Meta analysis the use of e-modules based on research based learning models

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Abstract. This study aims to analyze the use of E-MODUL based on research based learning on student learning outcomes. The method of this study is a meta-analysis with a sample of 10 articles in national journals. Research meta-analysis shows that the effect of using E-MODUL based on research based learning on student learning outcomes is more effective. The results showed that the effect size on the effect of learning outcomes was carried out on 10 national journal samples categorized as medium. This means that the influence of the use of E-MODULES can improve student learning outcomes greater than using conventional learning.

1. Introduction

Learning resources are one of the important components in learning, learning resources are anything that can be used as a place where teaching material exists or is the origin for someone’s learning. The development of computer technology today greatly affects the procurement of learning resources. Learning resources used are not only limited to teachers in classrooms and school libraries. However, learning resources have developed into cyberspace that can be accessed through internet networks. Learning resources used must be adapted to student characteristics, learning goals, the benefits of media, and media procurement. Learning resources used in learning can be printed and non-printed. The module is an unlimited source of knowledge and one of the learning resources used in learning. Along with the development of current technological equipment. The procurement of modules as learning resources is not only limited to printed modules but also has modules in digital form known as electronic modules (e-modules). One of the advantages of using e-modules is that it saves on paper usage making it more environmentally friendly. However, to use it requires a computer device to open it. One of the e-modules used in learning at school is the Electronic School Module issued by the Ministry of National Education (MONE).

E modules issued by the Ministry of National Education start at the level of Elementary School (SD), Middle School (SMP), and High School (SMA) for all subjects. modules can be easily obtained in module stores in the form of text modules at affordable prices and downloaded or downloaded for free via the internet. The text module is one of the printed learning resources that is often used by teachers in delivering lessons in class, one of them is the Class VIII Middle School Science module.

The Class VIII Science Module consists of 15 (fifteen) chapters containing physical, chemical and biological material. Class VIII Science Modules are arranged systematically and are equipped with flowcharts in each chapter. The results of the analysis of all existing journals and references, the results of the data analysis also show the strengths and weaknesses of the Class VIII Middle School Science
Module.
Students want a Science Module that has many color images that can explain the science lesson material. Middle school students who are around 12-15 years old still prefer to read comics rather than lesson modules especially if they are colored and use non-rigid language. Thus giving rise to interest in reading students and motivating students to study the module. Based on the results of observations by the author e module issued by the Ministry of National Education, it is not yet equipped with Competency Standards (SK), Basic Competencies (KD), and Learning Indicators. The E module issued by the Ministry of National Education has components namely learning objectives, flowcharts, material, examples of questions, practicum, and competency test questions at the end of each chapter. So it is necessary to develop an e-module for class VIII SMP / MTs physics that is interactive and has complete components of a lesson module.

Through class VIII interactive e-module physics students can interact directly with modules in the form of digital forms containing material, color images, animations, simulations, and videos. In the interactive e-module there is multimedia interaction into an interactive digital module that is suitable for use by middle school students. The object originally displayed in the form of still images can be displayed in the form of animations, simulations, and videos. So that students besides reading modules can also witness objects directly related to the material being studied such as style, application of pressure, light, resonance, and so on. Animations and simulations can also be used in discussing sample questions so students can watch the problems displayed. Display of objects through animation in an interactive e-module indirectly it has helped to overcome time constraints. So the time needed to draw objects on the board has diminished. The interactive e-module also provides interactive quizzes for students that students can use to measure students’ cognitive abilities from the material they have learned. Interactive quiz in the form of a collection of multiple choice questions and essays that can be accessed directly by students and the results can be immediately known. Interactive e-modules can be developed through computer programs including Microsoft Word, Adobe Acrobat, E-module Maker, 3D PageFlipp for PowerPoint, Neobook 5. Interactive e-modules can also be used in learning.

2. Method
This study uses a meta-analysis method by reviewing several articles in national journals. Meta-analysis is quantitative because it uses calculation of numbers and statistics for practical purposes, namely for compile and extract information from so much data that is not possible with other methods.

According to Suarsana and Mahayukti (2013), the advantages of e-modules compared to print modules are their interactive nature which makes navigating easier, allows displaying / loading images, audio, video, and animation and is equipped with formative tests / quizzes that allow automatic feedback immediately. The term metaanalysis was first introduced by Glass in its article published in 1976 on the Educational Researcher (Hedges and Olkin 1985; Hunter and Schmidt, 1990). The article was discussed for the first time about the concept of primary analysis (analysis of primary data), secondary analysis (analysis of data collected by other researchers), and meta-analysis (analysis of the results of statistical analysis of other researchers) in the study.

The study of this meta-analysis using a sample of 10 articles in national journals about the use of e-modules in this study are national journals that discuss the use of e-modules on learning outcomes for SMP / MTs IPA VIII. The research sample was taken using the hunter sampling technique using effect size. This is because the data or information to be obtained from the sample is determined based on its suitability with the theme of this research. Analysis of the data used is the analysis of quantitative data with percentages.

3. Results
The data obtained in 10 of these studies were in the form of students’ Physics competencies in three aspects, namely aspects of knowledge, aspects of attitude and aspects of skills. Knowledge aspects are obtained from the results of written exam tests conducted after learning. Attitude aspects are assessed during the learning process. Skills aspects are obtained during scientific work and during the process of
learning activities take place. With the hope of the value of students' Physics competencies in the three aspects, namely the knowledge aspect, the attitude and skill aspects in the experiment class are better than the control class. From the 10 studies conducted we took one of the 10 national journal results data as follows:

Table 1. Results of Sample Class Normality Test in the Attitude Domain

| Class   | N  | L₀  | L₁  | Category |
|---------|----|-----|-----|----------|
| Experiment | 27 | 0,171 | 0,115 | Normal |
| Control    | 40 | 0,144 | 0,1678 | Normal |
the experimental sample class and the control having good data. The experimental class and the control class produce data that is homogeneous and normally distributed. The data in tables 3 and 4 on the skill aspects for the experimental sample and control classes have good data. The experimental class and the control class produce data that is homogeneous and normally distributed.

In table 5 the thesis effect size category on the effect of learning outcomes was carried out on ten thesis samples of Physics Department students where three categories were obtained, namely two in the high category, five in the middle category and three in the low category. Thesis effect size category on the effect of learning outcomes is obtained calculation of the average effect size price of 1.177, standard deviation 181.11. This means that the effect of using LKS is assisted E-module can improve student learning outcomes by 32.73%. The price of the effect size produced is categorized as medium.

4. Discussion
The development of problem-oriented e-modules requires various stages starting from the initial investigation phase, design phase, realization / construction phase, test / evaluation phase and revision and implementation phase. In the initial investigation, two main problems that need to be addressed and addressed in learning included: the use of e-learning which was not optimal and the students’ critical thinking skills were low. Based on the study conducted, the solution steps are designed in the form of developing problem-oriented e-modules. Furthermore, in the design / design phase the model is carried out by e-module design and also supporting research instruments such as module assessment sheet, critical thinking ability test and student response questionnaire. Broadly speaking, the components of the e-module include: (1) basic competencies and indicators as learning objectives, (2) a description of the material designed so students do problem solving activities to find the concepts learned, this section is also equipped with images, animations and the simulation in the print module is not possible for that, (3) examples of questions, (4) summaries, (5) formative test simulations and (6) immediate feedback that is automatic after students complete formative tests and (7) bibliography. At the stage of realization, modules and research instruments are arranged based on the designs that have been made so that a product prototype is produced. After the e-module prototype is produced, an assessment is carried out by experts in the field. From the results of the assessment revealed several strengths and weaknesses that exist in this e-module developed. Overall the e-module produced is of good quality. This means that the e-module produced has met the feasibility aspects both in terms of content, learning design, visual display and utilization of supporting software. The four components are the main components that must be considered in the development of ICT-based teaching materials (Ministry of National Education, 2010). Following up on the results of the validation from each expert, further improvements were made, including the following. (1) the material description is made more complete and detailed by completing it with apperception, examples of questions and enrichments, and (2) multiplying the number and variety of media uses such as images, animations or videos. In order for the e-module to be produced to be of high quality and sufficiently valid to be used it requires several trials. In this study, this cannot be done fully because time is not possible.

5. Conclusion
Based on the results of this development research it has succeeded in achieving its objectives: Developing a product in the class VIII interactive physics e-module as a learning resource. Product development is carried out with the development model of Lee and Owens (2004) which consists of four stages, namely: the analysis phase, the design phase, the development stage, and the evaluation phase.

An interactive grade VIII E-module for junior high school physics has been tested covering feasibility, attractiveness, and effectiveness. Feasibility has been tested with expert validation and trial processes. Attractiveness has been tested in the testing phase of individuals and small groups. Effectiveness has been tested using student performance appraisal at the large group trial stage. Interactive e-module for SMP physics learning can be used in classical and independent learning. Suggestions for the use of interactive e-modules for SMP physics learning are as follows: Availability of electricity and a set of computers / laptops / notebooks to operate interactive e-modules
for junior high school physics learning. Interactive e-modules can be run on Windows XP or Windows 7 Operating System (OS). Computer devices to run interactive e-modules must be supported by DVD Player, minimum monitor resolution of 1024 x 768 or more, FlashPlayer 10 ActiveX Software, Media Player Software, and Speaker.

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