Implementation of Web-Based School Library Information System Design with RAD Method Approach

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Abstract

In the current era, several school libraries have implemented the design of web-based school library information systems using the Rapid Application Development (RAD) approach. The primary objective of this method is to enhance efficiency and accessibility in managing an organization/institution. This research aims to ascertain the advantages of the RAD method in the development of school library information systems. The research methodology employs a literature review by gathering relevant literature materials about the topic. The RAD method was chosen because it allows for rapid and iterative development, aligning with the dynamics of changing user needs and technology. The system is designed to support collection management, borrowing, and book

searching effectively. The analysis results indicate that the implementation of the RAD Method in designing library information systems yields several positive impacts on the development of school library websites, namely, firstly, providing quick responses to user needs; secondly, improving previous systems; and finally, achieving relatively faster development compared to traditional software development methods.

Keywords: *RAD, Rapid Application Development, Library Information System.*

Abstrak

Pada era saat ini, beberapa perpustakaan sekolah telah mengimplementasi perancangan sistem informasi perpustakaan sekolah berbasis web menggunakan pendekatan Metode Rapid Application Development (RAD). Tujuan utama dari metode ini adalah meningkatkan efisiensi dan aksesibilitas dalam manajemen suatu organisasi/lembaga. Penelitian ini bertujuan untuk mengetahui kelebihan metode RAD pada pengembangan sistem informasi perpustakaan sekolah. Metode penelitian ini menggunakan studi pustaka dengan mengumpulkan bahan literatur sesuai dengan topik bahasan terkait. Metode RAD dipilih karena memungkinkan pengembangan yang cepat dan iteratif, sesuai dengan dinamika perubahan kebutuhan pengguna dan teknologi. Sistem ini dirancang untuk mendukung manajemen koleksi, peminjaman, dan pencarian buku secara efektif. Hasil dari analisis menunjukkan bahwa penerapan Metode RAD dalam perancangan sistem informasi perpustakaan memberikan sejumlah dampak positif terhadap pengembangan website perpustakaan sekolah yaitu yang pertama, memberikan respons yang cepat terhadap kebutuhan pengguna, kedua, perbaikan sistem sebelumnya yang menjadi lebih baik, dan terakhir adalah hasil pengembangan yang relatif cepat daripada metode pengembangan perangkat lunak tradisional.

Kata Kunci: *RAD, Rapid Application Development, Sistem Informasi Perpustakaan.*

A. Introduction

Management Information Systems (MIS) within an institution play a crucial role in its organization and development. Consistent with its function, MIS is implemented to organize critical data within the institution. It is asserted that in the operational framework of an institution, MIS is highly essential for decision-making in achieving organizational objectives[1]. Management Information Systems provide accurate and timely information to facilitate decision-making and problem-solving[2].

This allows planning, control, and operations functions to run efficiently. Therefore, Management Information Systems have an important role in managing data and information within an institution or organization. With an information system, the flow of information within an institution or organization can be structured and well-organized. Whether it is a company, organization, or institution that has implemented automation at various levels of management, an essential and integrated management information system is needed[3]. A management information system is an information processing system that organizes data and information that is useful as support in carrying out organizational tasks[4]. Meanwhile, a management information system is a set of interconnected information subsystems designed to efficiently transform data into valuable information by using various methods

[1] Anastasya Lipursari, "Peran Sistem Informasi Manajemen (Sim) Dalam Pengambilan Keputusan," *Jurnal STIE SEMARANG* 5, No. 1 (2021): 26–37.
[2] Adisel and Robeet Thadi, "Sistem Informasi Manajemen Organisasi Perannya Dalam Pengambilan Keputusan dan Pemecahan Masalah," *Journal Of Administration and Educational Management (ALIGNMENT)* 3, No. 2 (2020): 145–53.
[3] Miyarso Dwi Ajie, "Sistem Informasi," n.d., 7823–30.
[4] Hariyanto Slamet, "Sistem Informasi Manajemen," *Sistem Informasi Manajemen* 9, No. 1 (2018): 80–85,.

to increase productivity based on individual styles and preferences, while adhering to established quality standards[5].

An information system is a combination of interrelated components used to collect, process, and store information. This information supports decision-making and increases the effectiveness of information processing within an institution. A well-designed information system can improve the accuracy of data (information) efficiently and systematically. A good information system will produce accurate and systematic data (information) for an institution. Accurate and systematic information obtained from the formulation of business strategies can create greater opportunities.

Any institution or organization that manages extensive data and information, including in the field of education, can take advantage of this management information system. The implementation of management information systems is observed at the school level where the available data is processed as raw material for decision-making by the school principal[6]. Meanwhile, it shows that integrated data in education management within madrasah/school institutions can be utilized through the implementation of this management information system[7].

In addition, findings from research conducted by Hakiki et al. (2021) show that the implementation of a well-processed management information system can speed up information

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[5] Hadion Wijoyo, "*Sistem Informasi Manajemen*", ed. M.M. Mada Faisal Akbar, S.E., 1st ed.

[6] N Ririyanti, et al., "Peranan Sistem Informasi Manajemen Pendidikan Bagi Kepala Sekolah Dalam Pengambilan Keputusan Di Sekolah SMA WR Supratman 2 Medan," *Jurnal Pendidikan dan Konseling* 4 (2022): 9875–80.

[7] Nur Rahmi Sonia, "Implementasi Sistem Informasi Manajemen Pendidikan (Simdik) dalam Meningkatkan Mutu Pendidikan di Madrasah Aliyah Negeri 2 Ponorogo," *Southeast Asian Journal of Islamic Education Management* 1, No. 1 (2020): 94–104.

retrieval[8]. Not limited to schools, libraries that are an integral part of educational institutions can also benefit from this management information system. However, unfortunately, there are still many school libraries that have not implemented management information systems in their operations. For example, the library information management of Madrasah Aliyah Malakaji in Gowa Regency is still done manually[9] and who stated that services in the SMK Negeri 11 Malang library are recorded in a notebook, and the limitations of their library information system which can only be accessed by users through one desktop[10].

Libraries, as part of educational institutions, collect a large amount of information, thus encouraging the implementation of software-based management information systems to help collect such information. Software development based on the SDLC (System Development Life Cycle) serves as an important foundation to ensure optimal operation functions. SDLC represents a cycle in software development structured through phases in which software is created and modified[11]. This cycle involves the use of certain models and methods in the software development process. Furthermore, in the context of software engineering, the SDLC concept serves as the foundation that supports various methodologies in software development[12].

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[8] Muhammad Hakiki et al., "Perancangan Sistem Informasi Manajemen Berbasis Sekolah SMA Negeri 1 Muara Bungo," *Jurnal Muara Pendidikan* 6, No. 1 (2021): 50–57.

[9] Sitti Arafah, "Menengok Kesederhanaan Pengelolaan Perpustakaan Madrasah Aliyah Negeri Malakaji Kabupaten Gowa," *Libraria* 6, No. 1 (2018): 1–22.

[10] Nur Aini, et al., "Pembangunan Sistem Informasi Perpustakaan Berbasis Web Menggunakan Metode Rapid Application Development (RAD) (Studi Pada : SMK Negeri 11 Malang)," *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer* 3, No. 9 (2019): 8647–55.

[11] Fadillah Siva et al., "Survei Metode-Metode Software Development Life Cycle Dengan Metode Systematic Literature Review," *ILKOMNIKA: Journal of Computer Science and Applied Informatics* 5, No. 2 (2023): 36–52.

[12] Seema Kute and Surbahi Thorat, "A Review on Various Software Development Life Cycle (SDLC) Models," *International Journal of Research in Computer and Communication*

This methodology provides the structure necessary to organize and oversee the steps in the information system creation and software development process. One of the methodologies derived from the SDLC concept is RAD. RAD or Rapid Application Development was first introduced in a publication with the same title by James Martin in 1992 and was defined by him as 'a commercial need to deliver working business applications in a relatively short timeframe'[13]. The definition of RAD is further explained as an approach to computer system construction that integrates Computer-Assisted Software Engineering (CASE) tools and techniques, user-driven prototyping, and tight project completion deadlines into an approach that is proven to be effective, reliable, and obtain the best results in terms of quality and productivity. This method is a further development of a method formulation called Rapid Iterative Production Prototyping (RIPP) by Boehm and Gilb at DuPont in 1980[14]. The emergence of this method can overcome the weaknesses that arise from the traditional Waterfall development method and other variants[15] which tend to be rigid and do not involve users in their development.

The implementation of the RAD method has shown that it has many advantages. This model emphasizes a sequential and rapid development process to achieve results in a relatively short period[16], usually between 20 to 40 days, known as time-boxing[17]. In addition to

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Technology 3, No. 7 (2014): 778–79.

[13] Hugh Mackay et al., "Reconfiguring the User: Using Rapid Application Development," *Social Studies of Science* 30, No. 5 (2000): 737–57.

[14] Randy Irawani, "Analisis Dan Perancangan Sistem Informasi Dalam Siklus Pengeluaran Pada PT X Dengan Metode Pengembangan Sistem Rapid Application Development (RAD)" (Institut Bisnis dan Informatika Kwik Kian Gie, 2017).

[15] Ginanjar Wiro Sasmito et al., "Implementation of Rapid Application Development Method in the Development of Geographic Information Systems of Industrial Centers," *Journal of Information and Communication Convergence Engineering* 18, No. 3 (2020): 194–200.

[16] Titania Pricillia and Zulfachmi, "Perbandingan Metode Pengembangan Perangkat Lunak (Waterfall, Prototype, RAD)," *Jurnal Bangkit Indonesia* 10, No. 1 (2021): 6–12.

[17] John McManus, "If You Want to Succeed in Software Development...," *Computer*

the speed of development, this method is proven to be more effective than the Waterfall method in producing systems that directly meet user needs[18]. However, this method may result in more system errors if speed is prioritized over quality[19]. In addition, the lack of open user involvement can hinder the development process[20].

This research aims to examine new perspectives on the utilization of the RAD method in developing web-based school library information systems, particularly exploring its advantages. The author used a research method in the form of a literature study by first tracing primary and secondary sources regarding the study of the RAD method and the implementation of the RAD method on school library websites. Research articles were obtained through the Google Scholar database within the specified period from 2020 to 2023 using the keywords 'RAD Method in Web-based School Library Information System'. The search results yielded 1,640 articles which were then reduced to five articles. The selected articles were then analyzed by referring to previous RAD method study articles which were presented narratively so that a conclusion could be drawn.

Bulletin (London, 1986) 39, No. 1 (1997): 20.

[18] Wahyu Wijaya Widiyanto, "Analisa Metodologi Pengembangan Sistem dengan Perbandingan Model Perangkat Lunak Sistem Informasi Kepegawaian Menggunakan Waterfall Development Model, Model Prototype, dan Model Rapid Application Development (RAD)," Jurnal INFORMA Politeknik Indonusa Surakarta 4, No. 1 (2018): 34–40.

[19] Agustinus Noertjahyana, "Studi Analisis Rapid Aplication Development Sebagai Salah Satu Alternatif Metode Pengembangan Perangkat Lunak," *Jurnal Informatika* 3, No. 2 (2002): 64–68.

[20] Murdiani Deni and Heri Hermawa, "Perbandingan Metodologi Waterfall Dan Rad (Rapid Application Development) Dalam Pengembangan Sistem Informasi," *Jurnal Informatika Teknologi Dan Sains* 4, no. 4 (2022): 302–6.

B. Discussion

1. Library Information System

In the current era, the library is an information resource that is the backbone of an institution, including educational institutions because of the demand to continue to adapt to the development of information[21]. He also said that the library is an institution whose purpose is to meet the needs of users so librarians must be responsive in meeting these needs so that the library can develop for the better. One of the factors that can improve the quality of a library is the implementation of an effective and efficient information system.

Systems are important tools needed in management, while information systems are information providers to support management. Information systems have a very broad meaning because they are related to technology and management. Information systems are a combination of technological elements that are interconnected to manage information. Information systems have several benefits when applied to libraries. By implementing an information system in the library, some information such as a list of library collections and collection circulation records that are stored manually will be stored more quickly and systematically. Reports on library activities can also be recorded so that they can be seen by the librarian[22].

Libraries have demands to provide appropriate information services[23] and fortunately, in this era of globalization, technological

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[21] M Yarni et al., "Menajemen Perpustakaan Sekolah Ma Anwarul Hasaniyah (Anwaha) Kabupaten Tabalong," *Educational Journal: General and Specific Research* 3, no. 3 (2023): 716–26.

[22] Nurul Fajriyah and Wawan Setiawan, "Analisa Dan Perancangan Sistem Informasi Perpustakaan Digital Pada Universitas XYZ," *Jurnal Ipsikom* 2, No. 1 (2019).

[23] Sri Anah, "Aplikasi Sistem Informasi Perpustakaan Stain Kudus Berbasis Teknologi Informasi," *Jurnal Libraria* Vol 3, No. (2015): 78–92.

developments have made library information systems develop rapidly so that they can be implemented through many platforms, one of which is through the website. A website can be defined as a collection of pages designed to display various kinds of information, ranging from text, images, animations, and sounds, to a combination of all of them. Pages can be static, with fixed content, or dynamic, allowing for change or interaction. The pages are connected through a network of interconnected pages, building a unified structure. Connections between web pages use hyperlinks, a mechanism that allows navigation between pages. Meanwhile, the text used to trigger these links is referred to as hypertext.

2. Rapid Application Development Method

Website design requires a fast software development method that facilitates iteration as an evaluation material for the realization of a quality website. One of the many types of software development methods that offer this is the Rapid Application Development method. The Rapid Application Development or RAD method is a method that carries a dynamic framework in system development, providing a shorter implementation time compared to the 'waterfall' model that has generally been used for a long time[24]. This method describes four important stages that comprise specific phases. Evaluation in this process involves the active involvement of the system analyzer as well as the end user, reinforcing in-depth interaction between both parties to ensure the suitability and performance of the resulting system[25].

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[24] Mackay et al., "Reconfiguring the User: Using Rapid Application Development."
[25] C. Shawn Burke et al., "Understanding Team Adaptation: A Conceptual Analysis and Model," *Journal of Applied Psychology* 91, No. 6 (2006): 1189–1207.

These phases consist of:

1. Requirements Planning

This first phase is a collaborative meeting between the system analyzer and stakeholders to establish the objectives to be achieved through the system to be developed. This process involves in-depth identification of the information needs that arise to achieve the goals that have been set, as well as comprehensively analyzing the entire system that is the main need for the users involved.

2. RAD Design Workshop

This second phase describes the RAD design workshop session which involves collaboration between the system analyzer and the software developer to design the concept of the system to be built. Both work synergistically to design the system and present a visual representation and working model to the users of the system. At this stage, users respond to the prototype that has been developed. System analyzers and developers can make adjustments and in-depth analyses of the modules that have been designed based on the feedback received from system users.

3. Instruction

This third phase is the time when implementation includes the creation of program scripts and is a continuation of the previous phase. In this phase, the platform, hardware, and software used are shown to the user. Any designs that have been prepared in the previous phase will be refined by utilizing Rapid Application Development (RAD) tools. When new functionality is available, it is presented to the users for interaction and feedback and then followed by adjustments made by the analyzer to each application design based on the instructions given by the users.

4. Implementation

In this phase, the analyst works with the users intensively during the workshop to design some non-technical aspects and needs. Once all aspects are approved and the system is created and refined, the new system or part of the system is tested and then introduced to the agency/organization.

The main goal of the Rapid Application Development (RAD) Methodology is to design and develop applications at high speed. This allows developers to iterate and update software efficiently without having to start from scratch every time a change is required. Naz et al., (2015) argue in their article that in the context of the classic software development cycle, completing application development quickly becomes a challenge that usually takes several months to complete and the Rapid Application Development method can be a solution, especially for institutions or institutions that are small to medium in scale[26]. This opinion is supported by research conducted by Daud et al (2010), where the RAD method was utilized as practicum training for students on the Application Management task. The reason for choosing this method was because the students were in a practical environment to work on an assignment. Development began on the proposed approach in the December-April 2009 period in mid-semester and lasted for three semesters. The results show that RAD is an appropriate methodology to achieve these objectives, especially in the context of small to medium-sized systems[27].

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[26] Riffat Naz and M N A Khan, "Rapid Applications Development Techniques : A Critical Review," *International Journal of Software Engineering and Its Applications* 9, no. 11 (2015): 163–76.

[27] Nik Marsyahariani Nik Daud, et al,. "Implementing Rapid Application Development (RAD) Methodology in Developing Practical Training Application System," *Proceedings 2010 International Symposium on Information Technology - System Development and Application and Knowledge Society, ITSim'10* 3 (2010): 1664–67.

In addition to having a high application development speed, the Rapid Application Development method allows active participation of users or clients at each development phase, making it easier to adjust to changes in user needs or business needs. In line with this statement, Gerber et al (2007), state that RAD methodology is more flexible and integrates continuous feedback from clients, less dependent on formal design reviews by all stakeholders[28]. This is evidenced by research conducted by Al Masri et al (2022), which shows that the development of a web-based sales information system using the RAD method allows speed in development work and involves users with an active role. The system which is tested for functionality using black box testing and feasibility testing using the user acceptance test shows good results, with a percentage value of system quality of 90%, and is included in the very good category[29].

This method is a good choice for improving pre-existing systems instead of deleting and rebuilding from scratch which will certainly increase expenses. This statement is supported by research conducted by Pradana et al (2022), regarding the information system of a village called Arjana Village which has a website where villagers can make a certificate through the website without having to go to the village office. Pradana et al (2022)., found the low flexibility of the website features that hampered the performance of village employees then carried out development using the RAD method by actively involving users during the website development process and the result was that the Arjana

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[28] Aurona Gerber, et al., "Practical Implications of Rapid Development Methodologies," in *Proceedings of the 2007 Computer Science + Information Technology Education Conference*, 2007, 233–45.

[29] Mutia Al Masri, et al., "Perancangan Sistem Informasi Penjualan Berbasis Web Pada NSS Frozen Food Menggunakan Metode Rapid Application Development," *INTECOMS: Journal of Information Technology and Computer Science* 5, No. 2 (2022): 226–37.

Village website features became more flexible without incurring additional costs due to the pre-existing system[30].

Based on previous studies that used the RAD method in the development of their research projects, this method would be very suitable for the development of school library websites because of its ability to provide fast and responsive solutions in library information management. Through the RAD approach, user participation can be enhanced, allowing parties such as teachers, library staff and students to be involved in the process of designing and testing various website features. The flexibility advantages of RAD allow for rapid adjustments according to user feedback, while the efficient management of time and cost in development provides an opportunity for schools to obtain an effective solution without having to experience resource pressure. Furthermore, the enhanced collaboration and rapid iteration capabilities also provide advantages for library website development, ensuring the site's continued relevance and optimization over time. In this regard, the author is interested in further reviewing relevant research articles on school library website development using the RAD method.

3. Analysis of the Implementation of the Rapid Application Development Method for School Library Website Development

There is a table containing the results of the analysis of articles that discuss the application of the RAD method to library information systems. The article search used the keyword 'RAD Method on Web-based School Library Information System'. Of the 1,640 search results

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[30] Maulana Kevin Pradana, et al,. "Pengembangan Sistem Informasi Desa Terpadu Menggunakan Metode Rapid Application Development (RAD) Studi Kasus Desa Arjasa," *INFORMAL: Informatics Journal* 7, no. 2 (2022): 64.

obtained from these keywords, five articles were found that met the author's criteria for in-depth review.

Table 1.1 Research Topics

No.	Author (Year)	Research Topics
1.	Puji Astuti and Ahmad Samudra (2023)	Development of library information systems, system design, programming languages used, user interfaces, and implementation results of web-based library information systems.
2.	Abdul Wahab, Julian Andiri, Rahma Ashara and Wasis Haryono (2023)	The use of a web-based library information system to facilitate librarians in managing book loan data and facilitate students in finding book information.
3.	Fanesyah Musvina, Sri Rahmawati, S.Kom, M.Kom, then Harkamsyah Andrianof, S.Kom, M.Kom (2022)	The development of the SMP Negeri 22 Padang library information system uses the Rapid Application Development method and the Unified Modeling Language (UML).
4.	Ade Ajie Ferizal, Mohammad Anas Sobarnas, dan Djoko Nursanto (2021)	Designing a web-based book lending system application using the Rapid Application Development (RAD) method.
5.	Nur Aini, Satrio Agung Wicaksono, dan Issa Arwani (2019)	Development of a pre-existing library information system in the school library of SMKN 11 Malang using the Rapid Application Development method.

Referring to the table above, the five articles have different topics but are still related to each other. Starting from the development of library information systems, the use of library information systems, the importance of web-based library information systems, to information systems as a solution for library data processing. System development is usually related to the maintenance and implementation of the system to make it more efficient when operated. The development and utilization of library information systems have an important role in improving the efficiency and effectiveness of information management in the library environment. By utilizing information technology, libraries can automate the process of borrowing, returning, and searching book collections, minimize the risk of errors, and improve data accuracy. Library information systems also provide better accessibility for users by allowing them to search and access information online, support distance learning, and provide a more interactive user experience.

It can be seen that the five articles listed in Table 1.1 all use the RAD method as a strategy for developing school library systems. Common problems that arise in school libraries studied by Puji Astuti and Ahmad Samudra (2023), Abdul Wahab et al (2023), Fanesyah Musvina et al (2022), and Ade Ajie Ferizal et al (2021), are information management activities carried out in the form of making reports, manual recording in book data collection, and circulation of borrowing and returning books are still carried out manually through paper media which can cause problems ranging from documents that can be lost or damaged and errors during the collection and circulation data collection process which causes library services to be less than optimal. While in the case of a school library researched by Nur Aini et al (2019), there are still many shortcomings in the library information system application at SMKN 11 Malang School, so better development is needed for the school library system.

Information system development is necessary because it can improve operational efficiency, support decision-making, facilitate communication, and enable better information management. By using information technology, organizations can increase productivity, respond more quickly to market changes, and achieve their business goals more effectively. A good information system can help integrate various aspects of the business and provide a competitive advantage.

The importance of information systems in library data management includes operational efficiency, inventory tracking, and data analysis for better decision-making. These systems assist libraries in providing services that are more responsive to user needs by presenting information in real time. In addition, integration with other information systems, such as membership and financial management, allows libraries to have full visibility into all aspects of their operations. As technology continues to evolve, the use of information systems in libraries will continue to be a relevant and necessary solution. The combination of traditional collection management and the integration of modern information systems creates a dynamic and responsive library ecosystem, meeting the challenges and demands of the times and providing better services to the user community.

Incorporating technology into library management and services certainly needs to be built based on the needs of users including librarians as library managers. If the technology produced for the school library has been established but does not accommodate the needs of its users, further system development is necessary. In this case, the RAD method besides having advantages in accelerating system development compared to other traditional methods also has a planning system flow that accommodates user needs. In table 1.2 the author presents the results of research on the development of school library websites using the RAD method.

Table 1.2 Research Results

No.	Author (Year)	Research Results
1.	Puji Astuti and Ahmad Samudra (2023)	The result of the implementation of a web-based library information system at SDIT Insan Mandiri Kalisari is to facilitate the work of librarians and students. Students can search and borrow books quickly, while librarians can easily collect data, reduce and increase the number of books, calculate fines, and identify lost books. References used in the development of this web-based library information system include research and case studies related to the development of web-based information systems.
2.	Abdul Wahab, Julian Andiri, Rahma Ashara and Wasis Haryono (2023)	The research results include use case diagrams, activity diagrams, class diagrams, and user interfaces, as well as the implementation of the login page, dashboard, book loan data, member data, and book data. The discussion also highlights that a web-based library information system makes it easier for librarians to manage book loan data and makes it easier for students to find book information. The RAD method, PHP, and MySQL are used in the development of this system, to assist librarians in managing school libraries and improving the book loan transaction process.

3.	Fanesyah Musvina, Sri Rahmawati, S.Kom, M.Kom, then Harkamsyah Andrianof, S.Kom, M.Kom (2022)	The application of the RAD method to design a library application system at SMPN 22 Padang can facilitate the preparation of library data, and circulation of borrowing and returning books so that librarians can serve users more efficiently so that there is a reduction in management costs from these data.
4.	Ade Ajie Ferizal, Mohammad Anas Sobarnas, and Djoko Nursanto (2021)	The results of the article show that the implementation of the RAD method on a web-based library information system at SMK Fatahillah Cileungsi has helped in managing book data, borrower data, returns, and report generation. System testing using the Black Box testing method shows that this application can make it easier for librarians and students to borrow books online.
5.	Nur Aini, Satrio Agung Wicaksono, and Issa Arwani (2019)	Updating the library information system in the form of applications at SMKN 11 Malang into a web-based information system using the RAD method. The results of the system development make it easier for admins to manage library data and make it easier for users when borrowing books with the results of User Accepting Testing carried out on five testers a result of 84%.

Puji Astuti and Ahmad Samudra found that the implementation of a web-based library information system applied to SDIT Insan Mandiri Kalisari facilitated the work of librarians and students (librarians and users). Students can search and borrow books quickly and easily, while librarians can collect data easily and optimally, on the other hand, officers also fully manage the reduction and addition

of the number of books, calculation of fines, and identification of lost books. The RAD method is used as a system development model in this research and the process includes the development of a library system which includes;

1. Planning Stage

At this stage the researcher first analyzes the problem, system needs, and user needs according to the data and information that has been obtained.

2. Design Workshop

After identifying system and user needs, a system design plan is designed that serves to solve the problems that have also been identified by analyzing several configurations needed in the library information system development process.

3. Construction

This stage is the execution stage for making program code that will be built and supported by programming software to produce a system that has been designed.

4. Implementation

The last stage is designing an information program developed by a programmer that has been approved by the previous user.

The design of this library website system includes use case diagrams, activity diagrams, entity relationship diagrams, and logical record structures. The programming languages used are PHP, CSS, HTML, Javascript, and SQL. The user interface includes various pages such as the main page, book page, login page, admin dashboard, admin user dashboard, borrowing page, transaction data page, transaction report page, and admin data page. The results of the design of this school library website system are considered successful because previously in the use of the RAD method, there was an analysis of

user needs in the early stages so that the resulting website fulfills what users need, namely library staff in collecting circulation data on loans and returns automatically and SDIT Insan Mandiri Kalisari students when searching, borrowing, and book availability without spending a lot of time and effort.

Abdul Wahab, Julian Andiri, Rahma Ashara, and Wasis Haryono (2023) discovered problems that occurred in the school library of SMKN 12 Tangerang Regency. These issues manifested in the manual recording of library data, including book collections, records of borrowing and returning books, and lists of library members. Such manual procedures burdened librarians and potentially compromised service performance. So a web-based information system for the school library was built using the RAD method because it was considered to meet the needs of its user system. The stage begins with analyzing the needs of its users. Then the results of the analysis made an Activity Diagram design. After analyzing the needs of its users, a proposed system analysis design was made based on the problems that occurred in the library of SMKN 12 Tangerang Regency. The next stage is designing a website-based information system by adjusting to user needs and problems that occur in the library. The last stage is implementation where the output of the system design that has been designed is a school library website with several web page views intended to facilitate librarians. The website page consists of a Dashboard Page to display the member data menu, book data menu, and book loan transaction data menu. Book borrowing data page to display borrowing data in the form of borrowing number, member ID, borrowing date, and returned book. The member data page consists of the member ID, member photo, member name, member username, gender, phone number, level, and member address. The last is the book data page where librarians can view information about library collections ranging from ISBN,

book title, publisher, author, book year, book stock, number of books borrowed, and book entry date. All information contained in these pages can be changed or reduced according to the librarian's wishes so that it can help the librarian's performance in carrying out library operational services. The RAD method in developing this website acts as a communicative method where system developers can work together with users to develop a good system.

Fanesyah Musvina, Sri Rahmawati, S.Kom, M.Kom, and Harkamsyah Andrianof, S.Kom, M.Kom (2022) conducted research at the SMPN 22 Padang school library and then stated that library data management at SMPN 22 Padang is still conventional so that a library information system is needed. The development of a library information system is then planned by first collecting research data in the form of what users need in the library information system starting from the process of borrowing books, returning books, late book fines, and organizing library documents. After that, a system analysis is carried out to develop a running system or create a new system. Then, user requirements are organized based on the user's position for the RAD Requirement Planning stage. These users consist of members, officers, and admins. Next, the RAD design workshop stage is carried out using UML. Before it is ready for users to use, the system is first tested to avoid errors that might occur when users are using the system. System testing also uses what is called the Black Box testing method. Black Box testing aims to get input and output from the system to match the developer's expectations. Tests were carried out in the form of logging into the system, searching for members, searching for books, the process of borrowing books, and the process of returning books, and all that was tested had the appropriate results so that the website design was considered ready to be used by users.

Ade Ajie Ferizal, Mohammad Anas Sobarnas, and Djoko Nursanto (2021) found that the Rapid Application Development (RAD) method can help library management better through the design of a web-based library information system. The implementation and testing of this system have been proven to improve library management services at SMK Fatahillah Cileungsi. In their study, the researchers explain that the RAD method enables a fast and iterative software development process, which is highly effective at meeting the specific needs of such school libraries. The RAD method works by dividing software development into several small phases, which include planning, requirements analysis, design, construction, and implementation. Each phase is executed with a focus on rapid user feedback and constant revision. The way the RAD method works in school website development is usually through system design, construction, feedback, and advanced development. Thus the RAD approach, library information system development can be completed faster than traditional methods because RAD emphasizes rapid iteration and intensive collaboration between developers and end users. The result is a system that is more responsive to user needs and can be adapted quickly to changes or the addition of new features. The implementation of RAD at SMK Fatahillah Cileungsi shows significant improvements in the efficiency of library management, including in terms of book recording, borrowing, and returns, as well as more accurate inventory tracking.
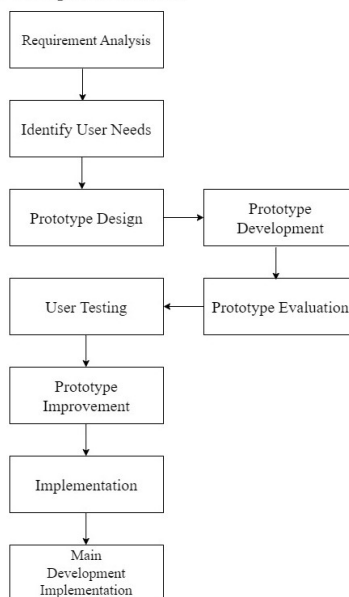
The research of Aini, Wicaksono, and Arwani (2019) elaborated that the RAD method allows for rapid and iterative software development, which is very effective in meeting the specific needs of school libraries. This process involves users intensively in every stage of development, ensuring that the resulting system truly matches their needs and expectations. Through the RAD approach, the development of library information systems

becomes more responsive and adaptive to user needs. Intensive collaboration between developers and users ensures that any new issues or needs can be identified and addressed quickly. The result is a system that is more efficient, user-friendly, and able to provide better services for library users at SMK 11 Negeri Malang. RAD's iterative approach also enables continuous improvement, ensuring that library information systems are always at optimal performance and in line with user expectations.

4. Results

Based on the analysis that the author has done by reviewing the findings of the article in the previous table, it can be concluded that the flow of the RAD method forms a pattern which when depicted on the chart will form the following flow,

Picture 1. Implementation Pattern of Rapid Application Development Method

After considering several findings obtained by the author regarding the results of developing a school library website with the implementation of the RAD method, it can be concluded that this method is useful for developing information systems in libraries. After reviewing all the results of the articles that have been analyzed, it is found that the Rapid Application Development method tends to focus on user needs for the system to be built. By being oriented to user needs, a system will be more adapted to user circumstances to make the quality of library information systems better than before.

C. Conclusion

Information systems in libraries have proven to provide significant benefits because they can encourage effectiveness and increase efficiency in library management. Information systems have a very important role for libraries because they can facilitate the library management process. Utilization of library information systems can provide quality services and information. Thus, the utilization of library information systems can provide benefits for librarians or users.

The Rapid Application Development (RAD) method in software development has advantages in time efficiency and resource use when entering the design, development, and completion stages of the application model. These advantages allow this method to optimize time management in projects that have specific time constraints. This approach actively involves users which can result in better adaptation to user needs and preferences. In addition, the integration process also takes place more quickly and efficiently.

The application of the Rapid Application Development (RAD) method to school library information systems can accelerate the software development period and be able to accommodate user

needs through its iteration phase. This can happen because of the optimization of hard work and focus between librarians, resulting in better services every time. The results of this optimization can be studied in the context of the Quality Total Management strategy because there is a trilogy of Quality Planning, Quality Control, and Quality Improvement.

The application of the Rapid Application Development (RAD) method to library information systems can accelerate the software development period and be able to accommodate user needs through its iteration phase. This method also does not require large costs in its development so it is suitable for school libraries of all levels from elementary to high school which have minimal costs. Therefore, the Rapid Application Development (RAD) method can be an option for librarians to improve the quality of library information systems.

Research on literature review on the topic of information systems in libraries is still rarely researched. The author hopes that in the future there will be more research that discusses the topic of library information system software development, especially regarding the implementation of the Rapid Application Development (RAD) method.

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