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THE GENERATE OF E-MODULES BASED ON CONTEXTUAL ON HARMONIOUS MOTION MATERIALS TO OPTIMIZE THE UNDERSTANDING CONCEPT IN SMA NEGERI 10 MEDAN

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Abstract

This study aims to knowing the validity, practicality, effectiveness, and optimization of students' understanding of concepts after using e-modules based on contextual on harmonious motion materials. The subjects in this research were students of class X MIA 1 & X MIA 2 in SMA Negeri 10 Medan. This type of research is Research and Development (R&D) using a 4D model. The data collection instruments is consisted of validation questionnaires, teacher and students response questionnaires as well as pretests and posttests of concept understanding abilities. The data analysis techniques are quantitative and qualitative. The results of this study gets very valid criteria with an average score of material experts getting 92.96%, and media experts getting 93.40%, learning experts at 96.48%, the teacher's response with 94.79% and 95.02% student response included in the practical criteria, the effectiveness with an n-gain of 0.71 in the high category, and the understanding of students' concepts by the hypothesis of the calculation t_{count} is 2,364 while the t_{table} is 1,799, it was stated that H_a was accepted. So it can be concluded that e-modules based on contextual on harmonious motion materials are valid, practical, effective, and can optimize the understanding of student concepts.

Keywords: Generate, E-Module, Contextual Approach, Harmonious Motion, Concept Understanding.

The era of the industrial revolution 4.0 presents challenges and opportunities for educational institutions. This era is an era in the use of digital technology which has had many impacts on the educational process. The rapid development of science and technology brings a new paradigm to printed teaching materials such as modules. The large number of smartphone use by students resulted in students being more interested in viewing writing through their respective cellphones. Currently, technology products provide an alternative in the form of modules that can be accessed and used by students using smartphones, computers, or laptops as the main device, known as electronic modules (e-modules). E-module is a form of presenting independent teaching materials that are systematically arranged in certain learning units that are presented electronically, where each learning activity is a navigation that makes students by presenting them a more interactive program with video, animations, and audio (Kementrian Pendidikan dan Kebudayaan, 2017).

Based on an interview with one of the physics teachers, it was found that the school used teaching materials in the form of textbooks and worksheets. Unfortunately, only a few students have these teaching materials due to the lack of availability of books from schools. The online

the effect of teaching materials in science and physics learning on conceptual understanding based on education level is most effective in high school with a high category and the most effective types of teaching materials are modules with a high category. Therefore, it is necessary to design an educational package that is accompanied by a learning model so that it can optimize students' understanding of the concept of effective and efficient. The preparation of physics teaching materials and their implementation must be directed to provide opportunities for students to achieve increased understanding. Although the available ICT-based learning support facilities are sufficient, in terms of implementation it is still not optimal because learning resources such as print-based teaching materials are very limited.

To deepen students' understanding, the researcher will create an e-module with the most appropriate approach, namely the contextual approach. Contextual learning is a concept that helps educators connect material with actual situations so that it can encourage students to connect their knowledge with applications in everyday life (Komalasari, 2017). Other researchers have also succeeded in obtaining success in making e-modules based on contextual, such as research conducted by Bukit et al. (2013) obtained the results of learning innovations by optimizing the use of effective CTL-based learning resources and quite providing a significant impact on general physics learning outcomes I using pretest and posttest in measuring students' level of understanding of the subject matter. Ngadimin et al. (2021) obtained the results that there is success in increasing understanding of the material based on the value of n-gain, proper validation results and high teacher and student reactions indicating that e-modules are suitable for use in education.

Based on the research described above regarding the success of e-modules using a contextual approach, this research is expected to be a suitable answer to current problems so it is very important to do CTL learning using e-modules. In addition, students can also be wiser in using smartphones, understand concepts and can use these concepts in their lives. This is what underlies researchers interested in raising and discussing this issue in a study on "The Generate of E-Modules Based Contextual on Harmonious Motion Materials to Optimize the Understanding of Concept in SMA Negeri 10 Medan".

METHOD

The research was conducted using a quasi-experimental design research type. The sample used in this study included two classes, namely 32 students in class X MIA 1 as the experimental

class and 34 students in class X MIA 2 as the control class. The sampling technique used is purposive sampling, namely the sampling technique with certain considerations.

The research design used is the pretest-posttest nonequivalent control group design. In data collection, researchers use with test techniques include pretest and posttest and non-test techniques in the form of interviews and questionnaires. In this study, the model used is the 4D development model by Thiagarajan, S., Semmel, D. S & Semmel, M. I (1974) which consists of four stages including Define, Design, Develop, and Disseminate with the consideration that the model is suitable for making learning model products that are on target, effective, efficient and of high quality. The research steps carried out by researchers are in accordance with the 4D stages shown in **Figure 1.**

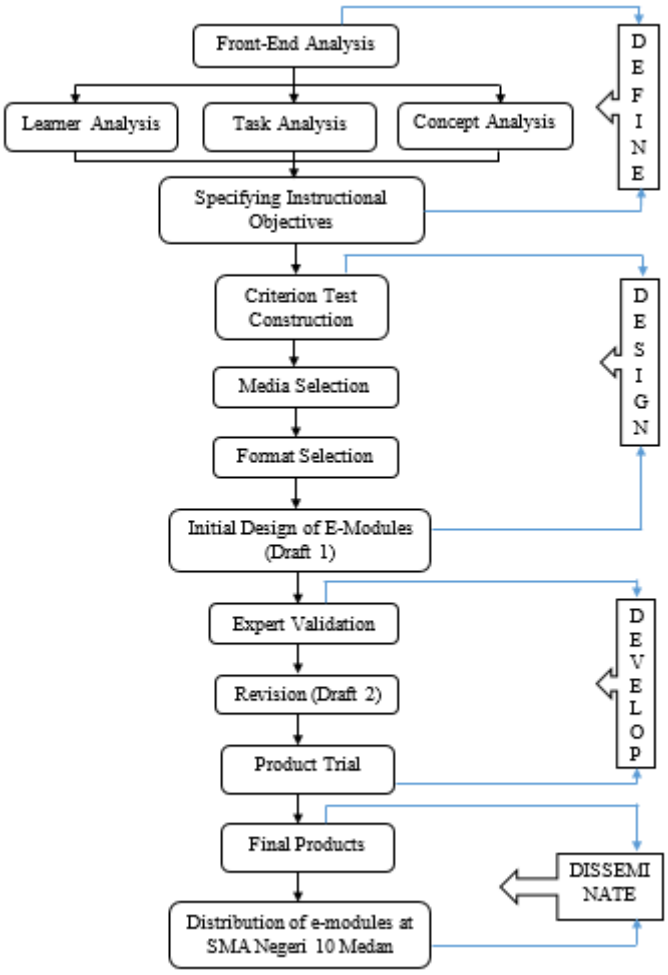

Figure 1. 4D Development Chart

The procedure in this research refers to the 4D development model, namely: The define stage includes 5 stages of analysis including: (1) The front end analysis is designed to explore problems in schools and alternative learning activities to draw solutions in schools; Learner analysis

was carried out by conducting needs analysis activities with students related to students' interest; (3) Task analysis is in the form of learning activities that are adapted to a contextual approach to group or individual assignments; (4) The concept analysis used serves to identify the material according to the basic competencies and make it in the concept map; (5) Specifying instructional objectives is carried out by summarizing the results of the task analysis and concept analysis which is then used as the basis for the preparation of tests and learning device materials to limit research. The design stage is to generate a prototype e-module that will be used in solving existing problems which covers criterion test construction, media selection, format selection, and initial design. The development stage is divided into two steps, namely (1) expert validating by material, media, and learning expert and (2) the trial was conducted on 66 students and provided pretest and posttest questions after learning to use e-modules. The disseminate stage that the product of teaching materials that have become the final product is then limited to distribution to physics educators and students at SMA Negeri 10 Medan.

RESULT AND DISCUSSION

The results of the define stage consist of 5 stages. First, the front end analysis where the researcher makes an initial guess to identify the fundamental problem in the learning process so that it is behind the need for a generate. Based on the results of interviews with teachers, obstacles encountered during the hybrid learning process are network disturbances and limited student quotas so that face-to-face online learning is rarely carried out, the material is given in the form of powerpoints or photos of material from textbooks. In addition, learning time and teaching materials in schools are limited, which makes many students who do not have books, which results in a lack of understanding of students' concepts to a decrease in learning outcomes. The teacher uses a method by giving assignments, material notes, and asking students to do individual practicums at home as a solution to overcome obstacles. The teacher gives a positive response regarding the innovation of making e-modules with harmonious motion material and enthusiastically expecting students to be interested and happy.

Second, learner analysis was carried out in X MIA 1 class. According to students, the lack of learning media used today and the infrequent online meetings have caused students not to be able to understand the material and have not fostered motivation and learning independence. Third, task analysis is in the form of learning activities that are adapted to a contextual approach to group or individual assignments. Fourth, the analysis of the concepts used to identify the material

and arrange the material according to the basic competencies which are then used in the form of a concept map. The material used as the basis for the concept map is harmonic motion. Fifth, the specifying instructional objectives is carried out by summarizing the results of the task analysis and concept analysis which is then used as the basic is carried out by summarizing the results of the concept analysis and task analysis and preparing learning objectives.

The results of the design stage are carried out to design the product through four stages. First, the selection of media by adjusting the needs of students. The selection of media that is used by taking advantage of the current technology such as laptops and smartphones, so the researcher decided to generate an e-module based on contextual on harmonious motion material for class X as the most suitable and suitable media. Other learning media designed to support this contextual-based physics e-module include: LKPD, google form links, quizzes, videos from youtube, and QR codes. The final result of this development is in the form of HTML and .exe. Second, the selection of the module format to describe the learning content. Such as formulating module designs, learning media used, approaches used, and learning resources. The e-module will contain materials and indicators that are compiled and adapted based on core and basic competencies.

Third, the preparation of test standards in the form of pretest and posttest questions as a reference to determine the optimization of students' understanding. Fourth, the initial design is the entire e-module design including the title, image design, layout, video, and writing. Views contained in e-modules based on contextual include: (1) Cover containing titles, subjects, learning materials, classes, and authors; (2) Introduction, which contains information related to the role of e-modules in the learning process; (3) Table of contents containing the e-module framework; (4) Introduction containing basic competence and competency achievement indicators, e-module features, and instructions for using the module. In addition, in the introduction there is also a concept map of the material and learning objectives; (5) Learning with a contextual approach that contains a description of the material with several features and barcode scan; (6) Evaluation; (7) Bibliography; (8) Glossary; and (9) Attachments in the form of biodata of the author.

At this result of development stage, it aims to generate a final product that has been revised based on input and advice from experts. Validation by experts can be determined by the validation criteria obtained based on the validator's average score, which is then converted according to the validity conversion table to determine the validity level of the e-module. The questionnaire

validation of the material, media, and learning expert referred to the scoring description adaptted from BSNP (2014) and Erinawati (2016).

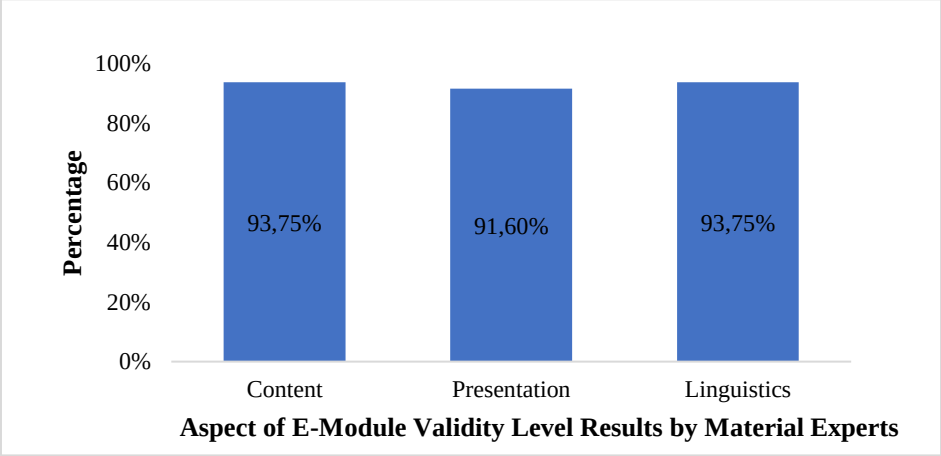

Figure 2. Chart of E-Module Validity Level Results by Material Experts

The results of the material expert's assessment the validity of content gets a percentage of 93,75%, presentation gets 91,60%, and linguistics 93,75%. Then the average presentation is 92,96%. If it is matched with the table of validity criteria, then this achievement score is included in the 'Very Valid' criteria.

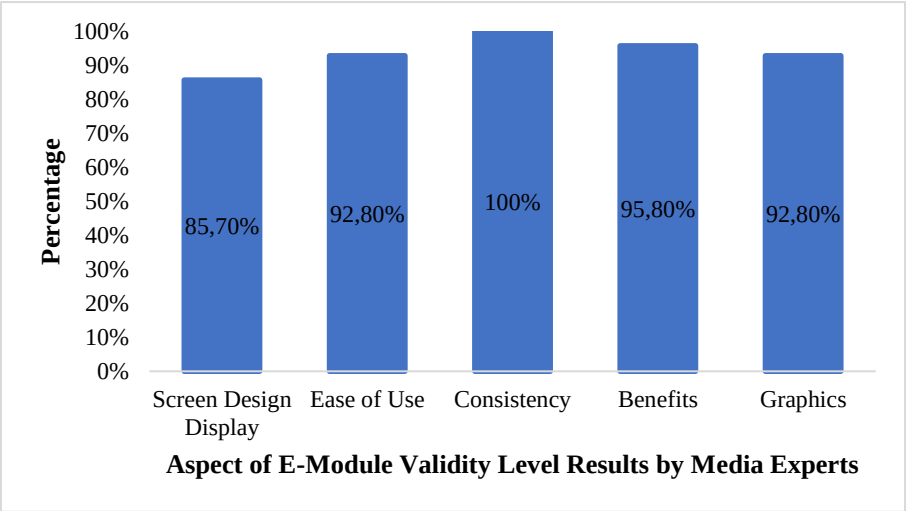

Figure 3. Chart of E-Module Validity Level Results by Media Expert

Based on the **Figure 3.** the results of the material expert's validity assessment that the appearance of screen design gets a percentage of 86%, ease of use gets 93%, consistency gets 100%, benefits 96%, and graphics by 93%, so the score is included in the "Very Valid" criterion.

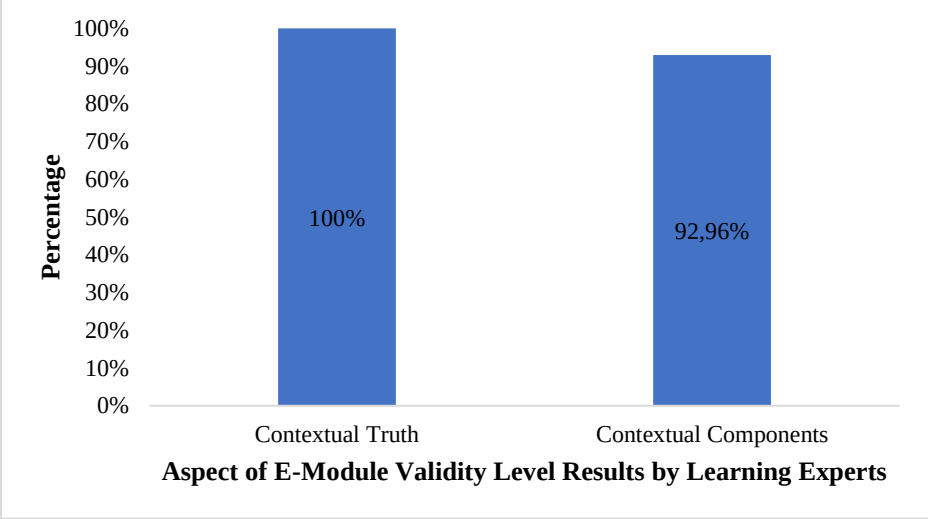

Figure 4. Chart of E-Module Validity Level Results by Learning Expert

Based on the **Figure 4.** the results of the learning expert's validity assessment that the contextual trurh by 100% and contextual components by 92,96%, so the score is included in the "Very Valid" criterion.

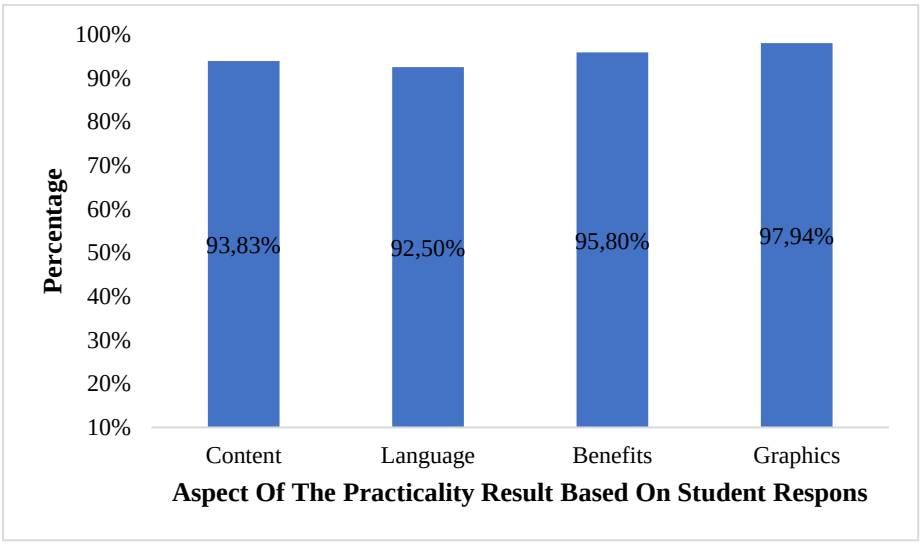

Figure 5. Chart Of The Practicality Result Based On Student Respons

Based on the **Figure 5.** that the practicality based on student respons of content gets a percentage of 93.83%, language gets 92.50%, benefits 95.80%, and graphics 97.94%. Then the average presentation is 95.02%. If it is matched with the table of practicality criteria, then this achievement score is included in the 'Very Practical' criteria.

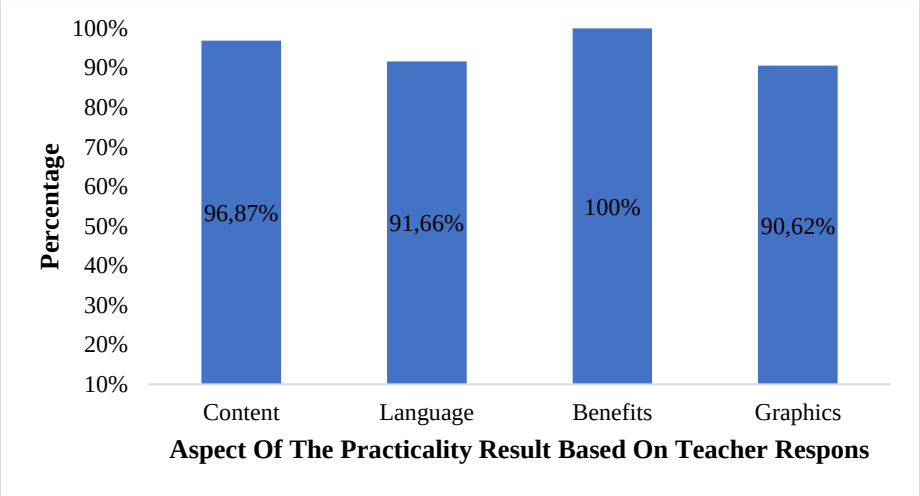

Figure 6. Chart Of The Practicality Results Based On Teacher Respons

Based on the **Figure 6.** that the practicality based on teacher respons of content gets a percentage of 96.87%, language gets 91.66%, benefits 100%, and graphics 90.62%. Then the average presentation is 94.79% with the 'Very Practical' criteria. So that the average result of the overall percentage of all respondents was found to be 94.90% with very practical criteria. Based on these data, it is stated that the resulting of this e-module is practically used without a total or significant revision. This is in accordance with the results of research by Arsyah, et al (2019) where obtaining the practicality of android-based computer system learning media, which is 90.6%, can be stated the level of practicality, which is very practical to use.

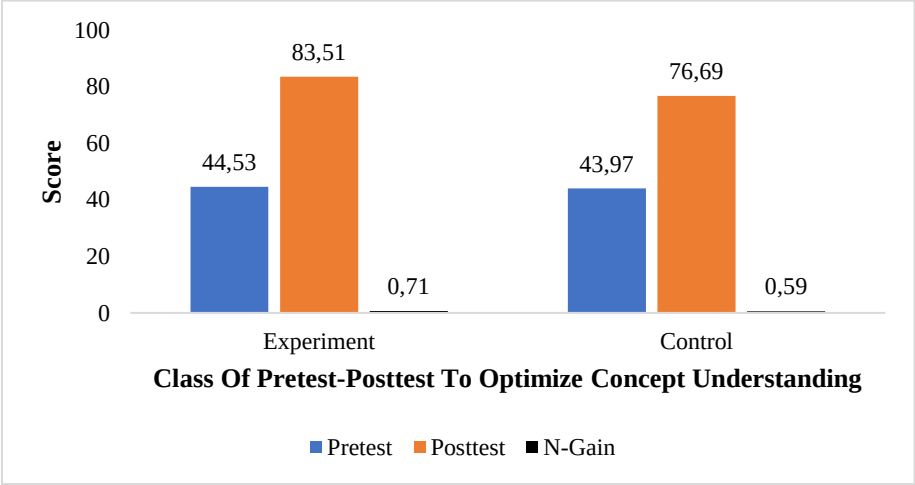

Figure 7. Chart Of Recapitulation Of Pretest-Posttest Results To Optimize Concept Understanding

The results of the descriptive data analysis showed that there was an optimization between the results of the control class learners' concept understanding ability test and the experiment. This result can be seen from the difference in the average pre-test score to the control group post-test

increased by 33.23 while the experimental group increased by 38.98. The greater increase in the gap is in the experimental class. This is due to the difference in treatment where the experimental class uses the e-module teaching materials produced. This means that the use of the physics e-module generated has a more positive effect on the understanding of students' concepts compared to not using e-module teaching materials.

The N-gain test is a very good indicator in proving the effectiveness of the treatment based on the scores obtained through the posttest (Sitohang et al, 2020). The purpose of the N-gain test is to determine the increase in understanding of the concept through the pretest and posttest. The average pre-test concept understanding score obtained by the control class of 43.97 means that it can be categorized in the sufficient category. After the post-test, it received an average score of 76.69 which showed the level of understanding of the concept in the high category which was realized with the calculation of n-gain of 0.59 with the medium category.

Meanwhile, the average score of the pre-test concept understanding score obtained by the experimental class is 44.53, which means that it is in the sufficient category. However, after the posttest was carried out, it received an average value of 83.82 which showed a very high level of understanding of concepts in the category which was realized with an n-gain calculation of 0.71 with a high category gain. Looking at the averages in the experimental class and the control class, it can be concluded that there is an optimization of concept understanding by using contextual-based e-modules in harmonious motion materials.

From the results of the research hypothesis, it can be seen from the posttest data which has a t_{count} value of 2,364 and t_{table} of 1,994 so that the $t_{count} > t_{table}$; 2,634 > 1,997, so H_a is accepted and H_0 is rejected. Based on the results of the hypothesis test above, it can be concluded the understanding of students' concepts that using e-module based on contextual is optimize than student using book in the school.

This is in line with the research of Susilawati, et al (2020) that learning using e-modules on the subject of straight motion is effective in mastering the concepts of class X students of MAN 2 Banjarnegara in the 2017/2018 academic year with the acquisition of an n-gain test of 0.510 in the medium category. Therefore, it can be concluded as a whole that learning using physics e-modules facilitates and motivates students to understand physics concepts. The final stage of this study is

dissemination, where researchers make limited distribution by providing e-modules based on contextual to class X physics students and teachers at SMAN 10 Medan.

CONCLUSION

Based on the results of the research and discussion that has been described, the conclusions in this study that the e-module based on contextual on harmonious motion material are very valid based on the expert assessment with coverage of material, media, and learning experts. The responses of students and teachers to the practicality of the e-module which were measured using a response questionnaire also obtained a very practical category. The effectiveness of the e-module was measured using the n-gain test with a high category, and understanding of students' concepts that using this e-module is optimize than the students using books in the school.

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