Develeopment of Local Web-Based Learning

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Development of Local Web-Based Learning (LWBL) as Low-Cost Digital Learning Efforts

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Abstract. In a learning practice, we cannot avoid the use of Information Technology (IT). IT has been able to contribute to the world of education. Learning is more effective, interactive, broad, not time-bound and not patterned only in the classroom. This condition makes IT able to improve the quality of education that can be proud of. The use of IT in the world of education is increasingly being realized its benefits and not only as a complementary medium for educational institutions but has become one of the competitive strategies for institutions in order to improve the quality of its outcomes. In practice, there are some obstacles in the use of IT in learning, namely inadequate infrastructure, inadequate human resources and high operational costs. This research aims to develop a local web-based learning product in an effort to minimize the above constraints. This technology is theoretically able to contribute to students in their learning activities such as increased productivity, flexibility and interactivity without being burdened by the cost of internet access and anxiety in the appearance of content that does not educate when learning takes place. This research uses the 4D version of Research and Development (R&D) approach (Define, Design, Develop, and Disseminate). The results of the study are localhost-based learning websites that can be accessed without the cost of internet access and avoidance of negative content carried by the internet. Based on the test results on the product, it is stated that the products produced can be categorized as valid, effective, and practical to be used in learning.

Keyword: e-learning, Web Base Learning, Learning Media, Information Technology

1. Introduction

The challenge of educational institutions today is how to produce quality, efficient and competent outcomes, both competent in their respective fields and general competencies in the form of competencies for communicating internationally and competence in utilizing information technology as a basic requirement in dealing with the changing industrial era directly influencing educational institutions [1]. Educational institutions must be able to realize a quality learning process so as to produce graduates who are broad-minded, professional, superior, far-sighted (Visionary), and have high

self-confidence. Utilization of IT is one alternative to realize results such as the demands above because IT offers interactive, attractive learning without being limited by time and space. [2]

Information Technology in this case the Internet has penetrated all domains of human life without being prevented or postponed. IT has proven to be a trigger for accelerating learning. Today's IT products are web-based applications. In learning, the web can improve performance and be a solution in improving student skil[3]. Web-based learning is able to accommodate various approaches and skills of students such as the ability to make connections and see understanding between patterns of knowledge, concepts and ideas [4].

Web-based learning is a learning model that has the characteristics of a modern educational prototype that is timely in the renewal of knowledge. Web-based learning is also able to improve the ability to sele analyze, organize, classify, and evaluate incoming information. Web-based learning can improve the development of informative and cognitive independence of learners' personality [4]. WBL as an application that integrates various tools to organize learning (discussion forums, calendars, assignments, evaluations), offers online communication (chat, messages, and conferences) and also provides learning materials [5]. Based on some of the definitions above, it can be concluded that web base learning (WBL) is a software package that manages learning that is able to support various types of learning with various interaction facilities such as e-mail, forums, chat, where the user interaction system is presented on the website . The WBL definition can be described as follows:

Figure 1. Definition of Web Base Learning

In principle, Web-based learning is e-learning that is specified in learning using internet applications such as websites. The use of websites in learning at this time is still quite expensive despite the anxiety of an educator that the appearance of content that is not in accordance with the values of learning becomes an obstacle to the use of the web in learning [2]. This study aims to develop a web base learning based on local host. This goal is based on the superiority of the technology used primarily for reasons of low production and operational costs.
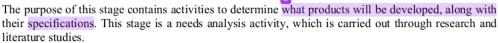
2. Methodology

This research uses the Research and Development (R&D) approach. It is a process to develop a new product or improve existing products that can be accounted for and test the effectiveness of the product [6]. Development research aims to discover, develop, and validate a product [7]. According to giyono development means to deepen and broaden existing knowledge, actions and products. The Research and Development (R&D) method used in this study is the 4D (Define-Design-Develop-Disseminate) version.This research uses the 4-D version of the Research and Development (R&D) method developed by Thiagarajan which is carried out in 4 stages, namely Define, Design, Develop, and Disseminate. [8]

Following is a description of each of the 4-D stages:
a. Define
The purpose of this stage contains activities to determine what products will be developed, along with their specifications. This stage is a needs analysis activity, which is carried out through research and literature studies.
b. Design
The purpose of this stage consists of making a design for a product that has been determined.
c. Develop
The purpose of this stage contains the activities of making designs into products and testing the validity of the product repeatedly until the product is produced according to the specified specifications.
d. Disseminate
This goal contains the distribution of products that have been tested for use by others.

2.1 Product Test
2.1.1 Product Validity Test
Validity Test illustrates the extent to which the measuring instrument (test) really measures what is to be measured [3]. Validity test is to determine the accuracy of the product produced or the product to be tested. A product can be said to be valid if it meets the specified criteria. To produce a quality product that is ready to be tested, it is necessary to test the validity of the product system or application. In order to get good results the validation is done using a questionnaire, where the user of the system or application fills out a questionnaire that contains several questions that have been provided. The product validity test results by the validator will be able to conclude whether or not a product or application is valid. Validity test analysis is performed by referring to the Aiken's V Statistical formula as follows:

$$V = \frac{\sum s}{n(c-1)}$$

Information :
s   : r - lo
Lo   : The lowest validity research rate.
c   : The highest validity research rate.
r   : The number given by an appraiser.
n   : Number of assessors.

To determine the validity, the number "V" is obtained between 0.00 to 1.00. The category determining the validity of the Aiken formula states that a product is valid if it has a range of Aiken's V values from 0.60 - 1.00 and is invalid if the Aiken's value is smaller than 0.60. [9]

2.1.2 Product Practicality Test
Practicality testing is a standard measure in terms of product practicality. Products are considered practical if they are easy to use. It is judged by how the users or other experts consider that the system or application is made easy and can be easily used by users. The practicality aspect is determined by the results of the user's assessments that answer the following questions [6].
  i.   Do practitioners think that what is designed can be used in normal conditions?
  ii.   Does the reality show that what is designed can be applied by practitioners?

The product evaluation based on the questionnaire that was filled out by the practitioners was analyzed to determine the practicality level of the product being developed. The assignment of practicality is done using the formula proposed by Riduwan.[10]. Practicality test results data with a percentage in accordance with the commitment according to the formula:

$$N = \frac{BP}{BM} \times 100\%$$

Information :

N	= Value obtained
BP	= Weight given to the questionnaire
BM	= Maximum weight for each question in the questionnaire.

The result of the total indicator value is measured by the following Likert scale criteria:

Table 1. Practically Percentage

Percentage(%)	Criteria
0-20	Not Practical
21-40	Less Practical
41-60	Pretty Practical
61-80	Practical
81-100	Very Practical

2.2 Product Effectiveness Test

The effectiveness test is the last step in product testing, which means to measure the suitability of the product results with the stated objectives. According to Reigeluth, the aspect of effectiveness in development is very important to know the level of application of the theory, or model in certain situations [6]. Operationally, the use of the system or application should give results as expected. According to Nieveen, the model designed is consistent in its use between expectation and reality [6]. Expectations are interpreted by using products that are expected to successfully meet the desired outcomes.Based on this, the researchers measure the effectiveness of the product with the response obtained whether the system can be used by applying the Kappa Moment formula:[11].

$$k = \frac{\rho - \rho e}{1 - \rho e}$$

Information :

k	= kappa moment that shows the product validity.
ρ	= Realized proportion, calculated by the number of values given by the validator divided by the maximum value.
Pe	= Not realized proportion, calculated by the maximum number of values reduced by the total number of values validated, divided by the maximum number of values with the following conditions:

Table 2. Result Categories Based On Kappa Mment (K)

Interval	Kategori
$0,81 - 1,00$	Very High
$0,61 - 0,80$	High
$0,41 - 0,60$	Medium
$0,21 - 0,40$	Low
$0,01 - 0,20$	Very low
$\leq 0,00$	Invalid

3. Result and Discussion

The development of web-based learning refers to the 4D approach. Based on these methods, Local Web-Based Learning can be developed with the following steps:

1. Define; Preparation and development of system infrastructure. Infrastructure and system development is carried out in stages such as providing terminals (computers) connected to each position (unit) that will be used by lecturers/teachers/experts. And it would be better if they provided it in each related room, such as in the library, administration, head of departments and the lecturers' or teachers' room.

2. Design; Web-based learning design and Application Program Selection. For the initial stage, we can take advantage of applications that have been provided for free, such as CMS Joomla, Wordpress, A-Tutor and so forth. After designing a website containing learning material, it can then be uploaded on an existing server.

3. Develop; Development of teaching ability of academic staff. At this stage, there should be an introduction of concepts and web-based learning system as well as intensive technical training along with the careful selection of subjects; subjects that are eligible to be included in the concept of web-based learning. There are several considerations in the selection of those subjects including:
   a. Subjects that are considered difficult by students, this is indicated by the percentage of students who passed in the subjects.
   b. Subjects that demands new skills in order to express thoughts in written form or description.

4. Disseminate; Web-Based Learning Program Socialization. The socialization is done by providing information in a way that is possible for all students to access web-based learning programs, such as in the Computer Lab, canteen, and so on.

After the application is designed, verified and limitedly implemented, then a product test namely the test of the WBL application is conducted consisting of three product tests. Based on the product validity test, the results obtained are 0.93. Based on the formula of Aiken's V, the product is considered valid. Based on the product practicality test, the final value of 5 users is 98%, meaning that the product is very practical and based on the product effectiveness test, a value of 0.90 means that the product is very effective.

There are several benefits that can be obtained by implementing local web-based learning, such as increment in productivity, because time can be fully maximized and unnecessarily time-consuming journey can be avoided. Learning is also more flexible and interactive because it can be done everywhere as long as it has source of knowledge connection. Learning contents or materials can be updated quickly, too. A real time interaction between lecturers and students is another benefit. Last but not least, LWBL can accommodate the entire learning process, starting from registration, matriculation, discussion and evaluation. Lecturers/teachers/experts can quickly add references to teaching materials that are in case studies, industry trends, and future technology projections through sharing resources to increase participants' insights on teaching materials. [2].

Using web-based learning can empower students and encourage responsibility for their learning [12]. Online students can learn and interact with one another interactively. Students who are busy or working and unable to attend regular learning process now can do it through a web-based learning. Students also can get guidance and help from lecturers, teachers, experts, tutors, resource persons, and distant colleagues. Learning materials will be more consistent, systematic and organized, making it easier for students to follow lesson modules. Tracking, evaluating, and administrating student progress is more organized and easy to manage.

The disadvantages of using web-based learning are as follows; Poor planning of web application design that didn't meet the need of learning. User-unfriendly; users or students are not familiar with the system due to lack of socialization and user's weak knowledge about internet technology [13]. To prevent such issues that may arise in the application of web-based learning technology, it is necessary to consider a complete understanding of the role of internet technology in users and adequate socialization of the application of web-based learning technology to users.[2]

Some opportunity factors in using web-based learning technology in education include the development of science and technology, especially information technology, so that information becomes mobile; easy to obtain and easy to provide. The telecommunications network also has expanded its scope, especially for internet access, besides the price of supporting technology devices is getting cheaper. [14]. Although the cost in Indonesia is relatively expensive compared to other countries, regulations are clear about the use of information technology. The decree of the Minister of Transportation No. 2 of

2005 stated regarding the use of the 2400Mhz -2483.5 MHz Frequency Band, which is essential to run internet equipment in the 2.4GHz frequency, that there is no need to get a permit from the government anymore. This regulation absolutely provides an opportunity to use free internet with the support of information technology equipment or known as water haul technology for the three crucial segments; education, small and medium industries and hospitals. Easier internet connection using the services of the Internet Serve Provider (ISP) is also another opportunity factor that can be enjoyed.

Some obstacles to be considered in implementing web-based learning technology are: First; Development time factor. The design and development of web-based learning requires a relatively long time. This is related to the design of learning websites, module designs or teaching materials, training materials and exam materials from lecturers. Second; Cost Factor: Implementation costs are related to website design costs that includes equipment procurement (Computers, line/ADSL networks, local network equipment, etc.) and monthly internet access costs. The cost factor will be lighter if the supporting facilities and infrastructure are available, so the focus is only the cost of internet access and website design costs. Third; Human Factor: The quality of human resources is a classic problem that always haunts in educational institutions, especially in the field of Information Technology.

Among alterative solutions that can be considered in overcoming the problem of implementing this web-based learning, is designing the web that meets the needs of learning at the initial stage. This means that only a few courses to be posted on the learning website. They can be gradually developed later on. Allocating special funds is the most effective step to overcome the problem of funding, so that implementation of web-based learning would not be delayed due to lack of funds. This is because most of educational institutions have independent academic websites and internet access networks, so with those conditions at least the educational institutions have made a prototype of web-based learning. The influence of information mobility challenges the students and lecturers to follow the development of science and technology, especially information technology. This condition makes students and lecturers motivate themselves to use technology facilities to compensate for the mobility of the information. In addition, intensive training and scheduled socialization will solve the problem of human resources quality.

4. Conclusion

Web-based learning requires technological aids, especially information technology such as computers and internet access. In practice web-based learning uses internet facilities as a medium to convey learning information (material) such as websites, e-mails, mailing lists, and newsgroups. It's proven that well-planned use of web-based learning technology contributes significantly to the world of education besides the disadvantages and strengths that it has. The government and related departments such as the Ministry of National Education and the Ministry of Religion and Telkom have issued extensive regulations on the use of the internet for education, this opportunity is the right momentum to improve the quality of education in the country. In implementing web-based learning, there are several factors that need to be considered, such as supporting facilities and infrastructure, users (students, lecturers, and teachers), online material availability and costs. In realizing the plan to use web-based learning, the awareness of educational institutions about the importance of using IT in the world of education is very much needed. Commitment or political will from the elements of Higher Education, both leaders and staff (lecturers and academic staff) to take advantage of opportunities given by the government in the use of information technology for education is also required. The students need for adequate facilities and infrastructure such as fast internet access and ownership of information technology devices like computers and laptops in order to be technology literate. The students and lecturers need for intensive socialization and training about the importance of internet technology in their learning activities. Special allocation of funds is also required for the utilization of information technology as well as special staff to handle the system.

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