Digital Library Development and Evaluation to Improve Students’ Digital Literacy

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Abstract. The existence of digital libraries support education in the evolution of generation 4.0 education, conceptual design of digital libraries has become important as a reference in the development of digital libraries. Many studies deals with digital libraries, however, they have not accommodated the needs and behavior of different users, this research develops digital libraries by adding an initial interface to digital libraries and developing sharing digital content in learning. Evaluation of system development is carried out by involving two experimental classes and a control class. The results of the qualitative evaluation also showed that 80.9% gave positive comments which showed that the category was very suitable to be used for the learning process. From the results of the evaluation of the experimental class control class showed that the experimental class was better than the control class, this shows that in the experimental class the students’ information technology literacy skills were better than the control class.

1. Introduction
In the digital era, changes in the advancement of information technology have made people more oriented to use smartphones in accessing information related to current issues easily and efficiently. One of the changes in library management is the development of the M-Library, where m-library is an information system or application developed to meet the information needs of mobile device users. The existence of academicians, most of whom are generations of gadgets and digital, make this system very important. M-Library is developed by a library for users of smartphones and Android-based smartphones. Furthermore, another opinion states that when technology is used effectively and successfully integrated in the educational environment, the productivity of the learning process can be improved [2]. Besides several things, such as effective school leaders and skilled teachers who are able to use information communication technology influence good teaching, as a learning medium [4]. In other words, technology has several important roles in the field of education.

STKIP Setiabudhi Rangkasbitung library is a place to access magazines, scientific papers, books, proceedings and thesis. The existence of a library collection needs to be made digital so that it makes it easier for students to access learning resources, one way is to add a digital collection menu that has been updated, making it easier for students to search for digital collections. Many other studies discuss...
the M-library but only few discussed the improvement of students’ digital literacy skills. Therefore, this study focuses on developing and evaluating android-based M-libraries so that they can improve students’ digital literacy abilities.

2. Methods
   2.1. Design
   This research is Research and Development (R & D), where the validation and development of educational products carried out in various stages of the process [Borg W R, and Gall M D]. The process in developing the m-library is as follows:

   - **Figure 1.** M-library design to improve student literacy

   a) The stage of determining needs, at the stage of specification analysis and the need for digital library design applications.
   b) The stage of system design and software, at this stage is done by designing applications to be developed. The design process is done by integrating the digital content management system with M-library including designing menus, interfaces and databases.
   c) The product-testing phase aims to optimize software performance. The trial uses the black box method and alpha test. Black box testing is done by trial and error, namely by trying several inputs when the application starts. This testing process is carried out by lecturers and students, when testing the alpha test is done by students to try to use the program to use an Android device.
   d) The result of evaluation phase is done by expert judgment from the learning media expert test and material expert, this is done to determine the effectiveness of the design that has been prepared.

   The Computer Science and Telecommunications Board recommend digital library design with the following approaches. a) involving representative users, both substantively and in the evaluation process, b) supporting research in digital libraries to be more innovative and more specific, c) minimizing the separation between design processes and evaluation with implementation and users, d) think of the prospects of other research-based design principles, e) providing access to a variety of digital information sources that are diverse from various computer systems and applications, e) accommodating different user needs and behaviors.

   2.2. Evaluation
   In the evaluation phase carried out by comparing two learning methods, in the control group used lecturing method, and the experimental group used M-library. The data analysis of the study was carried out by descriptive analysis, namely by percentage to describe the scale of feasibility. Descriptive analysis technique is carried out by using descriptive statistics, namely statistics used to analyze data by describing data that has been collected as it is without intending to make conclusions that apply to the public or generalizations [6].
The percentage calculation process is done by comparing the frequencies observed with the expected frequency. The percentage is calculated by using the formula as follow:

\[
\text{Percentage} = \frac{\text{Frequency that is preserved}}{\text{Expected frequency}} \times 100 \%
\] (1)

This study uses a feasibility scale to determine the results of data analysis. The data obtained is data in the form of numbers which are then categorized in the form of qualitative research in accordance with the Likert Scale measurement.

| Answer          | Score |
|-----------------|-------|
| Very Worthy     | 5     |
| Worthy          | 4     |
| Fair enough     | 3     |
| Not feasible    | 2     |
| Very inappropriate | 1   |

From these five feasibility scales are made and include quantitative criteria without consideration. The division of the scale is done by dividing the number [7].

| 0%  | 20%  | 40%  | 60%  | 80%  | 100% |
|-----|------|------|------|------|------|
| Very inappropriate | Not feasible | Fair enough | Worthy | Very Worthy |

**Figure 2.** Measurement Scale based on percentage

From the classification scale the percentage measurement above is grouped into the feasibility category.

| No | Score in Percent (%) | Appropriateness     |
|----|----------------------|---------------------|
| 1  | <= 20%               | Very inappropriate  |
| 2  | 21% - 40%            | Not feasible        |
| 3  | 41% - 60%            | Fair enough         |
| 4  | 61% - 80%            | Worthy              |
| 5  | 81% - 100%           | Very Worthy         |

### 3. Results and Discussion

#### 3.1. Design

The M-library design is adapted to the instructional design for learning, where library materials that were originally in the form of print or analog are supplied into digital format using android-based application hardware, with this approach as a means of preservation of library materials so that the media and contents of the library remain sustainable. In the design of the M-library it is divided into several stages as follows:
a) System of Architecture
The system of architecture is for the integration of M-library applications that is built as follows:

![System Architecture Diagram](image)

**Figure 3.** System architecture of m-library

The M-library design architecture consists of three actors group, they are librarian, lectures, and students. Each has a role as a user and manager connected to the m-library server.

b) System of Functional Specifications
In the functional specifications system in this study, the librarian, lecturers and students can see information of existing collections of M-libraries, as a facility to borrow books online, library members can see the status of books being borrowed, whether it is time to return or not, library members can include criticism or suggestions to get book titles that are not available in the library, and can read collections of digital books that have been made in digital format.

c) System of implementation
Implementation system is the stage that creates the design stage into the actual view. In the implementation phase of the developed M-library system, this stage is carried out by implementing the domain name and hosting available as the M-library system, then setting up the M-library system. The following is the implementation stage of the M-library system development.

![Implementation Diagram](image)

**Figure 4.** (a) Usecase, (b) Activity Diagram
Figure 5. Implementation results

3.2. Evaluation

The following is a summary of the data analysis from each assessment conducted by each respondent.

| No | Aspect                  | Average and percentage |
|----|------------------------|------------------------|
| 1  | Material quality       | 85%                    |
|    | Benefit                | 80%                    |
|    | Performance            | 67.50%                 |
|    | Design                 | 91.11%                 |
|    |                        | 80.9 %                 |

The average rating of all validators is illustrated by a bar chart as shown in the following figure.

Figure 6. Average validator rating

From the description above, it can be seen in certain aspects getting a high score, but in other aspects getting a low score. After being seen as a whole, the formulation of the problem of how appropriate the system of m-library as learning media is answered with a score of 80.90%, which is categorized into the very feasible. Therefore, in other word, the M-library system as an online learning media in this study is worthy of being used as a learning medium.

Furthermore, M-library evaluation is carried out by the experiment of students by applying to learning. Learning in the experimental group was done by using M-library, and the control group was done by using the lecture method. The application of M-library for learning was conducted during four meetings in the lecture on developing digital teaching materials. In the next stage, each meeting was
conducted post-test. The post-test was intended to see the extent of the effect of the treatment in the control group and the experimental group. From the results of evaluations at each meeting with the two groups, the mean score for the two groups were obtained. The mean score of learning with M-library is 7.69, meanwhile the mean score of learning with the lecture method is 7.63. On the following page is a graph of the mean score that compares learning achievement with the lecture method and M-library.

![Graph](image)

**Figure 7.** Student learning scores

From the results of the research obtained, learning using the lecture method obtained students’ learning achievement with the mean 7.63, while learning with M-library obtained learning achievement with the mean 7.69. From the results of this study, the students who learnt with the M-library learning class have better achievement and master the development of digital teaching materials. It is due to the M-library class is more in charge of the material and has more about information technology.

4. **Conclusion**

The design and evaluation of digital libraries is an inseparable entity, design is a linear process that starts from determining needs, then combines the design to respond to those needs, then the design is tested and evaluated to determine the effectiveness of the draft design. The results of expert judgment, development of M-library and evaluation show that the system is suitable for use. The application of the trials in the small class shows that in the class with the M-library, the students are more mastered in the material, this shows that in the M-library class students are better at mastering information technology devices and familiar with the use of information technology tools in learning.

5. **References**

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