Development of e-learning mathematics encyclopedia as learning tools for class viii junior high school

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Abstract. The purpose of this study was to describe the development of e-learning-based mathematics encyclopedia as a learning tools and test the validity and eligibility of e-learning based mathematics encyclopedia as a learning tools for junior high school students. The many terms and formulas in mathematics, sometimes makes students difficult in learning mathematics. Students often forget to apply a formula to solve certain math problems. To help students in learning mathematics, it is necessary to make a computer software (software) through computer-based learning in the form of a mathematical encyclopedia. The development of e-learning based mathematics encyclopedia that is integrated into learning can be through the development of learning tools. This learning tools can be applied in all devices based online. The use of tools in learning is intended to be able to help overcome various obstacles in the learning process including psychological barriers, physical barriers, cultural barriers and environmental barriers. This research is a development research. In general, this research will be implemented in three stages, namely: define, design, and develop. The define phase includes the analysis of encyclopedia; the design stage includes the preparation of draft encyclopedia. This research conducted in grade VIII Junior High School. The validation results of expert validators are as follows: encyclopedia with a value of 3,80 with a worthy category. And the advisability result of students who get value of 3,95 with a worthy category.

1. Introduction

Information technology causes science to grow and develop. Every innovation is created to provide positive benefits for human life. Providing a lot of convenience, as well as a new way of doing human activities. However, ICTs also have many disadvantages. ICTs not only give positive feedback, but also have a negative impact on life, one of which stands out in the field of education. When viewed at the present time the development of information technology, especially in Indonesia is growing. With the existence of information and communication technology can make it easier for us to learn and get information that we need from anywhere, anytime, and from anyone (Dianidah, 2012).

The Internet has become one of the vital ways to make available resources for research and learning for both teachers and students to share and acquire information (Richard, H., & Haya, 2009) Technology-based e-learning encompasses the use of the internet and other important technologies to produce materials for learning, teach learners, and also regulate courses in an organization (Fry, 2001). There has been extensive debate about a common definition of the term e-learning. Existing definitions according to (Dublin L, 2003) tend to reveal the specialization and interest of the researchers.
The media carries messages or information aimed at instructional or contains the purpose of teaching, then the media is called learning media (Arsyad, 2007). According to (Sanjaya, 2012) "learning media is everything like tools, the environment in all forms of activities is conditioned to increase knowledge, change attitudes or instill skills in everyone who uses them.

There are many types of learning tools that can be used by the teacher in delivering the subject matter. According to (Weberrawler, 2013) educational tools refer to channels of communication that carry messages with instructional uses. They are usually used for the sole purpose of learning and teaching. The tools used can vary, can be adapted to the material and characteristics of students. Educational tools such as print tools, non-print tools and electronic tools (Omodara, O. D., & Adu, 2014).

According to (Smaldino, 2011) teaching tools have a means of delivering available material involving technology or tools specialists and surveying source and tools reference guides by changing existing material and designing new materials. So from that, the teacher must be able to establish and develop learning tools to facilitate transfer of material to students.

According to (Association for Educational Communications and Tecnology, 1977) leading-edge technology as a concept of learning tools is defined as "instructional technology is the theory of design, development, utilization, management and evaluation of processes and resources for learning" (Kurt, 2018). The main role of learning tools is to support the delivery of material in the learning process and provide convenience for both teachers and students with tools facilities. The learning process was conducted by designing, developing, and assessing the learning process by utilizing information and communication technology based learning tools.

Many things encourage the thinking of e-learning to be one of the choices to improve the quality of education, including the improvement of information technology, and the development of internet users in the world now developing rapidly. The use of the internet becomes a necessity in supporting daily work or tasks. Especially with the availability of network facilities (Internet infrastructure) and internet connection (Internet connection). As well as the availability of learning software. Also people who succeed in installing or using the internet are increasing (Soekartawi, 2002).

Encyclopedias are knowledge about certain information or things more specifically or a list of things that are sometimes equipped with images to better explain it (Wikipedia, 2009). An encyclopedia provides an explanation in more depth than what we are looking for. An encyclopedia is usually collected in a book form by category or alphabetically.

The increasing number of people who own and use mobile devices opens opportunities for the use of technology devices to move in the world of education. The use of mobile devices in the learning process became known as mobile learning (m-learning) (Georgiev, 2004). (O'Malley, 2013) defines mobile learning as a learning that is learner (learner) is not silent in one place or learning activity that occurs when learning utilizes mobile technology devices. The presence of m-learning is not going to be able to replace e-learning (electronic learning) which is normal let alone replace face-to-face learning in class.

In a study developed by (Recha, 2014) the development of a flat-build encyclopedia to improve the learning outcomes of class V MI Irsyadut Tholibin Tulungagung Monument. The results of the research on the development of flat wake encyclopedia teaching materials met the validity criteria with the results of the material expert test 82.67%, media experts reached 90.76%, subject experts 81.54, and the results of field trials reached 99.06%. Student learning outcomes pre-test 73.4 and post-test 87. The equation with previous studies is an encyclopedia. The difference is the subject of research and the object of research.

(Masduki, 2014) with the title of developing encyclopedia mathematics media with realistic mathematical approaches in elementary schools. The results of the research on the development of mathematics learning media reached valid and effective indicators with validity tests from material experts with an average value of 80.05% with the contribution of the influence of student responses to matyclopedia by 80.7% with student learning outcomes higher than class learning achievement the control indicated by the average of the experimental class is 80.34 and the control class average is 75.54%. The equation with previous research is an encyclopedia. The difference is the subject of research and the object of research.
The development of e-learning based encyclopedias integrated into learning can be through the development of learning tools. This learning tools can be applied in all devices based online. However, in this study learning tools for grade VIII mathematics subjects will be developed in Junior High School in Malang.

2. Methods

This research adopted the Four-D Model by (Thiagarajan, 1974) consisting of Define, Design, Develop, and Dissemminate, from 4 stages to being, define, design, and develop. Overall the research activities will be carried out in three stages, namely: define analysis, draft an encyclopedia and instrument draft, and the testing phase of the encyclopedia learning tools, evaluation and refinement of e-learning based (develop) encyclopedias. These three stages are an integral part of a development research design.

![Figure 1. Research Activities Development](image)

The validity criteria for questionnaire data assessment for material experts and media experts' validation of encyclopedia use are presented in Table 1.

| Score | The Validity Criteria               |
|-------|-------------------------------------|
| 4.21−5.0 | Very decent, no need for revisions |
| 3.41−4.20 | Worthy, no need for revisions      |
| 2.61−3.40 | Fair enough, it needs revision     |
| 1.81−2.60 | Less feasible, need revision       |
| 1.0−1.80  | Not feasible, total revision       |

Table 1. Validation and Item Criteria in Questionnaires

The eligibility criteria for teacher assessment questionnaires, students for encyclopedia use are presented in table 2

| Score | The eligibility Criteria          |
|-------|----------------------------------|
| 4.21−5.0 | Very decent                      |
| 3.41−4.20 | Worthy                           |
| 2.61−3.40 | Fair enough                      |
| 1.81−2.60 | Not worth it                     |
| 1.0−1.80  | Very less feasible               |

Table 2. Eligibility criteria and items on questionnaires.

The use of e-learning based mathematics encyclopedia is 30 students of class VIII Junior High School

3. Results And Discussion

Development Eligibility

Data Expert Review of developed Products, data obtained from expert reviews are used as a basis for improving products so that product development is in accordance with the conditions and needs needed at school.
Data from validation by experts
Data from the media expert validation was obtained from 1 lecturer in computer application courses and language expert validation 1 Indonesian lecturer. In addition, there is also a material expert evaluating the substance of the material in the developed encyclopedia. In this filling, as a validator also gives suggestions and inputs, namely 1). It is recommended that character sentences be changed to characteristics. 2). In the classification column, no need to be given a picture. 3). In the table of contents there are a number of sentences that are not appropriate. Data from the encyclopedia assessment validation by material experts and media experts can be presented in table 3.

Table 3. Data on Recapitulation of Validation by Material Experts and Media Experts

| No | Assessed Components | Score | Category                  |
|----|---------------------|-------|---------------------------|
| 1  | Eligibility. Content aspect | 4.50  | Very decent, no need for revisions |
| 2  | presentation aspect  | 3.45  | Worth it, no need for revision |
| 3  | Language Eligibility Aspects | 5.60  | Worth it, no need for revisions |
| 4  | Eligibility. Graph Aspect | 3.65  | Worth it, no need for revisions |

Student Response
Data obtained from the results of reader testing by 30 students of class VIII SMP. The data from the product feasibility test in this small group can be obtained a score of 4.55 so that the mathematics encyclopedia that has been developed is feasible to be tested to the next stage. The response test results can be seen in Table 4.

Table 4. Recapitulation of Response Test Results Data on students

| No  | components assessed | Score | Category |
|-----|---------------------|-------|----------|
| 1   | Attractiveness      | 3.41  | Worthy   |
| 2   | Convenience         | 4.55  | Very decent |
| 3   | Comprehension       | 4.20  | Very decent |
| 4   | Graph               | 3.65  | Worthy   |

4. Conclusion
Based on the results of research and development of e-learning based mathematics encyclopedia, it can be concluded that the encyclopedia that has been developed is in a feasible category to be tested based on data from material experts, linguists and appointed media experts, and the response given by students is good.

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