

DEVELOPMENT OF E-MODULE WITH PROBLEM-BASED LEARNING MODEL ON HUMAN DIGESTIVE SYSTEM MATERIALS AT SMPN CITY OF BENGKULU

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ABSTRACT

This research is a type of ADDIE model development research aimed at developing e-modules based on problem-based learning models. The percentage of achievement of the feasibility analysis results is 80.6% for material experts, 97.3% for linguists, and 95% for media/design experts that the product is suitable for use. The response results showed "very practical" criteria with an average percentage of students in the initial trial of 87.6%, operational trial students of 87.34%, and science education teachers of 90%. The calculation of the paired sample t-test with a significance level of 0.05 and degrees of freedom (df) = 29 obtained a sig value. (2-tailed) $0.000 < 0.05$ and $t_{count} = 20.239$ and $t_{table} = 2.045$, the average pretest score was 48.6 and the posttest showed a higher average score of 86.5 which resulted in very "effective criteria". The null hypothesis (H_0) is rejected and (H_a) is accepted because t_{count} is greater than t_{table} . This means that students who use e-modules get better learning outcomes. The findings of this study indicate that the e-module created has been successfully used as a student learning resource on human digestive system material to support the teaching and learning process at SMP Negeri Kota Bengkulu.

Keywords: e-module; problem based learning; science

INTRODUCTION

The rapid development of the 21st century is characterized as an era of knowledge, openness, automation and computing that requires a teacher to understand the learning paradigm of information, communication, computing, and automation. The challenges of the 21st century encourage various parties not only learners, but also teachers, are required to have the ability and skills in the field of technology in the teaching and learning process (Widiastuti 2021). Technology and science are needed as one of the benchmarks in building a nation so that it can compete globally.

Education according to law No.20 of 2003 is a conscious and planned effort to realize the atmosphere of learning and the learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality,

intelligence, noble character, and the necessary skills themselves, society, nation, and state (Vitrianingsih et al., 2021).

Learning is an activity in a formal or non-formal environment to acquire knowledge that can be developed. Some psychologists like James O. Whittaker defined learning as a process of behavior change through a variety of experiences and exercises. This can mean that, self-study can produce a success after a long experience and training (Said 2018). In achieving the educational objectives will be required media that have a great function for the teaching and learning process as follows.

1. Sharpen the memo display so as not to lean towards oral lectures, to strengthen the learning system.
2. Overcoming problems with the media by improving the quality of learning with other alternatives such as showing a video that can hone students' knowledge

and abilities. Then, the learning process will be more interesting and not boring because the concept with the material can be made more specific and clear using the help of tools with the presentation of various models (Hasan 2021).

3. Through direct engagement between students and the environment, prepare pupils for independent learning. Because raising interest in learning is the objective.
4. The influence of media by providing media can reduce problems in the world of education, that is, generate opinions with the same experience and stimulate interest in the curriculum and teaching materials.
5. The Media itself that we often know is in printed form, such as books for school, usually in the form of package books and coupled with worksheets. However, there are also some other schools that utilize technology such as Infocus/projector to show students objects they have never seen (Darmamah 2019).

Only the contents of both the electronic module and the e-module differ. In Encyclopedia Britannica Ultimate Reference Suite explains that an e-book is a digital file that contains text and images suitable for electronic distribution and display on a monitor screen similar to a printed book (Putriana et al., 2021). Basically e-module itself has a visual with a more attractive form (digital) there is material with images that are digital and feasible to use in learning (Kristanto 2016).

E-module itself has several advantages, namely: 1) attractive design, 2) the evaluation of student abilities, 3) development with material that is evenly and in detail, 4) discussion of teaching materials adapted to academic levels, 5) has a more interactive form, 6) can combine sound, audio and animation (Ricu Sidiq and Najuah 2020). In terms of these advantages, it can be created more efficient learning media when compared to other

conventional media (Laili, Ganefri, and Usmeldi 2019).

Canva is an online design program that provides a variety of tools such as presentations, resumes, posters, flyers, brochures, graphics, infographics, banners, bookmarks, bulletins, and so on provided in the canva application. Canva has many types of features, namely student worksheets, pamphlets, posters, education, business and others (Pelangi 2020). Therefore, some of the templates available on canva can make it easier for users to create or design media with applications that can be used for free or paid. Several stages of using canva are: 1) downloading the application or opening it via the canva web, 2) Create an account by following the steps, 3) choosing a design and feeding it as needed, 3) after adding various needs the results can be downloaded and shared (Tanjung and Faiza 2019).

Problem Based Learning (PBL) is a learning model that is based on the principle of using the problem as a starting point to recognize the sides and integration of new knowledge (Wahyudiana et al. 2021). PBL itself is often used to improve students' ability to solve problems can train students' independence. The steps for the problem-based learning model are as follows (Sari et al., 2018).

1.1. The Steps In The Model Of Problem-Based Learning

No	Indikator	Teacher Activities
1	Orientation of students to the problem	Explain purpose learning, explain logistics required, and motivate students involved in activities solution to problem.
2	Organizing the participants educate for Study	Help students define and organize tasks learn which associated with the problem.

3	Guide experience individually or group	Encourage students to collect appropriate information, carry out experiment for get an explanation and problem solving.
4	Expand an and serve masterpiece	Help students in planning and prepare works according to the report and help them for various tasks with his friends.
5	Analyze And evaluate process	Assist students in reflecting on or evaluating the results of their research.

The type of research used is research of development to develop teaching media e-module. This research develops a medium of teaching materials that can produce a product. This invention was developed in the form of an e-module to support the learning process with the use of Canva application media and problem based learning models. According to sugiyoono in developed by borg & Gall there are 8 steps of simplified development. is a form of step or stage of development learning model that is R&D or ADDIE (Vikiantika, Kurnia, and Rachmawati 2021).

RESEARCH METHODS

The type of research used is research of development to develop teaching media e-module. The development process of this research uses ADDIE development model, which consists of five stages: analysis (analyze), design (design), development (development), application (implementation), and evaluation (evaluation) (Suwirno and Usmeldi 2022).

The method of data collection by conducting feasibility tests and product validity. In this study chose to use descriptive analysis in accordance with the development procedures developed for the needs of school media through observation. Validation in this study for the development of canva-based e-modules with problem-based learning model is a descriptive procedure by looking for the end result of the data. Acceptance criteria in practical analysis is very easy, easy, easy enough, less easy, not easy. Method of calculating the average percentage of participant responses. Then for the effectiveness test is a technique to see if the product used is effective. Analysis of the effectiveness can be seen from the answers to the test post learners.

RESULTS AND DISCUSSION

1. Validity Test Results

At this stage the preparation of instruments used in the form of questionnaire respondents for teachers and students, expert validation questionnaire for the material, language, and media. know the validity of the product e-module. The following are the results of reviews from material experts, media experts, and linguists

a. Results Of Assessment By Material Experts

E-module human digestive system material with PBL learning model assessed and reviewed by material experts. Mrs. Elvida Sari Yuniilosari, M.Pd and Mr. Erik Perdana Putra, M.pd., because both lecturers are lecturers of biology concentration. The results of media expert validation obtained an average value of "80.6%" $\leq$ 81% and declared "valid" worth using. After assessing the validator believes that this e-module can be used problem-based based learning is enough to help students who have a diversity of ways of learning.

b. Results Of Assessment By Linguists

The linguist who assesses and reviews the E-module media is Mrs. Susi Seles,

M.Pd., who is one of the lecturers of Tadris Bahasa Indonesia Fatmawati Sukarno State Islamic University (UINFAS) Bengkulu. The results of the linguist validation obtained a percentage value of "97.3% $\geq$ 81% and declared "very valid" with the category without any comments and suggestions from the validator. with the category without any comments and suggestions from the validator. After giving an assessment on the e-module, the validator said that this medium of grammar was suitable for use.

c. The Results Of The Media Assessment

Mr. Adrian Topano, M.P.D., and Dr. Mr. Suhirman, M.P.D. evaluated the media expert who evaluated the e-module media. The first validator, Mr. Adrian Topano, M.Pd, is a professor who teaches media courses in the Science Department. The second validator, Mr. Dr. Suhirman, M.Pd, is a lecturer at UIN Fatmawati Sukarno Bengkulu and has the most recent education credentials in technology. The results of media expert validation obtained an average value of "95%" $\geq$ 81% and declared "very valid" worth using without. After assessing the validator believes that this e-module can be used based on pbl is enough to help students who have a diversity of ways of learning.

2. Results Of Descriptive Analysis Of Variables

a. Small Group Test

This learning study utilizes learning outcome measurement tools in the form of tests. The prepared test consists of 15 multiple choice questions and 4 answer options for each question. The test is made based on the indicators to be achieved. Before being used as a data collection tool, the test must be tested first to ensure that the test meets the requirements as a valid measurement tool. Furthermore, this test was tested in Class VIII at SMP Bengkulu as many as 15 students.

1) Test the validity of the item about

Validity test aims to evaluate whether the item is valid or not using spss. With the value of r_{table} 0.514 indicates that the item

test instruments can be considered valid and can be used as a measure of learning outcomes.

From the test results as many as 20 questions there are some questions that are not valid, item number 4 ($r_{count} = 0.462$), 8 ($r_{count} = 0.036$), number 9 ($r_{count} = 0.406$), number 11 ($r_{count} = 0.249$), and number 15 ($r_{count} = 0.138$) has a value of r_{count} less than r_{table} 0.514 so that the five questions are considered invalid. Meanwhile, the item about the number 1, 2, 3, 5, 6, 7, 10, 12, 13, 14, 16, 17, 18 19, and 20 has a r_{count} value greater than r_{table} 0.514 so it can be said that 15 questions are valid. Based on the results of the table above shows that the validation of the initial small group trial of the item using $r_{count} > r_{table}$ so the instrument can be said to be valid.

2) The reliability of the test

Reliability testing is also carried out if you have conducted a validity test which obtained 15 valid question instruments that have met the reliability testing requirements, then the instrument can be used to collect data. The results of the reliability test are listed in the appendix. The test results on the question items were obtained with a Cronbach's alpha value of $0.906 > 0.60$. These criteria can be categorized as good and reliable. To ensure that each item of the test instrument can be trusted and used as a measuring tool for learning outcomes, the correlation value must exceed 0.6. After that, the level of difficulty of each item was tested.

3) Test the level of difficulty

A good question is one that is neither overly straightforward nor very complex. Students are not prompted to exert more effort when answering questions that are overly basic. Each question's difficulty level is determined by its level of difficulty. After the reliability of 15 questions that have been valid, the level of difficulty will be tested. From the results of testing the level of difficulty, question number 13 is an instrument with an easy level of difficulty because it has a value between $0.80 > 0.70$. Meanwhile, questions number 1, 2, 3, 5, 6,

7, 10, 12, 14, 17, 18, 19 are instruments with moderate difficulty because they have a value of $0.3 \leq TK \leq 0.70$. For questions number 16 and 20 the TK value is < 0.30 which is included in the difficult questions.

4) Test the differential power of questions

After knowing the level of difficulty with 15 valid questions, it is continued with the test of the differentiating power of the questions to determine the high ability and low ability of students in solving each question. Differentiating power analysis is carried out to determine the quality value of the question. For the magnitude of the differentiating power of item numbers 1, 2, 3, 5, 6, 7, 10, 12, 13, 14, 16, 17, 18, 19, and 20 differentiating power $0.4 < D \leq 0.7$ "Good (used)", while item number 14 $DP \geq 0.7$ "Very good (used)" so, there are 15 items with a significance value > 0.2 and it is stated that the item is good with a very good criteria index.

5) Respondent Test

The questionnaire test used in this study to obtain data. This questionnaire is called a questionnaire with answer choices because there are several answer choices provided for each statement, the results of the respondents in the small group test, found that the average response to the e-module was very practical with a percentage of 87.6%. So that respondents just choose the answer that they think is most appropriate.

6) Revision

It is known that the e-module that has been made has met the requirements in making the module, that the preparation of the module has been in accordance with existing competency standards, that the components that have been assembled have followed the correct writing format, and that the material that has been presented has been well structured and the level of depth of the material has been a. Improvements have also been made as a result of panelists' recommendations. The module can now be utilized as a learning resource after being repaired.

b. Large Group Test

1) Pre-test and post-test results

Before the implementation of teaching and learning activities ended, conducted pre-learning exam to the students. This exam aims to determine the level of mastery of the material learners before learning begins. Based on the results of the pre-learning exam, it is known that the average pretest score is 48.6 with the lowest score of 27, the highest score of 74. In addition, the most grades obtained by students ranged in the grade interval 40-49.

Before the end of the lesson, a final evaluation is carried out to students who participate in learning activities. This evaluation has a function to determine students' understanding of the material after learning. While the median posttest score as 86.5% the lowest posttest score is 60, and the highest posttest score was 100. Additionally, the 81-90 area is where students score the most frequently.

2) Questionnaire Respondents

The research tool made to support the learning modules in this study is the student response questionnaire. Questionnaires are an effective data collection technique if the researcher knows the variables to be measured with certainty and knows what to expect from the respondent. Based on the results of student responses, it can be seen that getting an average score of 87.34%, from these results the e-module is very effective. While the teacher's response gets a percentage of 90% which indicates the effectiveness of the product.

3) Hypothesis Test

It must first fulfill a number of prerequisites before implementing a hypothesis test on the pretest and posttest findings. The homogeneity test and the normalcy test are among these requirements. It can only be completed by the researcher normalcy test because the experiment only employs one sample.

a) Normality Test

The Kolmogorov-Smirnov test is used to test for normalcy. Based on the

Kolmogorov-Smirnov normality test, the pretest significance is $0.200 > 0.05$ and the significance of the posttest results is $0.067 > 0.05$, so the data is declared normal.

b) Homogeneity test

The results of the homogeneity test carried out using SPSS version 26 by getting a significance result of $0.155 > 0.05$, so the data distribution is declared to fulfill the homogeneous assumption. Furthermore, the paired sample t test or paired t test can be continued to see the hypothesis and effectiveness of the pretest and posttest results.

c) Paired sample t-test

After it is proven that the pretest and posttest results are normally distributed, it can be continued with a parametric hypothesis test using a one-sample t-test. Because the sample used was only one group, the hypothesis tested was the result of posttest in the effectiveness of e-modul in science subjects of human digestive system material. The results of the t-test calculation at a significance level of 0.05 and degrees of freedom (df) = 29, obtained sig. (2-tailed) $0.000 < 0.05$ and $t_{count} = 20.239$ and $t_{table} = 2.045$. The fact that the $t_{count} > t_{table}$, rejecting the null hypothesis (H_0), and accepting the null hypothesis (H_a), demonstrates the effectiveness of the E-module. Furthermore, a paired sample t test analysis was conducted to compare measurements before (pretest) and after treatment (posttest) using modules as learning resources.

RESULTS AND DISCUSSION

On a small scale test this first meeting began with students doing prayer before learning and then the researchers conducted attendance to students. After that, the researcher conveys information and performs a pretest on the topic of the material to be studied on that day. Then enter the core activities of researchers share link E-modul comparison material so that students can learn the material through their respective HP, while the researchers also explain the material about the comparison

and examples of problems, ask students whether they understand or not about the material presented.

Then the researchers distributed a response questionnaire to be filled by 15 students. Then in this closing activity, students and researchers conclude the material learned that day, then listen to the direction at the next meeting and close the learning with a joint prayer. The 15 students selected are the choice of teachers based on the ability of high, medium and low students. The results of the initial practical test obtained an average of 87.6%, in the limited group test improvements were made based on suggestions from the panelists. Once improved, it can be used for the operational field test or the module is ready to be used as a learning resource.

In this big group experiment, the comparison material was briefly explained utilizing an e-module. After that, the researchers distributed response questionnaires to students to determine the level of practicality and responses about the e-module. This shows that this e-module is very practical and can help in teaching and learning activities so that students are more enthusiastic and motivated again. Furthermore, the data from the results of a large group trial involving 30 students of Class VIII .

Based on the results of large group trials, the average percentage value of “87.34%” was obtained with the criterion of “very practical”. As a teacher teaching the science class, Mr. M. Rozali gave a response after evaluating the E-module. From the results of the teacher response questionnaire obtained a value of 90% and into the criteria of “ very practical”. The responses and suggestions given by him to this e-module, namely this e-module, are very interesting, can help students in independent learning at home as well. I hope you will find e-books on other topics as well.

From the results of these trials, it shows that the E-module on this comparison material is included in the

criteria of being very practical and feasible to be used as a learning support tool in schools. Additionally, students take an effective test by being given a description of 15 questions in order to gauge the degree of effectiveness of this e-module. Based on the effectiveness test table, 27 out of 30 students met the maximum completeness criteria or KKM (75) in science learning. Based on the results of the effectiveness test and the percentage obtained, there are several criteria that exist, including in 30 students there are 19 students who are very effective, 10 effective and 1 is quite effective.

From the percentage of 30 students, the average percentage value for the effectiveness test is "86.5" and is included in the "Highly Effective" criteria. From the trials conducted by researchers, ranging from small group trials and large group trials used to determine the practicality of the e-module with very practical results and on the effectiveness test used to determine effective. In the calculation of the T-test of one sample at the significance level of 0.05 and degrees of freedom (df) = 29, obtained sig. (2-tailed) $0.000 < 0.05$ and $t_{count} = 20.239$ and $t_{table} = 2.045$. Because the $t_{count} > t_{table}$, the null hypothesis (H_0) is rejected and (H_a) is accepted. This shows that the average value of posttest learning of Class VIII students who use e-module is higher than the prettest value.

The end result of this stage is to get a learning-based module based on problems in the human digestive system material that is feasible, practical and effective. The specifications of the e-learning module developed are as follows.

1. Type of learning: E-learning
 2. Number of pages: 48 pages (including cover and body).
 3. Material: Human Digestive System
 4. Problem Based Learning (PBL)
- The usage of E-module on the developed comparison material has a number of benefits, including:

1. E-module is very practical; it can be used with a smartphone, laptop, or computer anywhere and anytime.
2. E-module is equipped with pictures and videos that can help learners in understanding the material.
3. This E-module can be a teaching material for self-study can increase motivation for students.
4. E-module is equipped with PBL education model based on real problems so that it can hone students' skills to think critically.
5. The existence of evaluation allows teachers and students to recognize the level of cognitive ability in which part has not been completed or has been completed.
6. Learning materials are arranged according to academic levels so as to make the material more efficient than printed material that is more static.
7. E-modules can also reduce the verbal element of large printed materials, thereby reducing the use of paper on a large scale.

The weakness of the e-module in this comparison material is:

1. The limitations of the material in this e-module, because only focused material comparison Junior High School Class VIII.
2. Limitations on features that must use the internet, so it can be developed again with other design applications to be more efficient and attractive again.

CONCLUSIONS

Based on the results of research and development on the manufacture of PBL-based human digestive system material e-modules using the ADDIE model with the Canva application produces good standards. The percentage results of the feasibility test validated by material experts obtained "80.6%" with the criteria "Valid", linguists obtained "97.3%" with the criteria "Very Valid", and media experts obtained

"95%" with the criteria "Very Valid" then, obtained the qualification "feasible to use". The results of the practicality of the e-module from the results of the initial trial of students obtained 87.6%, for the operational trial of students 87.34% and science teachers 90% then, met the criteria of "Very Practical". In the results of the t-test calculation at a significance level of 0.05 and degrees of freedom (df) = 29 obtained a sig value. (2-tailed) $0.000 < 0.05$ and $t_{count} = 20.239$ and $t_{table} = 2.045$. Because $t_{count} > t_{table}$, then (H_0) is rejected and (H_a) is accepted. The average value of the pretest was 48.6 and the posttest showed a higher average value of 86.5 which met the criteria of "very effective". This shows that VIII grade students who use e-modules on average learn more effectively than students who do not use e-modules at SMPN Kota Bengkulu.

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