri 7 Padang. The results obtained are the academic abilities of students are heterogeneous, namely high, medium and low. During this pandemic, the learning process turned to online learning. The use of existing teaching materials causes learning methods that only read full text so that the learning process is less effective and causes

students to be bored, as can be seen from the lack of student participation in learning.

In the analysis of students, it was found that students were more interested in using technology in the learning process in the form of electronic-based teaching materials because they were considered capable of loading pictures or even learning videos. Electronic teaching materials are also considered more practical because they are easy to use. Since the learning system switched to online learning, students have been facilitated by smartphone by parents or schools that can be used to support the learning process.

The last analysis is concept analysis. Based on the results of the concept analysis, it was found that some of the main concepts that students must learn on work and simple machines include work, types of simple machines, simple machine working principles, mechanical advantages of simple machines, and simple machine working principles in human muscles and skeleton.

After conducting the analysis, prototype I was formed in the form of an initial design of an electronic module based on a contextual approach. The prototype I produced in the form of an electronic module has several components, namely cover, preface, menu, instructions for use, KI and KD, learning objectives, learning activities, learning videos, summaries, evaluation, bibliography, and developer profiles. Prototype I will be evaluated by the author. The results show that several parts of the module in prototype I need improvement, including: (1) improvements to the cover, namely adding the author's identity and color variations to make it more

beautiful to look at, (2) improvements to the e-module menu section, i.e. changing the background, changing the layout of the menu buttons which were originally arranged in two columns into one column and arranged in a coherent way starting from the user manual to the developer profile. The results of improvements at this stage are referred to as prototype II.

Furthermore, prototype II next to the expert review stage and one to one evaluation. The evaluation given by the validator to the e-module includes 4 aspects of validation, namely aspects of content eligibility, language aspects, presentation aspects, and graphic aspects (Depdiknas, 2008). The results of the e-module validity obtained from expert assessments are 0.85 with a very high validity category. In more detail can be seen in Table 2.

Table 2. Results of E-Learning Module Validation Data Analysis

No.	Rated aspect	Average K	Category Validity
1	Content Eligibility	0.82	Very high
2	Language	0.87	Very high
3	Presentation	0.86	Very high
4	Graphics	0.83	Very high
	Overall Average	0.85	Very high

In assessing the content eligibility aspect, the e-module obtained an average kappa moment value (k) of 0.82 with a very high validity category. This shows that the e-module is in accordance with KI, KD, and the truth of the substance of the learning material.

In the assessment of the lianguage aspect, the e-module obtained an average kappa moment value (k) of 0.87 with a very high validity category. This shows that the e-module have linguistic appropriate. The linguistic aspects assessed include writing that is in accordance with the KBBI, the use of language is effective, and the use of clear sentences so that the language in the e-module can be understood by students and information can reach well. This is in accordance with the opinion of Arsyad (2010) which states that a learning media must have clear legibility, where this readability will relate to the linguistic aspect.

In the presentation aspect assessment, the e-module obtained an average kappa moment value (k) of 0.86 with a very high validity category. This shows that the e-module has presented material that is in accordance with the indicators and learning objectives, is coherent, is able to invite students to participate actively, and the information presented is complete. Arsyad (2010) states that a media must have motivating, social instructional qualities and completeness of the material.

In the evaluation of the graphic aspect, the e-module obtained an average kappa moment value (k) of 0.83 with a very high validity category. This shows that the e-module is appropriate in terms of its graphics. The graphic aspects assessed include the use of the type and size of the font that can be read clearly, the layout is appropriate, the design and color selection of the e-module is attractive, interested, and the images and videos included are attractive and clear. This is in accordance with the opinion of Arsyad (2010) which states that a learning media must have good technical quality so that it can be used to support the learning process. The characteristics of

quality teaching materials are that they can attract students' attention, increase learning motivation, contain interesting illustrations/pictures and use clear language. Presentation of images is needed to support and clarify the content of the material, as well as to increase the interest of readers (Prastowo. 2012). At this expert assessment stage, there are several suggestions for improving the e-module in terms of appearance and language to make it better.

Furthermore, prototype II also assessed the children individually. The results of the one-to-one evaluation on 3 students obtained data that the e-module in terms of appearance and features was considered to be able to attract students' interest to use it. Furthermore, in terms of the language used is also easy to understand and in accordance with the character of students. The evaluation results at this stage do not require revision because there are no suggestions from students that require to make improvements to the e-module. At this stage, prototype III will be produced.

After expert and one to one evaluation, prototype III will be tested in small groups of 6 students. The results of the analysis of small group evaluation obtained data on the practicality of e-modules on 3 aspects, namely ease of use, efficient learning time, and benefits of e-modules. In more detail can be seen in Table 3.

Table 3. Results of Analysis of E-Module Assessment Data on Small Group Evaluation

No.	Rated aspect	Average K	Category Validity
1	Ease of Use	0.83	Very high
2	Learning Time Efficiency	0.79	High

3	Benefits of Use	0.82	Very high
	Overall Average	0.81	Very high

The results of the practicality of the e-module obtained from small group trials are 0.81 with a very high practicality category. At this stage the prototype IV was produced.

Prototype IV will be field tested to determine its level of practicality. The field test was conducted on 5 science teachers and 30 students of SMP Negeri 7 Padang by providing a practicality questionnaire. The results of the field test analysis on teachers and students can be seen in Tables 4 and 5.

Table 4. Results of E-Module Assessment Data Analysis on Field Tests Based on Teacher Responses

No.	Rated aspect	Average K	Category Validity
1	Ease of Use	0.86	Very high
2	Learning Time Efficiency	0.82	Very high
3	Benefits of Use	0.89	Very high
	Overall Average	0.88	Very high

Table 5. Results of E-Module Assessment Data Analysis on Field Tests Based on Student Responses

No.	Rated aspect	Average K	Category Validity
1	Ease of Use	0.85	Very high
2	Learning Time Efficiency	0.78	High
3	Benefits of Use	0.86	Very high
	Overall Average	0.83	Very high

The results of the practicality of the e-module obtained from the field test both from the responses of teachers and students are in the very high practicality category.

The first aspect to be assessed is the ease of use of the e-module. In terms of ease of use, it is in the very high practicality category. This shows that the e-module already has instructions for using the module

that are easy to understand. The material presented is clear and the language used is easy to understand and doesn't cause doubt when teachers and students use it. E-modules can be used repeatedly and used anywhere, so that with this e-module it allows students to learn and repeat material anywhere and anytime. E-modules are also easy to use so that they are considered to increase the activeness, motivation, interest, and learning activities of students (Wijayanto, 2014).

The second aspect of assessment is the aspect of learning time efficiency. In this aspect, e-modules are in the category of high practicality. According to Daryanto (2014) learning using modules can make learning time more efficient and students can learn at their own pace. This is in accordance with the results of the practicality questionnaire analysis of students, it is known that by using e-modules students can learn at their own pace, can save learning time, and can work on evaluation questions on time so that learning time becomes more efficient. e-modules can make learning time more effective and efficient.

The third aspect of the assessment is the aspect of the benefits of use. In this aspect, e-modules are in the category of very high practicality. This shows that the e-module developed is able to help students learn independently and can understand the material through the images presented so that it can increase students' curiosity and motivation to learn. This is certainly in line with the demands of the curriculum 2013 which requires students to be more active and independent, it means that students are able to find learning resources and are even

able to understand concepts independently (Ernica, 2019). Besides, it is also in line with the purpose of using the module, namely so that students are able to learn independently with or without direct teacher guidance (Prastowo, 2014). This e-module also makes the learning process more enjoyable.

From the teacher's perspective, e-modules are useful in supporting the teacher's role as a facilitator. In accordance with the purpose of the e-module itself, the module is one of the teaching materials that is systematically arranged using language that is easy to understand by students so that students can learn independently with or without guidance from the teacher (Prastowo, 2014). The module can support the teacher's role as a facilitator because the steps presented in the learning module are clear, systematic, and easily understood by students so that the teacher is no longer dominant in learning activities because it is students who have to play an active role in finding concepts.

Based on the practicality data as a whole, it shows that the prototype IV e-module is in the very high practicality category, both from student responses and teacher responses.

CONCLUSION

Based on the study, it can be obtained data that the e-module based on a contextual approach in work and simple machines for secondary school produced has a very high category of validity and practicality. So that the final product of this study is a e-module based on a contextual approach in work and simple machines that are valid and practical

to use for students grade VIII in secondary school.

REFERENCES

Al Attas, Syed Muhamad Naquib. 2009. *Konsep Pendidikan dalam Islam : Suatu Rangka Pikir Pembimbing Filsafat Pendidikan Islam.* Cet. I; Bandung: Mizan

Anwar, Ilham. 2010. *Pengembangan Bahan Ajar*. Bahan Kuliah Online. Direktori UPI. Bandung

Arsyad, Azhar. (2010). *Media Pembelajaran*. Jakarta: PT Raja Grafindo Persada.

Boslaugh, S & Andrew PW. 2008. *Statistics in a Nutshell, a desktop quik reference.* Beijing: Cambridge, Famham, Koln, Sebastopol, Taipe, Tokyo; O'reilly

Daryanto, D & Dwicahyono, A. 2014. *Pengembangan Perangkat Pembelajaran (Silabus, RPP, Bahan Ajar)*. Yogyakarta: Gava Media.

Depdiknas. 2008. *Penulisan Modul*. Jakarta: Direktorat Tenaga Kependidikan, Ditjen PMPTK, Depdiknas.

Ernica, S. Y., & Hardeli, H. 2019. *Validitas dan Praktikalitas E-Modul Sistem Koloid Berbasis Pendekatan Saintifik.* Ranah Research: Journal of Multidisciplinary Research and Development, 1(4): 812-820.

Mulyasa, 2012. *Pengembangan Dan Implementasi Kurikulum 2030.* Bandung: PT. Remaja Rosakarya.

Nurdin, S. & Adriantoni. (2016). *Kurikulum dan Pembelajaran*. Jakarta: Rajawali Press.

Plomp, T & Nienke N, 2013. *Education Design Research: An Indtroduction, dalam An Introduction to Educational Research*. Enschede, National Institue for Curriculum Development.

Prastowo, A. 2012. *Panduan Kreatif Membuat Bahan Ajar Inovatif: Menciptakan Metode Pembelajaran yang Menarik dan Menyenangkan*. Yogyakarta: Diva Press.

Putra S.R. 2013. *Desain Belajar Mengajar Kreatif Berbasis Sains*. Jogjakarta: DIVA Press.

Wijayanto, Zuhri, Muhammad Saifuddin. (2014). *Pengembangan E-Modul Berbasis Flip Book Maker dengan Model Project Based Learning untuk Mengembangkan Kemampuan Pemecahan Masalah Matematika*, Prosiding Mathematics and Sciences Forum, 626-628. http://prosiding.upgrismg.ac.id/index.php/masif2014/masif2014/paper/viewFile/487/436