

ANALYSIS OF PROTOTYPING METHODS IMPLEMENTATION FOR LIBRARY INFORMATION SYSTEMS DEVELOPMENT IN SMAN 3 BENGKALIS

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Abstract

SMAN 3 Bengkalis Library is a school library with a collection of reading books and lessons located in Bengkalis Regency, Riau Province. Currently, the system that operates in the SMAN 3 Bengkalis library is still conventional and is prone to physical damage. In addition, with current technological advances, the registration system for students as members is also still written using paper cards, plus the difficulties of library staff in procuring and managing library books. Based on these problems, a web-based library information system development is proposed, expected to solve the problems that occur. With prospective system users who are pretty laymen, a particular way is needed to develop the system, especially when carrying out user needs and system design. With this need, a prototyping method is used, which does function to accommodate these needs. Each phase of this method is carried out carefully to produce a product that meets expectations. In this study, an evaluation of the development process was carried out. The evaluation is carried out in several ways, such as UAT and Usability Testing with ISO 9126 and 9241-111. Based on the results of the evaluation, it was found that with the application of this method can produce a library information system product that is good and runs according to functionality and is to the expectations of users in solving the problems they face.

Keywords: *Library Information System, Prototyping, User Acceptance Test, ISO 9126, ISO 9241-11*

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INTRODUCTION

Information technology is growing more rapidly, having a significant impact on the progress of an organization or agency because by applying information technology, access to information becomes easy and fast, so the application of information technology becomes an absolute thing to be applied because it increases performance excellence and becomes effectiveness and efficiency [1]. Of course, it will work, including educational institutions that have started to implement information technology in library development because the library is the heart of education that provides various sources of knowledge and information to improve the quality of education [2].

SMA Negeri 3 Bengkalis is one of the public high schools domiciled in Bengkalis Regency, Riau Province, Indonesia [3]. The Library of SMA Negeri 3 Bengkalis has a collection of readings and lessons according to learning standards according to high school learning standards. However, the ongoing process at the SMA Negeri 3 Bengkalis Library is still done manually, like all processes related

to data collection are still in the form of bookkeeping, so the data search process takes a long time. Students who want to borrow books must be registered as members who are still made in the paper cards so that they are vulnerable to damage and loss of member cards, coupled with the pandemic situation so that access to library visits becomes challenging to borrow books to get materials and the ratio of books to be borrowed is not sufficient.

It is hoped that developing a library information system can help the library manage book collection, borrowing, returning, membership, and creating member accounts and reports quickly and easily. Meanwhile, members make it easier to search for books and read and access uploaded electronic books.

Based on these problems, the solution to solving the problem is developing a website-based Library Information System that makes it easier for users to access information flexibly. The Library Information System will be developed using the Codeigniter framework to make it easier for developers to develop dynamic websites quickly and efficiently [4].

Moreover, to support the system development, the methodology used is the prototyping method because it is considered appropriate because it helps collect user requirements so that users can interact directly in making system designs, so that system development becomes easy and can quick because it is developed based on user input and requirements [5].

With the hope that the development of a library information system can assist the library in managing book collection, borrowing, returning members, creating member accounts, and helping generate reports quickly and easily. Meanwhile, members can make it easier to search for books and read and access electronic books uploaded through the website online.

Based on various researchers stated that the development using the prototyping method was one of the appropriate methods for the case in this study, as stated by Sahfitri [6], which develops a prototype e-catalog designs and mobile-based library book lending so that it can provide easy search and borrowing of books that are difficult to borrow because of the small amount. In addition, Arrafiq [7] also developed the Dashboard for Cooperation, Business, and Marketing at Caltex Riau Polytechnic using the Prototype Method. The system developed using this method can work and run well according to existing needs.

Based on these various references, it strengthens that the development carried out in this study can utilize the prototyping method to produce a good library information system for SMAN 3 Bengkalis, where using the prototype development methodology is considered suitable because it helps collect user requirements so that users can interact directly in making designs system, then system development is easy and can be completed quickly because it is developed according to the needs along with input from the user so that it can develop product design into a final product that can meet user requests.

RESEARCH METHODOLOGY

In this study, the library information system developed will utilize the work stages recommended by the prototyping method. In addition, Testing and evaluation are carried out with the Functional and User Acceptance Test (UAT) to find out how user acceptance of the developed library system is and to find out the system developed has been successful and runs according to the expected functionality. Then a system's evaluation process is also carried out using Usability testing by utilizing the ISO 9126 framework to find out how large the

percentage of users is in understanding the system being built and ISO 9241-11 to find out how much the effective and efficient value of the system being built is.

The prototyping method is one of the software development methodologies involving developers' and users' interaction in the system development process [8]. The prototyping methodology can help illustrate the system model to be built. The purpose of using the prototype development methodology is to make it easier to collect information from users so that users can play a direct role in system development.

There are advantages of the prototyping method compared to other methods is that it can establish communication between users and developers, then users can provide input on the system to be built and every improvement made in the development of the system is a suggestion, and feedback from users, so that provides efficiency and time in developing the system [5].

The stages of development with the recommended prototyping methodology are shown in Figure 1 below.

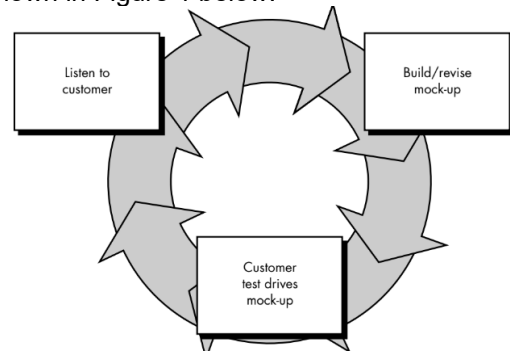


Figure 1. Stages of Prototype Methodology

Based on the image shown in Figure 1, the following are the results of the implementation of the library information system development carried out:

A. Listen to customer

Collecting user requirements for the SMAN 3 Bengkalis library using several techniques, as illustrated in Figure 2 below:

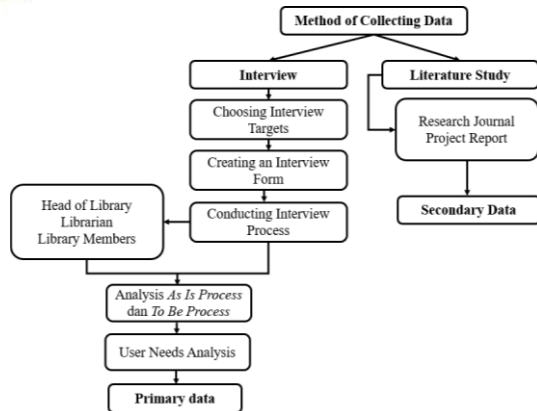


Figure 2. Method of Collecting Data

The following describes the process stages of the method of collecting user requirements by the developer.

I. Interview

a. Choosing Interview Targets

Target interviewees are parties who are actively involved with activities at the library of SMAN 3 Bengkalis, namely the head of the library, librarian, and library members. So based on the results of interviews with the three parties, the user needs are obtained that can be used in system development.

b. Creating an Interview Form

After knowing the target of the interview, the next thing to do is to make a list of questions. A form that will be used in the interview process, where the questions on the interview form are made based on a grid of questions as follows:

1. Questions related to the problems that occurred.
2. Questions regarding the current state of the system.
3. Questions related to business processes that apply and will be made.
4. Questions regarding the desired system characteristics.
5. Questions related to features/menus to be made.
6. Questions regarding the expected system development.

c. Conducting The Interview Process

After making the interview form, the next thing to do is conduct interviews. This activity was carried out in the library room of SMA Negeri 3 Bengkalis 2 times. The first activity was carried out with the head of the library. Then the second was carried out with the librarian and library members.

From the results of the interviews obtained, identification of problems that occur in

the SMAN 3 Bengkalis library is carried out, like the process related to data collection is still in progress. Bookkeeping, member registration, and paper cards are still being made, plus the pandemic, the difficulty of borrowing books, and the ratio of books are not enough.

d. Business Process Analysis

The business process that occurs at the SMA Negeri 3 Bengkalis library is that students who want to borrow books must be registered as library members by fulfilling the list requirements, namely bringing one sheet of 2 x 3 photos for making member paper cards. At the same time, teachers do not require making membership cards because registration is only recorded in the form of books. Then for the process of borrowing books, mainly textbooks, they are borrowed using a session change system depending on the class that has a schedule of subjects that need these textbooks. This process is done because the ratio of books owned by the library is insufficient for all members, causing most students not to study comfortably. After all, books can only be borrowed during the teaching process and can only be read.

From the analysis of the problems and the users' needs, it is known that the system running at the SMAN 3 library can be identified as an as-is process business process. Based on the analysis of the as-is process business process, it is known that there are potential problems with the system running at the SMAN 3 library. Like data collection is still made in the books so that it is difficult to search for data, registration as a library member is still in the form of paper cards so that it is vulnerable to lose and damage, and difficulty borrowing books because of the procurement of books that do not match the ratio.

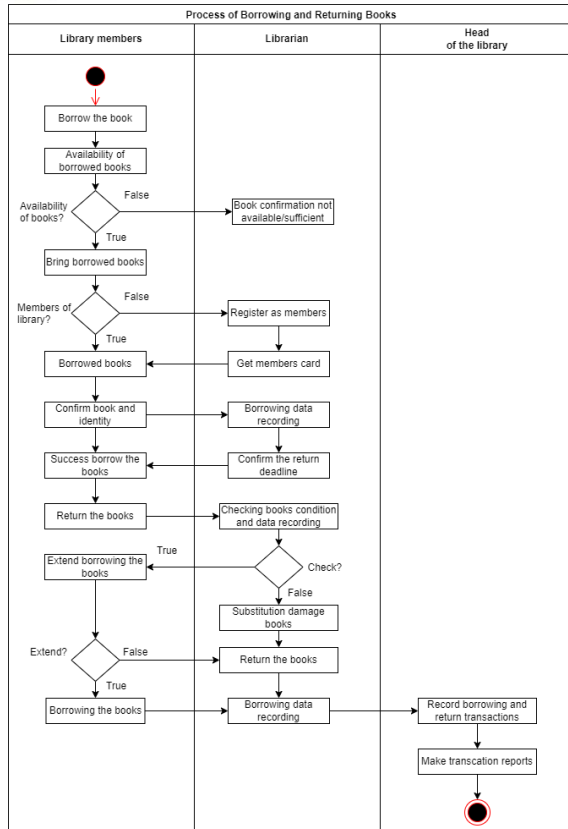


Figure 3. Business Process As-Is

After knowing the potential problems from the ongoing business process, the solution to the problem is done by identifying business processes in a to-be process. Based on the to-be process analysis of business processes, it is known that the solution to the problem is to develop a library information system that has several features. The features can manage book collection, members, borrowing and returning books computerized, then features help create library member accounts and features help members to access or read books online.

e. User Requirement Analysis

Based on the results of the problem evaluation, in order to obtain a system analysis of user requirements for system development, such as shown at table 1 below.

Table 1. User Requirements

Head of Library	Librarian	Library Member
Create a member account	Create a member account	View the list of books
Upload book	Upload book	Read a book
Manage data collection and officers	Data Management	View borrowing and returning book

Print Report	Change Personal Data	transactions Change Personal Data
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II. Study of Literature

It was collecting information through searching, reading, studying, and researching in various research journals, reference books, final project reports, and other references related to the development of a web-based library information system to know the application of methods and methodologies that can be used in solving problems that happened.

III. System Design

Based on user requirements obtained, then in this use case diagram, there are three actors: library members, librarian, and librarian.

To find out more detailed functionality of the system it can be seen in the following use case diagram.

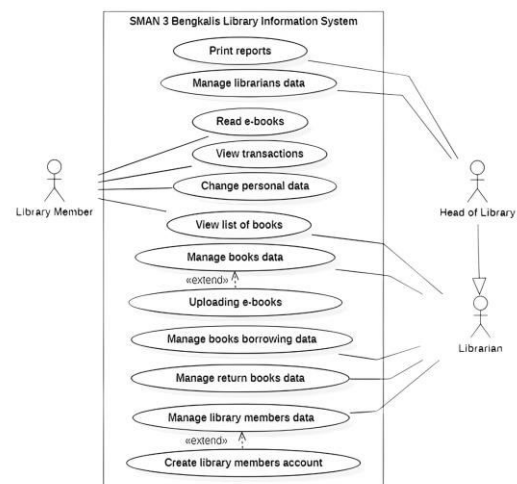


Figure 4. Use Case Diagram

Furthermore, to describe the relationship between objects in the system that was built, an entity relationship diagram (ERD) was designed. The results of the entity relationship diagram (ERD) design were built in accordance with system requirements, as illustrated in Figure 5 below.

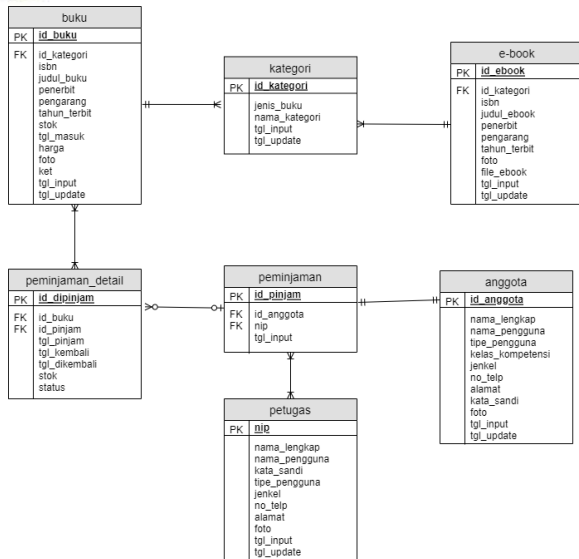


Figure 5. Entity Relationship Diagram

Make a temporary design based on the analysis of the evaluation of problems and user requirements obtained from the needs gathering stage through interviews.

Where the prototyping design is divided into three parts of the design.

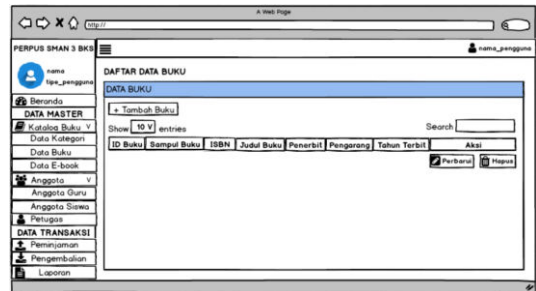


Figure 6. Book List Page Design

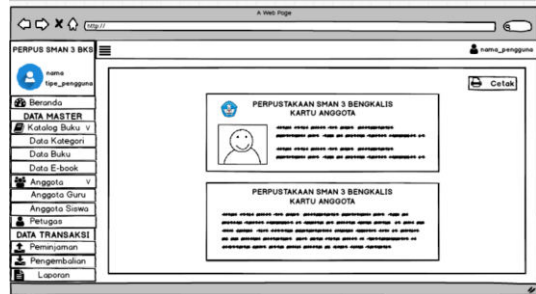


Figure 7. Card Print Page Design



Figure 8. E-book Reading Page Design

Table 2. Feature Design

Head of Library	Librarian	Library Member
<ul style="list-style-type: none"> Login Form Dashboard Book categories management Book Management e-book management Member Management Officer Management Transaction Management Reporting 	<ul style="list-style-type: none"> Login Form Dashboard Book categories management Book Management e-book management Member Management Transaction Management 	<ul style="list-style-type: none"> Login Form Dashboard Book List view Read an e-book Transaction View

Here are some views of the interface design page used to evaluate the mockup.

At the prototyping evaluation stage, an evaluation or trial process is carried out on the design of the mockup that has been previously made to the user, namely from the head of the library, librarian, and library members, so that a review of the evaluation results carried out from the user's side is reused to revise the mockup design.

The evaluation process for the preparation of the mockup was carried out through interviews with the 3 users consisting of 1 respondent from library members, 1 respondent from the librarian and 1 respondent from the head of the library, so that from the interview results a prototyping evaluation document was obtained which contained the evaluation results of the mockup, criticism and suggestions from users that will be used to re-evaluate the appearance of the mockup design which is carried out repeatedly until the results of all the display designs from the mockup are approved by the user.

The following describes the stages of each evaluation iteration carried out, such:

1. First Iteration

In this first iteration, the developer evaluates the user features for the head menu and librarian, where the evaluation results are set out in figure 9 below.

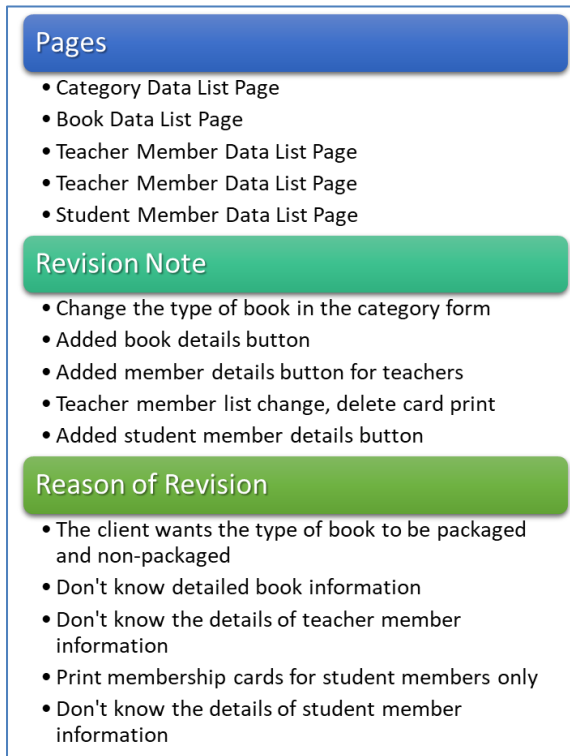


Figure 9. Revision of First Iteration

2. Second Iteration

For the second iteration, the developer shows the improvement results from the first iteration in this second iteration. Then the developer evaluates other features with the head and librarian. The results of the evaluation in the second iteration are shown in Figure 10 below.

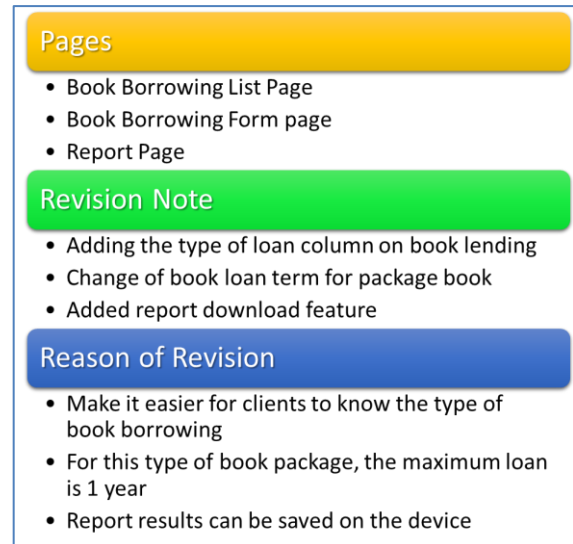


Figure 10. Revision of Second Iteration

3. Third Iteration

In the third iteration, the developer shows the revised results of the second iteration, and in the third iteration, the developer evaluates the features for members. The results of this iteration evaluation can be seen in Figure 11.

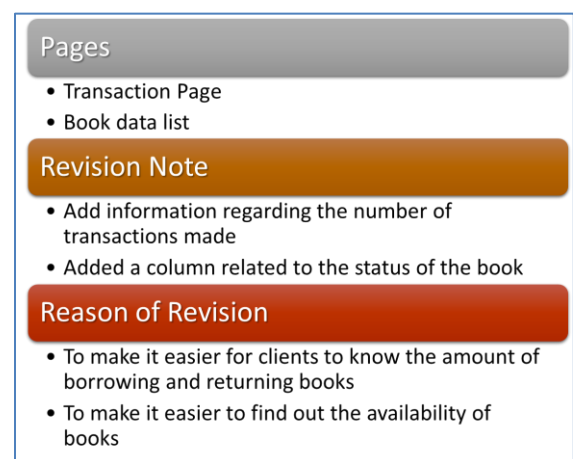


Figure 11. Revision of Third Iteration

4. Fourth Iteration

The fourth iteration contains improvements from the third iteration and is the last iteration of the evaluation of the design of the SMA 3 Bengkalis Library. The evaluation results in this fourth iteration state that all repairs have been completed without any further changes.

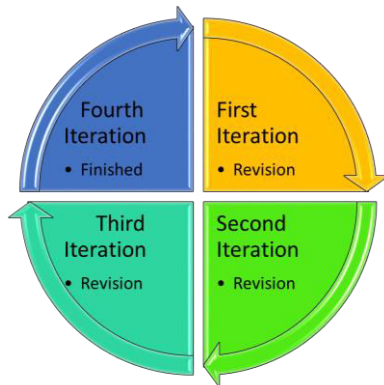


Figure 12. Final Iteration of Prototyping

Evaluation is carried out repeatedly by involving several parties until the expected system is achieved. In the development of the Bengkalis 3 Public High School Library System, there were four evaluation iterations, based on the results of interviews with the users regarding mockup evaluations made in the form of documents, it is known that in the fourth mockup evaluation stage the users have agreed to all the results of the mockup design of the library system so that the parties involved agree to use the results of the 4th iteration, so the iteration process is only carried out 4 times.

With the stages that have been carried out, an analysis of the entire process is carried out to see the success of the application of the method in developing information systems, especially in the case of a library information system in a high school.

After the mockup is complete, the next step is to design the system architecture. The system architecture is designed based on system requirements to facilitate the system development process and know how the system works. The design of the system architecture that is built is depicted in Figure 12 below.

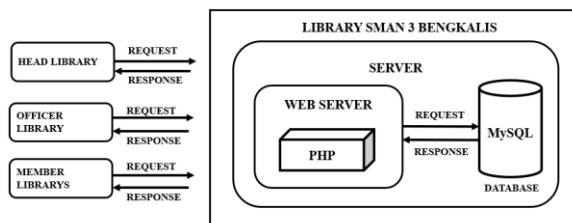


Figure 13. System Architecture

Based on Figure 13, there are three system users: the head of the library, the librarian, and library members. Besides that, several essential components are needed in building the final project design architecture, namely the web server and database server. The web server is the PHP programming language, while the database server is the MySQL database. For the mechanism of the

system architecture process, starting from the user can request to access data on the server, then the server will process the data request from the user by querying the database to retrieve the data, and then it will be sent back to the user in the form of a response.

IV. System Coding

The next thing to do is the coding stage of the system. In this phase, the program code is defined if the temporary design is under the wishes and needs of the user, then the next step will be translated into the PHP programming language with the Codeigniter framework and MySQL database as the database.

IV. System Testing & Evaluation

After completing the system coding process, the next step is testing and evaluating the built system. This test is planned to be carried out in several ways, namely Functional Testing, User Acceptance Testing (UAT), and Usability Testing.

Functional Testing focuses on testing the system's functionality that has been made by the user's requirements, where Testing is carried out by executing features on the system to determine whether the functional features are as expected.

User Acceptance Testing is a test carried out directly to educational institutions that implement the system by providing several questions related to the system in the form of a questionnaire answered by the respondents.

The evaluation of the system is carried out to measure the quality of the software developed by usability testing, namely in the ISO 9126 and ISO 9241-11 Standards.

ISO 9126 evaluation is used to assess user responses related to user understanding of the system to be developed, which consists of 4 criteria, namely understandability, learnability, operability, and attractiveness.

Evaluation of ISO 9241-11 is used to assess whether the system to be developed has been able or not to increase effectiveness and efficiency for users. Where ISO 9241-11 consists of 3 criteria, but only two criteria are used, namely effectiveness and efficiency, because only software evaluation is effective and efficient.

RESULTS AND DISCUSSION

Based on the problem identification of the SMAN 3 Bengkalis Library, it is known that the process related to data collection is still conventional. Also, the member registration is still made in paper cards. With the unstable COVID-19 pandemic, it is difficult for all related

parties to borrow books because the procurement of books does not match the ratio. . Therefore, the development of a library information system for SMA 3 Bengkalis is carried out, which can assist the process of managing data in the library, helping to create member accounts and helping to read and access books online.

From the system coding stage, it is defined to create features to help solve problems by creating features for managing data, such as bookkeeping.

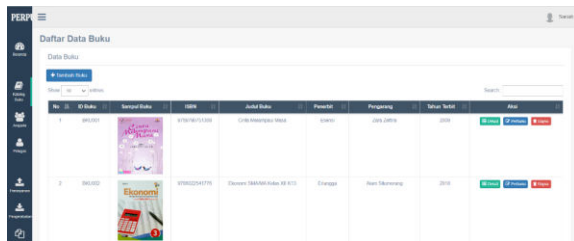


Figure 14. Books Data Management Page

In addition, it also helps manage data related to members, officers, borrowing, returning, and others.

Then create a feature to help solve problems related to creating member accounts.



Figure 15. Member Card Printing Feature

Lastly, making a feature to overcome the procurement of books that do not match the ratio, namely by creating an online reading feature that members can easily access.



Figure 16. E-book Reading Features

After successfully defining the program code, the next step is the testing process for the system being built, namely by using tests in the form of:

a. *Functional Testing*

Perform functional Testing with the black-box method on three feature users, namely the head of the library, librarian, and library members, where the developer tests each test item by entering the input conditions, and the output results issued by the system will be assessed by the developer to find out whether each functionality on the system has been running correctly or not.

Based on the test results, it is concluded that every functionality in the system has been running as expected, so that the SMAN 3 Bengkalis Library Information System can be declared successfully built and the system has run as expected in terms of system functionality.

b. *User Acceptance Testing (UAT)*

Conduct user acceptance testing for system users, where each user verifies whether the system's functionality meets user requirements. Based on the results of user acceptance testing (UAT), which was carried out on three system users consisting of the librarian, librarian, and library members, it can be concluded that the SMAN 3 Bengkalis Library Information System was built by the needs and requests of the system users and every functionality in the system. the system has been running well.

In addition, a system evaluation is carried out to determine user ratings regarding the library information system that has been built. Where at the evaluation stage, usability testing is carried out with different models because to determine the level of user understanding of the system being built, the type of usability testing used is Standard ISO 9126, which focuses on understanding software consisting of 4 criteria used, namely understandability, learnability, operability, and attractiveness. Meanwhile, to determine the effectiveness and efficiency of the system, usability testing is used in the form of Standard ISO 9241-11, which consists of three criteria. However, only two criteria are used, effectiveness and efficiency, because only software evaluation is effective and efficient.

Usability in the ISO 9126 Standard is carried out to determine the percentage of users understanding the system being built. The evaluation was carried out using a Questionnaire totaling 12 questions consisting of 4 criteria: understandability, learnability, operability, and attractiveness.

Table 3. Criteria of ISO 9126

No	CRITERIA
	Understandability
1	I understand the presentation of information

- contained in the system
- 2 Menus and features on the system are easy to understand
 - 3 I understand the use of the system easily without requiring instructions.
- Learnability**
- 4 The system is easy to learn how to use
 - 5 I have no difficulty in learning to use the system
 - 6 I have no difficulty in collecting data
- Operability**
- 7 The system for uploading books is easy to operate
 - 8 I learned quickly to operate the features available on the system
 - 9 I can operate all available features to display information.
- Attractiveness**
- 10 I am interested in using the system for data collection
 - 11 I'm interested in the system's performance in uploading books
 - 12 I am interested in reading books through the system.

Table 3 shows 12 statement items from the ISO 9126 questionnaire. Respondents must fill in 12 statement items to provide a subjective assessment of several options Strongly Disagree, Disagree, Neutral, and Strongly Agree, then the results of the assessment of the respondent's responses will be measured using a Likert scale.

The results of calculations based on Likert scale measurements at ISO 9126 can be seen in Table 4 below.

Table 4. Calculation of ISO 9126

No	Value Amount					Total Value	Score Min	Score Max	Percentage (Total/Max)* 100%
	SS	S	N	TS	STS				
(1)	5	8	2	0	0	63	15	75	84%
(2)	5	10	0	0	0	65	15	75	87%
(3)	6	6	3	0	0	63	15	75	84%
(4)	5	7	3	0	0	59	15	75	79%
(5)	6	6	3	0	0	63	15	75	84%
(6)	5	5	5	0	0	60	15	75	80%
(7)	3	8	4	0	0	59	15	75	79%
(8)	5	5	5	0	0	60	15	75	80%
(9)	4	7	4	0	0	62	15	75	83%
(10)	6	4	5	0	0	61	15	75	81%
(11)	6	8	1	0	0	65	15	75	87%
(12)	7	5	3	0	0	64	15	75	85%

The results of the recapitulation of the assessment with ISO 9126 can be seen in Figure 17 below.

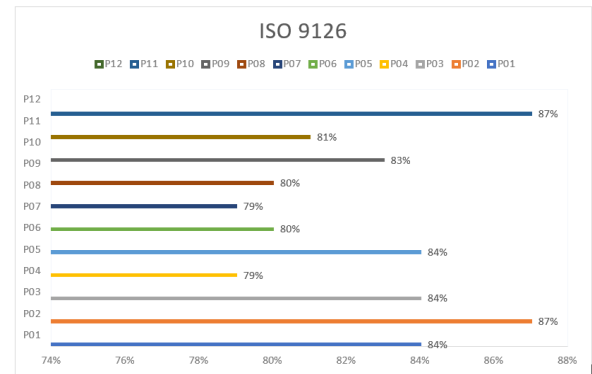


Figure 17. Evaluation results with ISO 9126

Based on the ISO 9126 percentage graph displayed, it is known that the criteria that have an enormous value on understandability in P02 are 87%, and attractiveness criteria in P11 are 87%. Then from the evaluation recapitulation results, it can be concluded that if the system users are the librarian, librarian, and members, the library strongly agrees regarding the ease of understanding, learning, use, and attractiveness of the Bengkalis High School 3 Library System that was built.

To find out the percentage of users related to the efficiency and effectiveness of the system being built. The evaluation was carried out using a Questionnaire totaling 12 questions to 15 respondents, comprising six people from teacher-type library members, six student-type library members, two librarians, and one head of library.

Table 5. Criteria of ISO 9241-11

No	CRITERIA
Efficiency	
1	I can complete structured data collection with the help of the system
2	I can easily find and find the desired information by using the system
3	I can find information quickly and can fulfill needs easily
4	I find it easier to find books
5	I feel that using the system makes the task easier
6	I find it very helpful in managing data collection to be faster.
Effectiveness	
7	I find the system very practical to help get the job done
8	I find it practical to read books online
9	I can get information quickly
10	I find it helpful for users to know the list of available books
11	I find it saves time in helping with data management
12	I feel that the system improves the user's performance in doing work.

After testing with ISO 9241-11, then the results will be measured using a Likert scale.

The results of calculations based on Likert scale measurements at 9241-11 can be seen in Table 6 below.

Table 6. Calculation of ISO 9241-11

No	Value Amount					Total Value	Score Min	Score Max	Percentage (Total/Max)* 100%
	SS	S	N	TS	STS				
(1)	3	8	4	0	0	59	15	75	77%
(2)	7	6	2	0	0	65	15	75	87%
(3)	5	8	2	0	0	55	15	75	73%
(4)	2	10	3	0	0	59	15	75	79%
(5)	5	9	1	0	0	64	15	75	85%
(6)	5	5	5	0	0	60	15	75	80%
(7)	10	4	1	0	0	69	15	75	92%
(8)	8	6	1	0	0	67	15	75	89%
(9)	7	7	1	0	0	66	15	75	88%
(10)	11	4	0	0	0	71	15	75	95%
(11)	8	7	0	0	0	68	15	75	91%
(12)	9	4	2	0	0	67	15	75	89%

The results of the recapitulation of the assessment with ISO 9126 can be seen in Figure 18 below.

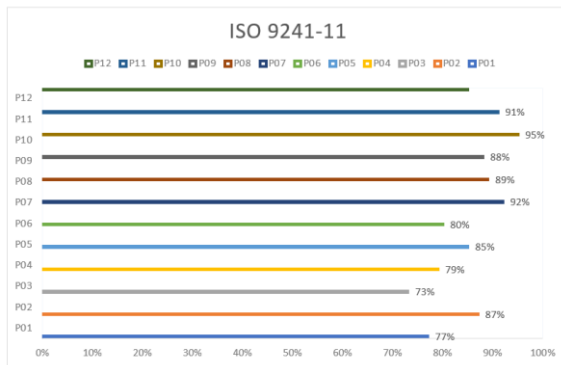


Figure 18. Evaluation results with ISO 9241-11

Based on the ISO 9241-11 percentage displayed, it is known that the criterion with the most significant effectiveness value is 95%. At P10 from the evaluation recapitulation results, it is concluded that system users consisting of the head of the library, librarian, and library members strongly agree regarding effectiveness and efficiency in the management of data collection using the help of the SMAN 3 Bengkalis Library Information System that has been built.

CONCLUSION

Based on the research that has been done, it can be concluded that the application of the prototyping method in the development of the library information system of SMAN 3 Bengkalis that has been carried out can produce a good information system product with the process of reaching an agreement after four iterations so that the system can run well and help the library in managing the library.

For future research, evaluation should be carried out when the system features are successfully built to display a more realistic system picture so that users get a clear picture of the system being developed.

ACKNOWLEDGEMENT

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REFERENCE

- [1] Martinus Maslim and S. P. Adithama, "Pembangunan Sistem Informasi Perpustakaan Sekolah Dasar Berbasis Web," *Din. J. Pengabd. Kpd. Masy.*, vol. 3, no. 2, pp. 350–360, 2020, doi: 10.31849/dinamisia.v3i2.3073.
- [2] R. D. Oktaviani and I. Seprina, "Rancang Bangun Sistem Informasi Perpustakaan SMA Pusri Palembang Menggunakan Barcode," *Bina Darma Conf. Comput. Sci.*, pp. 89–96, 2020.
- [3] SMAN3BKS, "SMAN 3 BENGKALIS," *SMA Negeri 3 Bengkalis*, 2017. <http://sman3bkls.sch.id/>.
- [4] I. Y. Supardi and A. Hermawan, *Semua Bisa Menjadi Programmer CodeIgniter Basic*. Jakarta: Elex Media Komputindo, 2018.
- [5] M. Prabowo, *METODOLOGI PENGEMBANGAN SISTEM INFORMASI*. Salatiga: LP2M Press IAIN, 2020.
- [6] V. Sahfitri, "Prototype E-Katalog Dan Peminjaman Buku Perpustakaan Berbasis Mobile," *J. Sisfokom (Sistem Inf. dan Komputer)*, vol. 8, no. 2, p. 165, 2019, doi: 10.32736/sisfokom.v8i2.665.
- [7] F. Arrafiq, *Pengembangan Dashboard Bidang Kerja Sama, Bisnis dan Pemasaran Politeknik Caltex Riau Menggunakan Metode Prototipe*, Fitra Arra. Pekanbaru: Politeknik Caltex Riau, 2020.
- [8] D. Purnomo, "Model Prototyping Pada Pengembangan Sistem Informasi," *J I M P - J. Inform. Merdeka Pasuruan*, vol. 2, no. 2, pp. 54–61, 2017, doi: 10.37438/jimp.v2i2.67.
- [9] Yahya, H. A. Q. (2020). Rancang Bangun Aplikasi Perpustakaan Menggunakan Framework Codeigniter (Studi Kasus Sdn Cibubur 05). *Jurnal Sistem Informasi Dan Sains Teknologi*, 2(2), 1–8. <https://doi.org/10.31326/sistek.v2i2.663>
- [10] Nurmansyah and Cholifah, W. N. (2021).

- Rancang Bangun Sistem Informasi Perpustakaan Mi Assa ' Adiyah Attahiriyah. *Seminar Nasional Riset Dan Inovasi Teknologi (SEMNAS RISTEK)*, 1436–1441.
- [11] Pressman, R. S. (2001). *Software Engineering A PRACTITIONER'S APPROACH*.
- [12] Hutagalung, D. D. and Arif, F. (2018). Rancang Bangun Sistem Informasi Perpustakaan Berbasis Web Pada Smk Citra Negara Depok. *Journal of Chemical Information and Modeling*, 53(9), 1689–1699.
<https://doi.org/10.1017/CBO9781107415324.004>
- [13] Ima, Z. (2019). *Implementasi Metode Usability Testing Dengan System Usability Scale Dalam Evaluasi Website Layanan Penyedia Subtitle*. X(2), 104–110.
- [14] RIFQATUSA'ADAH, F. L. (2017). *EVALUASI USABILITY BERDASARKAN ISO/IEC 9126 DAN NIELSEN MODEL MENGGUNAKAN METODE USABILITY TESTING (STUDI KASUS: APLIKASI MOBILE REBLOOD)* (F. L. RIFQATUSA'ADAH (ed.)). Institut Teknologi Sepuluh Nopember.
- [15] Supono, & Putratama, V. (2018). *Pemrograman Web dengan Menggunakan PHP dan Framework Codeigniter* (1st ed.). Deepublish.
- [16] Taufiq, M., Hidayat, Z., Mangiri, H. S., Arga, H., and Rani, D. (2020). Perancangan Sistem Informasi Perpustakaan Berbasis Web pada SMP Negeri 1 Ngarangan. *Journal of Information Education*, 3(1).