Effectiveness of Use Web-Based Learning Media for Information and Communication Technology in Senior High School

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Abstract. The purposes of this study to develop an effective web-based learning media. Methodology of this research is a Research and Development (R & D). Development model used is Instructional Development Institute (IDI). The principle approach applied IDI system consists of determination, development, and evaluation. Research design used is descriptive quantitative. The instruments used is a questionnaire to measure validity, practicalities and posttest to measure effectiveness. Then data was analyzed using statistical methods for descriptive analysis, which describe validity, practicality and effectiveness of web-based learning media. The results showed that web-based learning media declared valid and practice for use by teachers and learners. The results obtained that average value of experimental group was higher than control group. It means that web-based learning media "effective" to use. As expected, web-based learning media effectively to improve student learning outcomes. The analysis showed a significant difference between the learning outcomes of students who are taught by media web-based learning with student learning outcomes without use of web-based learning media.

1. Introduction

Media education is a fundamental element of a pedagogy which would allow schools to renew their mission of training citizens in basic literacy, including informing and communicating about themselves [1]. Determines the learning media for learning resources used to make it effective. Selecting instructional media should be based on learning objectives, learning activities, the classes, the time available, the appropriate methods and the media sense [2].

One media that can be developed today are web-based learning media. Web based learning or web-based education (WBE) or e-learning (electronic learning) can be defined as software web technology in learning. All learning is done by using internet technology and perceived during the learning process occurs by which followed it, then the action will be called as a web-based learning. Web-based learning media can reduce passive atmosphere and make learning interesting, effective, and interactive content can increase the motivation of learners [3].

Through a Web-based instruction (WBI) allows the learning process interesting and more meaningful because it provides a multi-sensory experience to the learners. Shifting patterns of learning centered on teacher-centered learning learners emphasize using the WBI. WBI helps learners and teachers and institutions improve their overall learning process. The authorities need to focus on the integration of technology and pedagogical practices. Perspective learners to online learning offers the interaction between learners and teachers [4].

Web based learning model can improve the cognitive abilities of the students by using technology as a medium for transferring network and the content of learning objectives [5]. Web based instruction
is an effective teaching strategy for developing scientific skills like reporting, interpretation, reasoning and problem solving especially for the higher secondary students [6].

Web-based learning is the application of electronic learning (e-learning). E-learning is learning to use the media or the help of an electronic device. In the implementation, electronic learning using the services of audio, video, computer, or a combination of all three. Electronic learning is a learning process that is conducted through the network (network). With e-learning, learning can be done anytime, anywhere, effective. In addition the use of electronic learning can be measured from the habit of using information and communication technology (ICT) for learning activities. The use of ICT including the interaction between teachers and learners, the use of technology as a learning resource and tools. Teachers and learners not only as an object that can use it as the subject of electronic learning. Subjects had an active role in determining the success of electronic learning. Teachers and learners should have the will and ability in using ICT.

Advantage and disadvantage of web-based learning: (advantages: distance learning, economie of scale and consistent message; flexible schedule; Easily update resource; individualized learning; assessment and documentation), and (disadvantage: social isolation; Individualized instruction; cost; technical problems; poor instructional design) [7].

2. Method
This study type of research is the development of research that produces a product that is web-based learning media for information and communication technology. Development model used is the development model of Instructional Development Institute (IDI). The principle approach applied system consists of three stages, namely the determination (define), development (develop), and evaluation (Evaluate) [8]. The beginning stage is to determine (define), which consists of the steps of problem identification and analysis of background. The second is the development stages (develop) containing initial drafting and validation of the product. Then the third stage is an assessment (Evaluate) which contains the steps of testing and analysis of test results. IDI models have been selected for this system approach in accordance with the stages of development that researchers do research. Starting with the determining step, that observation to get an overview of the condition of the field and analyze the needs and condition of existing school facilities to develop learning media.

3. Research Result
The validity of the data capture web-based learning media is to use the validation sheet. In this case the researchers provide validation to the five sheets of validator that validates aspects of media and learning materials. Three first validator provide an assessment of the development of instructional media. Validation media consists of four aspects: display, readability aspect, the aspect of use, interactivity aspects. Media validation results obtained from the assessment of each aspect of a given indicator validator, and then analyzed using a formula Aiken's V. Here are details of the results of validation of learning media shown in Table 1:

| Validation Aspect | Aiken’s V | Category |
|-------------------|-----------|----------|
| Display           | 0.8917    | Valid    |
| Use               | 0.9083    | Valid    |
| Legibility        | 0.9306    | Valid    |
| Interactivity     | 0.9583    | Valid    |

Table 1 can be taken from an average of instructional media validation of three validator so it can be concluded that the validator included in the category "Valid".
Table 2. Teacher Questionnaire Response Results.

| Validation Aspect                                      | (%) | Category |
|--------------------------------------------------------|-----|----------|
| The quality of the content and purpose                 | 92  | Practical|
| The quality of technical                               | 91  | Practical|
| The quality of learning and instructional              | 90  | Practical|

From Table 2 can be taken practicality scoring average from teacher questionnaire response so it can be concluded that web-based instructional media included in the category of "Practical".

Table 3. Students Questionnaire Response Results.

| Validation Aspect                                      | (%)  | Category |
|--------------------------------------------------------|------|----------|
| The quality of the content and purpose                 | 86,12| Practical|
| The quality of technical                               | 85,09| Practical|
| The quality of learning and instructional              | 84,90| Practical|

Table 3 can be taken practicality scoring average from student questionnaire response so it can be concluded that web-based instructional media included in the category of "Practical".

Table 4. Comparison Results Posttest Control and Experiment Group

|                  | N  | Mean | Std. Deviation | Minimum | Maximum |
|------------------|----|------|----------------|---------|---------|
| Control          | 17 | 75,00| 8,29           | 59,00   | 88,00   |
| Experiment       | 17 | 94,17| 3,89           | 88,00   | 100,00  |

Figure 1. Histogram Experiment Group Posttest Result.
The results of the comparison of student posttest between the control and experiment group can be seen that the average posttest experimental group was much higher than control group. Then the maximum value achieved is much higher experimental groups than control group. It can be concluded that results posttest of the experimental group was better than the control group, so the use of web-based learning media a significant impact on learning outcomes of ICT subjects.

Web-based learning media developed using a Learning Management System (LMS) Moodle. Here's the web interface:
4. Discussion
Some studies reveal that web-based learning to improve the quality and learning outcomes. Effectiveness of the implementation of web-based learning of the results and the quality of the learning process, because it can be reached anytime and anywhere at an affordable cost [9]. Web-based learning can also improve student independence in learning. Web based learning has a positive impact on improving student learning outcomes [10] [11]. Web based learning can improve the efficiency and effectiveness of the learning process because it can be done anywhere and anytime [12].

The effectiveness of e-learning has been demonstrated primarily by studies of higher education, learners using computer-based instruction learned more efficiently and demonstrated better retention. e-learning improved student self esteem, increased motivation and ability to work independently, and other academic achievements [13].

Use web based training system due to improve their training and complete it more quickly, since performance expectancy have strong effect on their intention to use web based training system [14]. The effectiveness of e-learning has been demonstrated primarily by studies of higher education, government, corporate, and military environments. Learners’ knowledge, measured by pre-post test scores, was shown to improve. Moreover, learners using computer-based instruction learned more efficiently and demonstrated better retention [13].

5. Conclusion
Conclusion of this research is media developed Web-Based Learning is already valid, practical, and effective to use for Information and Communication Technology subjects. Web-Based Learning Media developed effectively to improve student learning outcomes. It is evident from the increase in student learning outcomes are taught using a web-based learning media is higher than students taught without a web-based learning media. The analysis showed a significant difference between the learning outcomes of students who are taught by media web-based learning with student learning outcomes without the use of web-based learning media.

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