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DIGITAL LIBRARY DEVELOPMENT AT MAN 1 BUKITTINGGI AS AN ACCESSIBILITY CONVENIENCE SUPPORT FOR USERS

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Abstract: A digital library is a service system that capable in supporting access to information objects automatically using a computer technology. In this study, the authors aimed to develop a digital library application based on SLiMS 9 bulian at MAN 1 Bukittinggi library, especially in terms of content with the addition of e-book features, and changing the character of its applications into mobile version, which were previously local (intranet). The methods used were research and development, while system development used the Waterfall model. This study succeeded to develop a digital library application based on SLiMS 9 at MAN 1 Bukittinggi library. The development of the digital library in this study has been carried out through testing, including three types of product tests, namely validity test, practicality test, and effectiveness test, each of which was tested using a questionnaire instrument. The product validity test obtained an average value of 0.88 in the valid category; the product practicality test obtained an average value of 0.90 in the very practical category; and the product effectiveness test obtained an average value of 0.94 in the high effectiveness category. Based on the product test results that have been described, the digital library development product in this study was declared feasible and applicable as a digital library, and can be accessed via mobile by users, such as students, teachers, and library members of MAN 1 Bukittinggi.

Keywords: Digital Library; Mobile Application; Research and Development; SLiMS 9

Abstrak: Perpustakaan digital merupakan sebuah sistem yang memiliki layanan yang mendukung akses objek informasi secara otomasi menggunakan teknologi komputer. Dalam studi ini, peneliti bermaksud mengembangkan aplikasi perpustakaan digital berbasis SLiMS 9 bulian pada perpustakaan MAN 1 Bukittinggi, khususnya dari sisi content-nya dengan penambahan fitur e-book, serta mengubah sifat aplikasinya menjadi bersifat mobile, yang mana sebelumnya bersifat lokal (intranet). Metode dalam studi ini adalah penelitian dan pengembangan, sedangkan pengembangan sistem dilakukan menggunakan model Waterfall. Penelitian ini berhasil mengembangkan aplikasi perpustakaan digital berbasis SLiMS 9 pada perpustakaan MAN 1 Bukittinggi. Pengembangan perpustakaan digital dalam penelitian ini telah dilakukan melalui pengujian, meliputi tiga jenis uji produk, yaitu uji validitas, uji praktikalitas, dan uji efektivitas, yang setiap pengujiannya dilakukan menggunakan instrumen angket. Uji validitas produk memperoleh nilai rerata 0,88 dengan kategori Valid; uji praktikalitas produk memperoleh nilai rerata 0,90 dengan kategori Sangat Praktis; dan uji efektivitas produk memperoleh nilai rerata 0,94 dengan kategori Efektivitas Tinggi. Berdasarkan hasil uji produk yang telah diuraikan, produk pengembangan perpustakaan digital dalam penelitian ini dinyatakan layak dan dapat diterapkan sebagai perpustakaan digital, serta dapat diakses secara mobile oleh para pengguna, yaitu siswa, guru, dan anggota perpustakaan MAN 1 Bukittinggi.

Kata kunci: Aplikasi Mobile; Perpustakaan Digital; Penelitian dan Pengembangan; SLiMS 9

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INTRODUCTION

The library, as one among various public service institutions that provide information, is often analogous to a "connecting bridge" between users and information that has been packaged in various forms of media. As a public service institution, a library must be managed properly, structured, and systematically, especially regarding to strategic plans, development policies, and operations of the library and information area [1]. Over the time, the concept of library management has been developed by utilizing information and communication technology, in which conventional libraries have been developed into digital libraries. A digital library is a service system that capable in supporting access to information objects automatically using a computer technology [2].

Compared to conventional libraries, digital libraries offer many advantages, including digital collections that do not have to be physically visible, and are identical to the internet or computers [3]. In addition, digital libraries can be accessed anytime and anywhere without the need for a special place like conventional libraries. Digital libraries are managed by a system that includes hardware, software, electronic collections, and services by utilizing various information and technologies [4].

Research concerning the development of digital libraries has been carried out by Febi, et al who discussed how to properly design and implement web-based library information systems. Their research has succeeded in creating a barcode scanner technology to identify library collections [5]. In addition to barcode scanner technology, there is hardware that is used to support digital library operations, consisting of various computers installed on WAN and LAN networks [2]. Therefore, to facilitate mobile library information, it is necessary to develop a digital library application as referred to this study [6]. Android-based applications can also make it easier for library administrators to manage the book archives [7].

Nowadays, digital library management uses a Content Management System (CMS) open source application, such as the Senayan Library Management System, better known as SLiMS [8]. SLiMS is a web-based library management information system with various benefits that is very effective and efficient. This information system is useful in providing analysis towards decision making so that improvements in organizational performance can be identified in a timely, targeted, reliable, clear, and flexible manner [9] .

SLiMS is an open source library management software, which is expected to be one among many solution alternatives to overcome various obstacles in terms of access the library information, circulation management (borrowing and returning), and data archiving, which were previously conducted manually. The usage of SLiMS CMS is very easy due to its accuracy and ease of the data storage process, as well as member data information and library collections can be accessed anytime via the internet. This CMS is built through a website model that utilizes PHP scripts using a DBMS My-SQL [10].

Based on observations, it is known that to date, circulation services, such as borrowing and returning collections, have utilized computers, or so-called automation. The content that is expected to be developed from this application is e-book filling. The next development that should be implemented is the

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accessibility of this application. After being developed into an online form and packaged into a mobile APK (Android Package Kit) version, then this application is expected to be accessible by all madrasah citizens anywhere using a smartphone or Android.

Digital library is a program that can be accessed on smartphones that offers various library service features, such as text, PDF file, and links, thus facilitate students to quickly access loans and to easily read collections anywhere and anytime [6]. This digital library based on SLiMS 9 is also in accordance with the characteristics of students who are often referred to as Alpha Generation. The Alpha Generation or they who were born in the period of 2011–2025 are the generation that have the higher literacy to technological advancement compared to the previous generation [11].

METHODS

The conducted methods were categorized as research and development, often be abbreviated as R&D. R&D is a research method that systematically aims to explore, improve, and develop certain products or models, as well as investigate these products in terms of validity, effectiveness, and practicality [12].

This research used the SDLC (System Development Life Cycle) development step, which is the process of developing software using various models and methodologies [13].

The SDLC Waterfall model was chosen as the system development model in this study. The waterfall model is often referred to as the "Classic Life Cycle", where this model emphasizes several sequential and systematic phases, consisting of Communication, Planning, Modeling, Construction, and Deployment [14] .

Research Procedure

Based on the system development methods and models, this research procedure combined the R&D research steps and the system development model (SDLC).

Research Instruments

The research instruments were consisted of observation sheets and questionnaires.

Data Collection Techniques

Data collection techniques were consisted of observation, documentation, and questionnaire [15].

Data Analysis Technique

The product test was consisted of three types of tests, namely validity test, practicality test, and effectiveness tests. The tests were conducted using a questionnaire instrument.

Validity Testing

Validity testing aimed to produce quality products and determine the level of product validity, namely MAN (State Islamic High School) 1 Bukittinggi digital library [16]. The validity questionnaire was processed using a validation formula that refers to Aiken's V [17] [18] formula. Validity test questionnaire was addressed to three experts in the IT field, such as programming, computer systems, and others.

Practicality Testing

The practicality test questionnaire was addressed to three practitioners whose areas of expertise are related to digital libraries. Assessment of each statement in the practicality questionnaire

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was then analyzed using the Kappa Cohen formula [17].

Effectiveness Testing

Analysis of effectiveness was conducted using the G-Score formula or Richard R. Hake statistics [19]. The effectiveness test questionnaire was tested on ten students.

RESULTS AND DISCUSSION

Development stage was carried out with reference to the stages of the system development model, namely the waterfall model.

Communication included project initiation and requirements gathering. Planning included Estimating, Scheduling, and Tracking. Estimating: distributed tasks to each user and their respective roles. Scheduling: consisted of 10 research activities for two months. Tracking: created the system in a web version, then packaged or hosted it into an online form in order to obtain this URL address: https://dlib-man1.web.id/admin, then the researchers packaged the digital library into the mobile APK version.

Construction of the mobile application was consisted of several stages as illustrated in Image 1.

Image 1. Construction stages of the digital library apps at MAN 1 Bukittinggi

Image 1 describes the following: (1) It is confirmed that the system/application has undergone the analysis and system design. (2) Coding and testing the application on a web-based basis was conducted in a web-based programming language, then was packaged into a CMS, namely SLiMS 9 bulian, then supported by a database management system, namely MySQL.

Image 2. Overview of the digital library installation and customization process

(3) Web hosting was conducted by installing CMS SLiMS 9 online. (4) Transformation of digital library applications from web forms into APK forms with the webviews concept using the MIT Appinventor software as shown in Image 3. (5) Applications that have been transformed into APK form can then be distributed, for example via Google Playstore.

Image 3. Overview of the digital library application transformation process into APK form

Deployment was consisted of application implementation in the field, followed by product testing.

Validity Test was assessed by three experts in the IT field, such as programming, computer systems, and others. Furthermore, the questionnaire that was filled in by experts was processed using

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the Aiken's V formula, which obtained an average value of 0.88 in the Valid category, as described in Table 1.

Practicality Test was tested on practitioners whose areas of expertise are related to digital libraries. The product practicality test questionnaire was consisted of five aspects of assessment and has been filled in by three examiners. The results of the product practicality test were processed using the Kappa Cohen formula, which obtained an average result of 0.90 in the Very Practical category, as described in Table 2.

Effectiveness Test. Analysis of the effectiveness of the SLiMS 9 application development at MAN 1 Bukittinggi was determined by assessing a questionnaire filled out by 10 students. The results of the effectiveness test were processed using the statistical formula of Richard R. Hake, which obtained an average value of 0.94 in the High Effectiveness category, as described in Table 3.

Table 1. Product Validity Test Processing Results

Validators	Validators 1		Validators 2		Validators 3		∑s	n(c-1)	Score V	Average V grade
	r	S	r	S	R	S				
Aspect of Validity Content	4	3	5	4	4	3	10	12	0.83	**0.90**
	5	4	5	4	4	3	11	12	0.92	
	4	3	5	4	4	3	10	12	0.83	
	5	4	5	4	4	3	11	12	0.92	
	5	4	5	4	5	4	12	12	1	
Aspect of Instructional Design	4	3	4	3	4	3	9	12	0.75	**0.90**
	4	3	4	3	5	4	10	12	0.83	
	5	4	5	4	5	4	12	12	1	
	5	4	5	4	5	4	12	12	1	
Aspect of Appearance	4	3	5	4	3	2	9	12	0.75	**0.78**
	4	3	5	4	2	1	8	12	0.67	
	4	3	5	4	3	2	9	12	0.75	
	4	3	5	4	5	4	11	12	0.92	
	5	4	5	4	3	2	10	12	0.83	
Aspect of Programming	4	3	4	3	5	4	10	12	0.83	**0.92**
	5	4	5	4	4	3	11	12	0.92	
	5	4	5	4	5	4	12	12	1	
Average score V as a whole										**0.88**
Information										**Valid**

Table 2. Product Practicality Test Processing Results

No.	Evaluated Aspects	Tester		
		Tester 1	**Tester 2**	**Tester 3**
1.	Clarity of instructions for using the system	5	5	4
2.	The system can be used easily without the help of experts	5	5	4
3.	Ease of accessing the system	5	5	5
4.	The system can work continuously	5	5	4
5.	Each component or form is mutually compatible, starting from input, process, and output forms, and reports can be printed easily	4	4	4
Amount		**24**	**24**	**21**
Average		**0.95**	**0.95**	**0.81**
Practical Results			**0.90**	
Information			**Very Practical**	

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Table 3. Product Effectiveness Test Processing Results

No.	Respondents	G Value or G-Score
1.	Respondent 1	0.85
2.	Respondent 2	1.00
3.	Respondent 3	0.73
4.	Respondent 4	1.00
5.	Respondent 5	0.93
6.	Respondent 6	0.93
7.	Respondent 7	1.00
8.	Respondent 8	1.00
9.	Respondent 9	0.67
10.	Respondent 10	1.00
	Average	**0.91**
	Category	**High Effectiveness**

This research succeeded to develop a digital library application based on SLiMS 9 at MAN 1 Bukittinggi library. Nowadays, digital library management uses an open source CMS, such as the Senayan Library Management System, better known by the acronym SLiMS. As a web-based library management information system, SLiMS has been proven to be very effective and efficient.

In this study, SLiMS 9 was chosen as a CMS for digital library development due to several considerations. Consideration in this context certainly focuses to the uniqueness or advantages offered by SLiMS. The main reason is the nature of SLiMS as an open source library management software, which is expected to be one among many solution alternatives to overcome various obstacles, namely in terms of access to library information, library service processes, and data archiving, which were previously done manually. The usage of SLiMS is very easy, the data stored is accurate and easily updated, and information on member data and library collections can be accessed anytime via the internet.

The development of the digital library in this study has been carried out through three types of product tests, namely validity tests, practicality tests, and effectiveness tests. The product test was carried out using a questionnaire instrument. The product validity test obtained an average value of 0.88 with the Valid category. The product practicality test obtained a value of 0.90 in the Very Practical category. The product effectiveness test obtained a value of 0.94 in the High Effectiveness category. Based on the product test results that have been described, the digital library development product in this study was declared feasible and applicable as a digital library, thus it can be accessed via mobile by users, in this context namely students, teachers, and library members of MAN 1 Bukittinggi.

Allthough this study have succeeded in developing a digital library that can be accessed by mobile app, research at this development stage still has limitations. Several drawbacks were faced in the development of digital library applications in this study, namely (1) this digital library applications need to be supported by annual expenses to allow perpetual/continuous access; (2) the administrators must thoroughly monitor the system and schedule regular database backup activities; and (3) It is confirmed

that not all features in the administrators menu can be accessed by the APK.

CONCLUSION

This study succeeded to develop a digital library applications based on SLiMS 9 at MAN 1 Bukittinggi library. The development of digital library in this study has been investigated through three types of product tests. The validity test obtained an average value of 0.88 with the Valid category. The practicality test obtained a value of 0.90 in the Very Practical category. The effectiveness test obtained a value of 0.94 in the High Effectiveness category. Based on the results of this product test, the digital library development product in this study was declared feasible and applicable as a digital library, thus it can be accessed via mobile by users, in this context namely students, teachers, and library members of MAN 1 Bukittinggi.

BIBLIOGRAPHY

[1] K. A. Hafizd and R. Sayyidati, "Sistem informasi perpustakaan Politeknik Negeri Tanah Laut," J. Sains dan Inform., vol. 3, no. 2, pp. 60–67, 2017, doi: 10.34128/jsi.v3i2.72.

[2] L. D. Prasojo, "Pengelolaan perpustakaan digital di UPT Perpustakaan UNY," J. Akuntabilitas Manaj. Pendidik., vol. 4, no. 2, p. 247, 2016, doi: 10.21831/amp.v4i2.10958.

[3] M. N. Amalia, F. Akbar, I. Risdiani, A. Islaha, and N. Srilena, "Audit sistem informasi pada perpustakaan ARS University menggunakan framework COBIT 5," J. Sains dan Inform., vol. 6, no. 2, pp. 139–147, 2020, doi: 10.34128/jsi.v6i2.226.

[4] S. Thorin and D. Greenstein, "The digital library: a biography," Syracuse Univ. Libr., Jan. 2002.

[5] F. A. Renatha, K. I. Satoto, and O. D. Nurhayati, "Perancangan dan pengembangan sistem informasi perpustakaan berbasis web (studi kasus Jurusan Sistem Komputer)," J. Teknol. dan Sist. Komput., vol. 3, no. 3, pp. 343–353, 2015, doi: 10.14710/jtsiskom.3.3.2015.343-353.

[6] H. Fitriah, "Peran perpustakaan digital di era millinea," Universitas Islam Negeri Antasari Banjarmasin, 2020, [Online]. Available: http://idr.uin-antasari.ac.id/id/eprint/15100

[7] A. Yuda and K. Muludi, "Aplikasi perpustakaan digital berbasis android pada perpustakan Jurusan Ilmu Komputer Universitas Lampung," J. Pepadun, vol. 2, no. 1, pp. 101–106, 2021, doi: 10.23960/pepadun.v2i1.28.

[8] A. Nugraha and H. Wicaksono, "The power of open source: SLiMS," SLiMS, 2021. https://slims.web.id/web/

[9] I. Lucyda and W. I. A. Adawiyah, "Manajemen perpustakaan digital perguruan tinggi Islam: Studi sistem manajemen perpustakaan digital Universitas Islam Bandung," Al-Idarah, vol. 7, no. 1, pp. 159–170, 2017, doi: 10.24042/alidarah.v7i1.2291.

[10] A. Nugraha and H. Wicaksono, "About SLiMS," SLiMS, 2021. https://slims.web.id/web/pages/about/

[11] S. Purnama, "Al Hikmah proceedings on Islamic early childhood education," Pengasuhan

Digit. untuk Anak Gener. Alpha, vol. 1, no. April, pp. 493–502, 2018.

[12] S. Zakir, E. Maiyana, A. Nur Khomarudin, R. Novita, and M. Deurama, "Development of 3D animation based hydrocarbon learning media," J. Phys. Conf. Ser., vol. 1779, no. 1, 2021, doi: 10.1088/1742-6596/1779/1/012008.

[13] A. Nur Khomarudin, L. Efriyanti, and M. Tafsir, "Pengembangan media pembelajaran mobile learning berbasis android pada mata kuliah kecerdasan buatan," vol. 3, no. 1, pp. 72–87, 2018.

[14] I. Sommerville, Metode Penelitian dan Pengembangan (Research and Development/R&D). Jakarta, 2003.

[15] Sugiyono, Metode Penelitian Kuantitatif dan R&D. Bandung: Alfabeta, 2010.

[16] L. R. Aiken, "Three coefficients for analyzing the reliability and validity of ratings," Educ. Psychol. Meas., vol. 45, pp. 131–142, 1985, doi: https://doi.org/10.1177/0013164485451012.

[17] S. Mayati, S. Supriadi, and A. N. Khomaruddin, "Perancangan aplikasi E-discussion pada SMA Negeri 1 Banuhampu," CSRID (Computer Sci. Res. Its Dev. Journal), vol. 11, no. 2, p. 118, 2021, doi: 10.22303/csrid.11.2.2019.118-129.

[18] M. R. Darmawan and H. A. Musril, "Perancangan sistem pendaftaran audiens seminar proposal di Institut Agama Islam Negeri (IAIN) Bukittinggi," J. Teknol. dan Inf., vol. 11, no. 1, pp. 26–39, 2021, doi: 10.34010/jati.v11i1.3346.

[19] R. Sagita, F. Azra, and M. Azhar, "Pengembangan modul konsep mol berbasis inkuiri terstruktur dengan penekanan Pada interkoneksi tiga level representasi Kimia untuk kelas X SMA," J. Eksakta Pendidik., vol. 1, no. 2, p. 25, 2017, doi: 10.24036/jep.v1i2.48.