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Development of E-Module Contextual Teaching and Learning Model on Global Warming Material for Class XI High School

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ABSTRACT

Technological developments will affect the world of education in terms of institutions, materials, teachers, methods, infrastructure and so on. This is a challenge that must be answered by the world of education, in the 2013 Curriculum where learning is required to be able to balance three student competencies including attitude, skills and knowledge competencies. To support the learning process, teaching materials in the form of e-modules are needed. This research aims to produce a product in the form of a physics e-module on global warming material for class XI high school. This research is included in research and development research with the Plomp development research model. Preliminary research data was obtained from needs analysis through interviews with teachers and distribution of questionnaires to high school students in the city of Padang and legitimacy information was gotten from 5 material science instructors. The instruments in this exploration were educator interview sheets, self-assessment sheets and master legitimacy sheets. Data were analyzed descriptively. This research produces a physics e-module with a contextual teaching and learning model with REACT learning strategies on global warming material. The self-evaluation results show that the e-module is in the good category. The validity test results obtained an average value of 0.81 which is in the valid category. Based on this data, the physics e-module with the contextual teaching and learning model with the REACT learning strategy has met the requirements in terms of validity so that it can be used in schools.

INTRODUCTION

Based on the 2013 curriculum, learning is an interactive learning process that not only emphasizes interaction between educators and students but also the environment around the learning. In essence, learning in the 2013 curriculum is oriented towards the goal of achieving balanced competencies between students' attitudes, knowledge and skills. Furthermore, based on the 2013 curriculum objectives which are applied in physics learning in schools, where physics learning in high school is learning that emphasizes natural phenomena and their measurements. The aim of learning Physics is to build students' scientific, spiritual and social attitudes. It is trusted that understudies can exhibit acceptable conduct in everyday exercises and can foster basic and imaginative reasoning abilities by connecting ideas, realities and

standards in the educational experience so members understudies can apply it in their day to day routines. Physics is also a field of science that is closely related to the development of science and technology.

Because Physics is a field of science that is closely related to the development of science and technology, in the 21st century we are required to be more critical and selective in utilizing technology so that technological progress has a positive impact on life and education. One method for confronting the difficulties of learning in the 21st century is to use existing educating materials. Mechanical advancements empower advancement in creating showing materials in learning exercises. Speed and simplicity in introducing data as a learning asset is effortlessly gotten if learning utilizes electronic media (Triyono, 2015). The advantages of ICT for instruction are not just restricted to PC innovation (equipment and programming) used to process and store data, yet additionally incorporate correspondence innovation to communicate data Martin (2012). In the field of training, the utilization of Data and Correspondence Innovation is centered around working on the nature of realizing which can eventually work on the nature of Schooling Anshori (2017). One of the instructing materials that can be changed into electronic structure is a module. E-module (electronic module) is a type of show of free learning materials which are organized methodicallly into specific learning units, which are introduced in electronic organization, where each learning action in it is associated with a connection (connect) as route which makes understudies more intuitive. with programs, outfitted with video instructional exercises, movements and sound to advance the opportunity for growth (DPSMA, 2017). Electronic modules are a type of free learning material that is deliberately organized and shown in electronic organization, including sound, liveliness and route (Sugianto et al., 2013).

An Earth-wide temperature boost is one of the genuine effects confronting mankind in the advancement of innovation in the 21st 100 years. This material should be given to understudies determined to build understudies' mindful mentality towards science, innovation and its effect on the general climate and society. Permendikbud plans that the 21st century learning worldview accentuates understudies' capacity to figure out data from different learning sources, form issues, think fundamentally, and participate and team up in tackling issues (Kemdikbud, 2013). One arrangement that should be possible by instructors is to apply the Relevant Educating and Learning Model. Where learning with the logical educating and learning model is discovering that can help understudies to can interface the information they have with true occasions or circumstances that they experience, like the utilization of logical hypothesis in mechanical applications, and its effect on the climate, with includes seven primary standards of powerful learning, in particular: constructivism, asking, finding, learning networks, displaying and real appraisal (Shoimin, 2016: 41). Where these capacities are supposed to have the option to foster the understudies' own personality and furthermore support understudies' contribution in the growing experience both intellectually and truly.

This is in accordance with Pastor of Training and Culture Guideline number 22 of 2016 concerning essential and optional schooling process principles which expresses that "the growing experience in instructive units is done in an intelligent, rousing, fun, testing and propelling way for understudies to take part effectively, as well as giving adequate room to drive, and autonomy as per the understudies' abilities, interests and physical and mental turn of events."

Based on the description above, various efforts have been made by the government to support the learning process by utilizing existing technology and learning resources, but it turns out that teachers who teach in schools have not yet utilized them properly. This is based on initial research conducted by researchers at three schools in the city of Padang, namely SMAN 1 Padang, SMAN 7 Padang and SMAN 11 Padang, by distributing interview

questionnaires to 3 teachers and several students in each school. Where in general teachers carry out the learning process only using printed teaching materials, which according to students are less interesting, thereby reducing students' interest in understanding the learning material. The learning methods or models used by teachers are still too ordinary and only focus on the teacher, not on student activity in class because the methods used are only lectures and discussions that focus on the teacher.

Based on research conducted by Zakiyah et al (2019) and Suastika & Rahmawati (2019), the learning process for junior high school students who use e-modules with a CTL approach can make it easier for students to understand the subject matter by relating it to everyday life and can be used by students. educate anytime, anywhere, and made using language that is easy to understand. Therefore, in this research, to overcome students' problems, an e-module design was carried out using a CTL approach on global warming material that was more interesting and used language that was easy for students to understand so that students could be more active in understanding the concepts of the subject matter and not get stuck. on the teacher's explanation.

From several descriptions of the problems described above, the solution to these problems is the existence of teaching materials in the form of e-modules which have been developed which are able to improve students' positive attitudes and skills, ready to give a fascinating new climate with regards to the educational experience being done. with the goal that understudies get a more significant educational experience. Gracious, that is the reason the point of this examination is to create a Physical science e-module for the Context oriented Instructing and Learning (CTL) Model on An unnatural weather change Material for Class XI SMA/MA.

METHODS

The type of research carried out is development research (design research). This research aims to develop a new product or improve an existing product. According to Rochmad (2012: 65). This e-module with a contextual teaching and learning model was developed using the Plomp development model, Plomp (2013: 12) states that development research is needed to design and develop an intervention (such as programs, tools and learning strategies, products and systems) as a solution to complex research problems and advancing science. Products that can be developed are in the form of teaching materials, modules and so on to improve the quality of learning. The instruments used in this research are a self-evaluation questionnaire and a validity questionnaire.

The preliminary research stage (Preliminary Research) was carried out in 3 ways, namely curriculum analysis, literature study and needs analysis by conducting interviews with 3 physics teachers each and distributing questionnaires to class XI students at SMAN 1 Padang with 17 students, SMAN 7 Padang with 19 students and SMAN 11 Padang with 19 students.

The preliminary research stage (Preliminary Research) where the concept of the 2013 curriculum is to be able to balance hard skills and soft skills. Curriculum analysis in the e-module created refers to the 2013 Curriculum. The e-Module is made based on Core Competencies (KI) and Basic Competencies (KD) 3.12 class which was carried out by analyzing journals to look for references and sources related to research activities, namely research conducted by Zakiyah et al (2019) and Suastika & Rahmawati (2019) which was the source of previous research.

At the preliminary research stage, the needs analysis was carried out by interviewing 3 physics subject teachers at SMAN 1 Padang, SMAN 7 Padang and SMAN 11 Padang where the interview sheet consisted of 19 questions. The interview sheet refers to the interview guide

grid, namely analysis of the curriculum used, analysis of Physics learning, analysis of students, analysis of literature, and analysis of the development of Teaching Materials.

Meanwhile, the analysis of student needs was carried out by distributing questionnaires to class This analysis includes physics learning analysis, literature analysis, student analysis, and development of teaching materials.

The self-evaluation development stage was carried out by the researchers themselves regarding errors and incompleteness of the initial prototype. Analysis of product validity data obtained from the checklist sheet was obtained from the checklist data on the validity sheet which was prepared using a Likert scale.

Likert scale	Assessment
1	Emphatically clash
2	Try not to concur
3	Neutral
4	Agree
5	Unequivocally concur

(Modified from Riduwan, 2012)

Results

Development Phase (Prototyping Phase)

E-Module Prototype Design

The prototype created is a global warming physics e-module with a contextual teaching and learning model with the REACT strategy. This prototype was created based on the guidelines for preparing e-modules created by the Directorate General of Primary and Secondary Education, Ministry of Education and Culture in 2017. The prototype design for making e-modules, with its parts, namely cover, instructions for using the e-module, menu, table of contents, glossary, instructions for use by teachers and students, core competencies and basic competencies, objectives and indicators, concept maps, activity sheets, summaries and evaluations.

At this stage the e-module is validated by experts using instruments that have been created by researchers. The validation instrument created has three assessment categories, namely the material and language category which consists of aspects of content suitability and language aspects, the second is the e-module category, namely aspects of e-module characteristics, aspects of application use, and graphic aspects, and the third category is aspects contextual teaching and learning model with the REACT learning strategy which is relating, experiencing, applying, cooperating and transferring. This validation was carried out by five experts who were Physics lecturers at FMIPA UNP.

Firstly, material and language assessment consisting of content suitability aspects and language aspects. The content feasibility aspect component consists of 15 indicators and the language aspect component consists of 6 indicators. The following are the results of the e-module validation for each component.

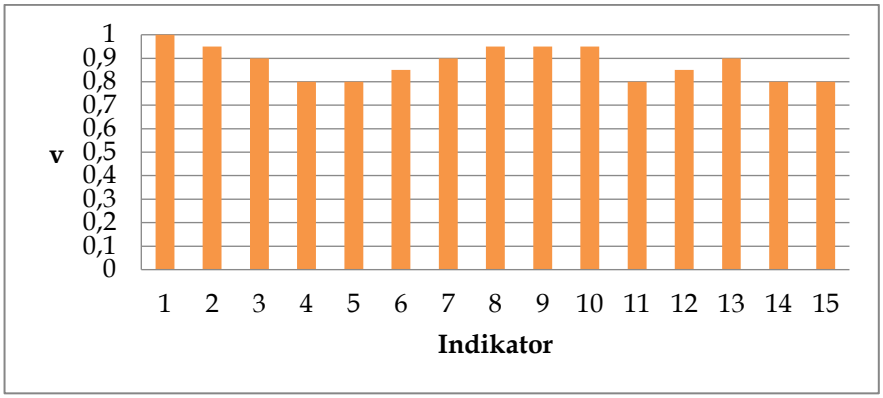

Figure 1. Validation of Feasibility Aspects of Result Content

In light of Figure 1, it tends to be seen that the marker values for the substance achievability viewpoint are in the scope of 0.80 to 1, consisting of 15 indicators. All indicators are classified as valid, namely ranging from 0.80 to 1. The average value of the fifteen indicator components for the content feasibility aspect is 0.88, which is classified as valid.

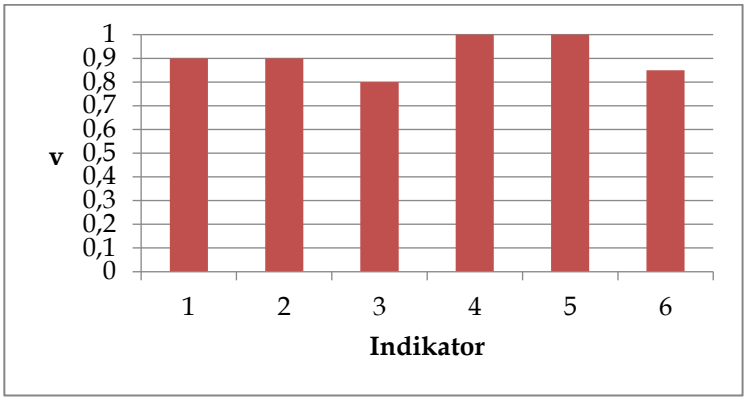

Figure 2. Validation results of language aspects

In view of Figure 2, it tends to be seen that the marker values for the language perspective are in the scope of 0.8 to 1, consisting of 6 indicators. All indicators are classified as very valid, namely ranging from 0.80 to 1. The average value of the six language aspect indicators, namely 0.90, is classified as valid.

The second is an e-module assessment questionnaire which consists of general e-module characteristics, application use and graphics. The components of the e-module characteristics consist of 14 indicators. The results of the analysis of e-module characteristic indicator values include the following.

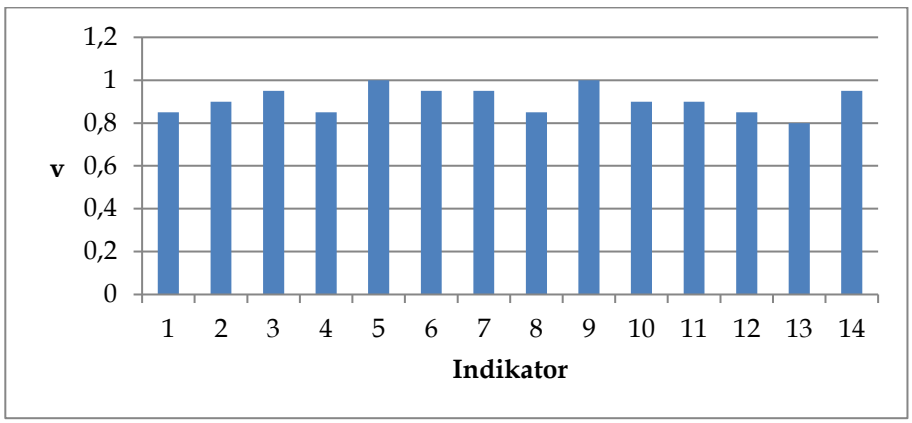

Figure 3. Validation Results of E-Module Characteristics

Based on Figure 3, the e-module characteristic indicator values are in the range of 0.8 to 1, consisting of 14 indicators. The average value of the fourteen components of the content feasibility aspect is 0.91, which is classified as valid.

The application usage component consists of three indicators. Where the results of validation are as follows.

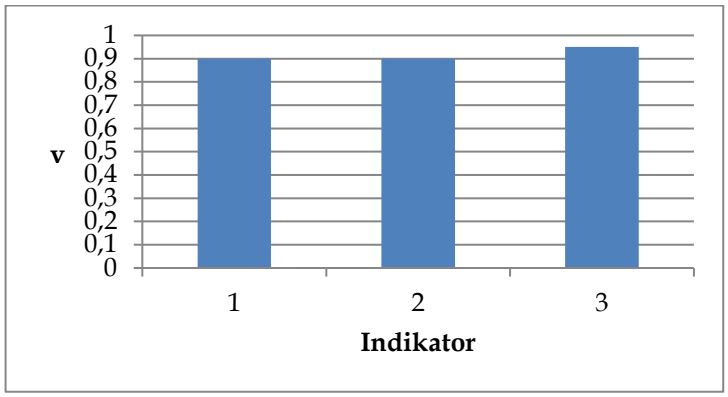

Figure 4. Application Usage Validation Results

In view of Figure 4, it tends to be seen that the application use pointer values are in the scope of 0.9 to 0.95, which consists of 3 indicators. The average value of the three components of application usage indicators, namely 0.92, is classified as valid.

The graphic component consists of nine indicators with the results as follows.

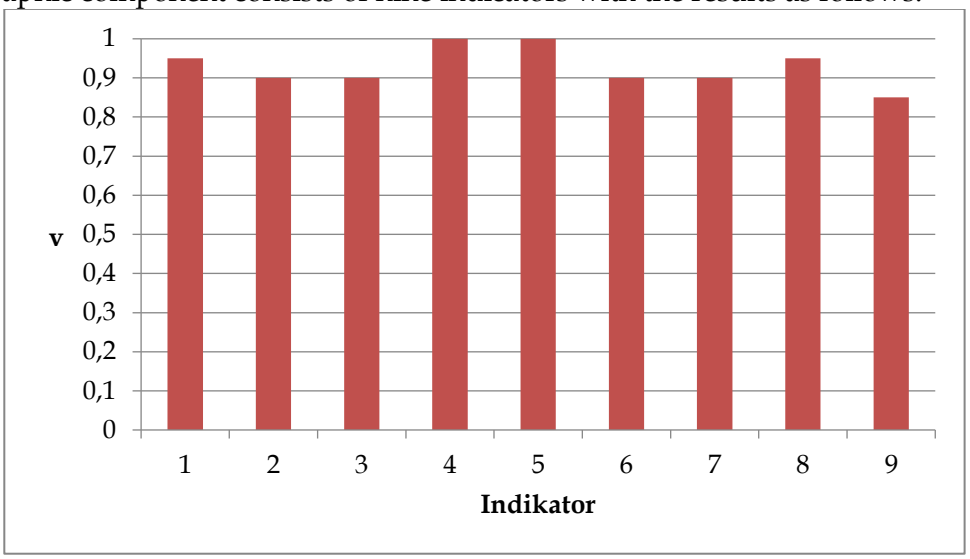

Figure 5. Graphical validation results

In view of Figure 5, it tends to be seen that the realistic pointer values are in the reach 0.85 to 1, consisting of 9 indicators. All indicators are classified as valid, namely ranging from 0.85 to 1 with an average value of 0.93 classified as valid.

The third is the contextual teaching and learning assessment questionnaire with the REACT learning strategy which consists of seven indicators where the results of the validation analysis are as follows.

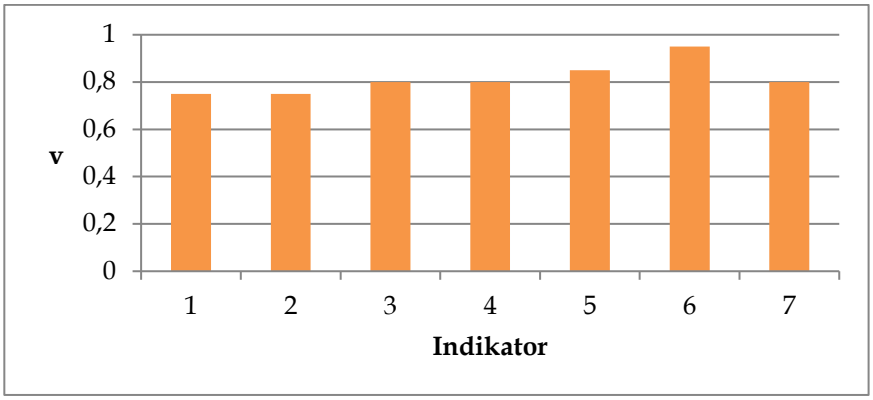

Figure 6. Validation Consequences of the Contextual Teching and Learning Model with the REACT Learning Strategy

In light of Figure 6, it tends to be seen that the pointer values for the relevant educating and learning model with the Respond learning procedure are in the scope of 0.75 to 0.95, comprising of 7 markers. There are two markers in the invalid class and five pointers in the substantial classification. The typical worth of the seven markers, in particular 0.81, is arranged in the legitimate classification.

Of the three assessment categories, namely the material and language category which consists of aspects of content suitability and language aspects, the second is the e-module category, namely aspects of e-module characteristics, aspects of application use, and graphic aspects, and the third category is aspects of contextual teaching and modeling models. learning with the REACT learning strategy where relating, the analysis of the average validity value of each category can be seen in the table.

Table 1. Validation Results of the E-Module Developed

Conclusion		Is
appropriateness of content	0.88	Valid
language	0.9	Valid
characteristic e-modul	0.91	Valid
application use	0.92	Valid
graphics	0.91	Valid
Model *contextual teaching and learning* with the REACT learning strategy	0.81	Valid
RATE-RATE	0.888333	Valid

In view of the table, it very well may be seen that for all approval parts, they are 0.88, 0.9, 0.91, 0.92, 0.91, 0.81 with a typical worth of 0.88, so from this worth it tends to be presumed that by and large the parts that are being created are in the substantial classification.

Discussion

Based on the research that has been carried out, the research results are divided into two, namely: Preliminary Research results and Develop Protyphing Phase results. Based on the results of preliminary research by reviewing several journals, it is known that technological developments and the demands of 21st century skills require teaching materials in the form of e-modules with a contextual teaching and learning model, especially on global warming material. Lack of student interest and motivation because they only use printed books which

only display a few pictures and cannot display other media such as videos. Where students also need teaching materials that can make it easier to understand the subject matter by relating it to everyday life and can be used anytime, anywhere, and made using language that is easy to understand. Therefore, teaching materials are needed in the form of electronic modules that are efficient and effective to make it easier for students to understand the material and improve and balance 3 student competencies, namely attitude, skills and knowledge competencies that contain video content about physical phenomena, contain pictures, graphs, and practice questions. , contains short material, contains competency tests, learning instructions, and uses language that is easy to understand.

The prototype phase has two stages, namely self evaluation and expert review. The self-evaluation results are in the very good category because the e-module is prepared based on the completeness of ICT-based teaching material components, prepared using a contextual teaching and learning model with the REACT learning strategy, namely 1) Relating. 2) Experiencing (experiencing). 3) Applaying (Applying). 4) Cooperating (cooperation). 5) Transferring (transfer of knowledge). The contents of the e-module are in accordance with the characteristics of the e-module, namely self-instructional, self contained, stand alone, adaptive, and user friendly. The contents of the e-module are also in accordance with the e-module preparation by the Directorate General of Primary and Secondary Education, Ministry of Education and Culture in 2017.

The expert review stage was validated by 5 experts, namely physics lecturers at FMIPA UNP. The results from the expert review stage are in the valid category. The e-module product has 3 assessment categories, namely 1) Material and language assessment, 2) E-Module assessment and 3) Assessment of the contextual teaching and learning model with the REACT learning strategy. The first indicator is the assessment of material and language. In the validation of material substance and language, high validation results were obtained, namely with an average of 0.88, namely the valid category. The substance in the e-module is in accordance with the core competencies and basic competencies in the 2013 curriculum.

The second indicator is e-module assessment. In this section, the characteristics of the e-module are assessed in accordance with the e-module creation guidelines, the use of navigation buttons works well, the clarity of the graphic design in the e-module is very good. The results of the validation of e-module characteristic indicators, application use and graphics are in the high category, with an average of 0.90.

The validation results for the third indicator are the contextual teaching and learning model with the REACT learning strategy. In this indicator, the e-module is in accordance with the contextual teaching and learning model with the REACT learning strategy, namely 1) Relating. 2) Experiencing (experiencing). 3) Applaying (Applying). 4) Cooperating (cooperation). 5) Transferring (transfer of knowledge). This third indicator is classified as high, with an average of 0.81. Based on the data from the validation analysis, it can be concluded that the physics e-module with the contextual teaching and learning model with the REACT learning strategy on global warming material is valid.

From the research results obtained, the Physics E-Module contextual teaching and learning model with the REACT learning strategy on global warming material can be applied and used by high school/MA class XI Physics students and teachers as one of the teaching materials in the learning process. Apart from that, the existence of this e-module will make it

easier for students to understand the material, and will be able to help students learn independently wherever and whenever.

Based on the results of the validity analysis of the use of the Physics e-module in the contextual teaching and learning model with the REACT learning strategy on global warming material, the results showed that the e-module developed was valid for use in high school physics learning in class XI. Therefore, researchers recommend this e-module to be used by teachers and students in Physics learning activities at school.

Furthermore, in this research it is not easy to get perfect results because of obstacles and limitations. When conducting research there are various obstacles so solutions are needed to overcome these obstacles. One of the obstacles faced by researchers is that the e-module is designed with lots of image, video and navigation button features. Researchers are constrained in controlling the navigation buttons, so that the display of the navigation buttons and their functions do not work as they should. So the solution to this problem is that researchers have to learn by taking longer to control the navigation buttons in order to produce quality and more attractive E-modules in accordance with developments in design technology. With the many obstacles and limitations of researchers, it is hoped that this e-module can be developed even better and further research can be continued at the practicality and effectiveness stage.

CONCLUSION

Based on the results of the research and discussions that have been carried out, it can be concluded that the validity of the physics e-module for the contextual teaching and learning model is in the valid category. This can be proven based on the results of data analysis, the average validation result is 0.88. The validation results for the material and language components obtained an average of 0.88 in the valid category. The validation results for the e-module characteristic components obtained an average of 0.91 with a valid category. The validation results for the contextual teaching and learning model components obtained an average of 0.81 in the valid category. Based on this data, the contextual teaching and learning model physics e-module has met the requirements in terms of validity so that it can be used in schools. E-modules need to be tested on a wider range of students, so that the scope and quality of this product can be met, because this research has only reached the validity stage, it has not yet reached the practicality and effectiveness stage.

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