International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Web-Based Software Development as Information Media and Digital Bulletin to Improve the Quality of Educational Services

Widya Febrianti, Ririn, Fany Ayu Hasanah, Adriel Malvin, Berliana Denita, Widiatry

[1,2,3,4,5,6]Informatics Engineering Study Program, University of Palangka Raya

Corresponding Author:widiatry@it.upr.ac.id

Abstract

The rapid and transparent delivery of information is a key pillar in improving the quality of education in schools. However, there are currently significant limitations in the process of distributing information from schools to parents or guardians. Furthermore, the lack of an official forum for collecting suggestions and criticism from parents/guardians hinders schools in continuously evaluating and improving educational services. This research aims to develop a digital platform that integrates a school information center with a digital bulletin feature as a forum for aspirations. This software development was carried out usingThe prototype method encompasses the stages of requirements analysis, system modeling, system design, and functionality testing. This method allows for ongoing interaction between developers and stakeholders to ensure the digital bulletin features meet field needs. This research is expected to improve the quality of school information distribution and strengthen synergy between the institution and parents.

Keywords: Digital Bulletin, School Information, Aspiration Platform, Software Engineering, Prototype.

INTRODUCTION

The digital transformation in education over the past two to three years has encouraged schools to strengthen information governance, expand communication access, and increase transparency of services to stakeholders. In this context, web-based platforms are no longer understood simply as publication media, but rather as service infrastructure that enables the rapid distribution of information, documented, and easily accessible to parents, teachers, and

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

the school community. Several studies have shown that digital school services can improve family connectivity with educational institutions, increase parental trust, and expand participation in the educational process, especially when face-to-face communication is often inadequate (Frontiers in Education, 2025; How Digital Resources Help Parents Stay Connected to Schools, 2026). Furthermore, the development of web-based information systems has also been reported to improve data management efficiency and facilitate more structured access to academic information (Website-Based Student Learning Outcomes Information System, 2024; Web-Based Academic Information System Application, 2022).

More specifically, the issue of school-parent communication remains a pressing issue in many educational institutions, particularly elementary and secondary schools, which lack formal, two-way communication channels. This often results in information about school policies, activity agendas, and institutional developments being conveyed fragmentarily, creating a communication gap and reducing the quality of interactions between schools and families. Studies on school-family communication indicate that the effectiveness of this relationship influences parental engagement and perceptions of educational services, while the appropriate use of digital services can compensate for barriers to conventional communication (Frontiers in Education, 2025; How Digital Resources Help Parents Stay Connected to Schools, 2026). In the Indonesian context, the need for web-based school information systems is also growing, along with increasing demands for transparency and easy access to public information in educational settings (Suryadicka et al., 2025; Firmansyah, 2024).

To date, previous research has focused on designing website-based school information systems for publishing profiles, news, announcements, and academic information. Firmansyah (2024) developed a school information system using a waterfall approach using CodeIgniter, while Suryadicka et al. (2025) designed a similar system at the kindergarten level using CodeIgniter 3 and MySQL to facilitate the dissemination of school information. Other studies have also shown that website-based school digitization can strengthen the provision of institutional information and support more structured school communication governance (Fitria et al., 2021; Adu et al., 2023). Meanwhile, prototype-based research such as that conducted by Pradini and Rikatsih (2023) and Kustanto et al. (2025) confirms that the prototype approach is effective when the system is developed iteratively with users, as it can more quickly and adaptively capture field needs.

However, most previous studies still tend to position school websites as one-way information channels, rather than as participatory spaces that allow parents or guardians to directly convey aspirations, criticism, and feedback. Furthermore, some studies are limited to

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

conveying school profiles and academic information without integrating documented feedback features, thus underutilizing the website's potential as a means of evaluating educational services. Studies on school-family communication also indicate that the quality of digital interactions is determined not only by platform availability but also by the relevance of features, ease of access, and the institution's responsiveness to user input (Frontiers in Education, 2025; How Digital Resources Help Parents Stay Connected to Schools, 2026). Thus, there remains a gap between schools' need for transparent information and parents' need for official, measurable, and sustainable channels for aspiration.

Based on this gap, this research explicitly leads to the development of web-based software that not only functions as a school information center, but also as a digital bulletin to accommodate user aspirations in a structured manner. The problem of this research lies in the lack of integrated two-way communication mechanisms in most existing school information systems, particularly at the level of bulletin feature implementation, input validation, and user interaction management. Therefore, this research positions the design of an interactive digital platform as a response to the real needs of schools for more transparent, responsive, and participatory information services, as well as a contribution to expanding the scope of the function of school websites from merely a publication medium to a medium for evaluating educational services.

Based on this urgency, this study aims to develop web-based software that integrates school information with digital bulletins using the Prototype method so that features can be iteratively validated according to user needs. The novelty of this research lies in the combination of two main functions in one system, namely the dissemination of institutional information and the provision of a documented forum for aspirations, so that its scientific contribution is not only in the software engineering aspect, but also in strengthening the school-parent communication model in the context of digital education services. Practically, the results of this study are expected to help schools improve information transparency, accelerate feedback, and strengthen the quality of education services; while theoretically, this research enriches the study on the application of the Prototype method in the development of educational information systems oriented towards user participation.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

LITERATURE REVIEW

Previous Research

Table 1. Previous Research

No	Writer	Title	Method	Explanation
1	David Firmansyah, Suharsono [2024]	Website-Based Information System Design for State Senior High School 1 (SMAN 1) Suhaid Using the Waterfall Method	*Waterfall*	Web-based school information system using the Waterfall method and CodeIgniter framework.
2	Farhan Suryadicka, Hari Aspriyono, Abdussalam Al Akbar [2025]	Design of a web-based school information system at Aisyiyah Bustanul Athfal 1 Kindergarten, Bengkulu	*Waterfall*	Web-based school information system using Codeigniter 3 framework and MySQL database
3	Cemy Nur Fitria, Hardika Dwi Hermawan, Ika Candra Sayekti, Karunia Dwi Selfia, Adilah Azra, Ipin Prasojo [2021]	Development of Website-Based School Digitalization in the Global Computing Era at Muhammadiyah Middle School	*Waterfall*	WordPress and Niagahoster based website development
4	Enga Prinda Adu, Cokorda Pramartha, and LAAR Putri [2023]	Design of a Website-Based School Information Management System	*Waterfall*	Interactive digital solutions to overcome the limitations of manual information delivery and improve the competence and quality of institutions
5	Faurika, Risqy Siwi Pradini,	Design of a School Information System	*Prototype*	Design of a school information system prototype for MTs Darul

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

	Nindynar Rikatsih [2023]	Prototype at MTS Darul Manja		Manja using the User Centered Design (UCD) method
6	Prio Kustanto, Bram Khalil Ramadhan, Achmad Noe'man [2025]	Application of Prototype Method in Designing Interactive Learning Media	*Prototype*	Interactive learning media for computer programming using the prototype method

METHOD

The method used in this research is the Prototype development method, as can be seen in the following image.

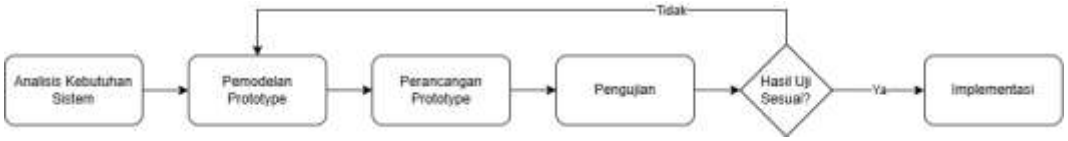


Figure 1. Prototype Method

System Requirements Analysis

At this stage, the author gathered information related to the system requirements list, divided into functional and non-functional requirements. Functional requirements encompass features such as school information management and digital newsletters. Non-functional requirements encompass aspects of ease of use and system performance.

Prototype Modeling

In this design stage, the author describes how the system will be built, from its structure to its process flow. Modeling includes creating diagrams such as use case diagrams to illustrate user interactions with the system, and activity diagrams to show the process flow within the system.

Prototype Design

At this design stage, the system interface is designed to suit functional, non-functional and modeling needs so that the website can be easily accessed by users.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

Testing

This testing phase is conducted to ensure that no errors occur in the system. Testing is conducted using functional testing methods (black box testing), which involves verifying whether each function in the system operates properly according to the expected inputs and outputs.

Implementation

The implementation stage is the final stage after ensuring that the designed prototype meets the desired standards.

RESULTS AND DISCUSSION

System Requirements Analysis

1. Functional Requirements
   a. Presentation of School Profile Information

      The system must be able to display complete school profile information, such as the vision, mission, and general description of the school, so that it can be understood by users.
   b. Presentation of News and Announcements

      The system must provide information in the form of the latest news and announcements related to school activities so that it can be easily accessed by users.
   c. Presentation of Extracurricular Activities Information

      The system must display a list of extracurricular activities along with supporting information, so that users can find out what activities are available at the school.
   d. Bulletin Features

      The system must provide facilities for users to convey opinions, suggestions, or responses regarding the school through the available bulletin feature.
   e. Website Page Navigation

      The system should provide a clear and structured navigation menu so that users can easily move between pages as needed.
   f. Input Validation in the Bulletin Feature

      The system must be able to check the data entered by the user, such as rejecting the sending of empty messages and displaying error notifications.
2. Non-Functional Needs
   a. *Usability*(Ease of Use)

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

The system should be designed with a simple, structured, and user-friendly interface. Navigation within the system should be clear so users can access available features without difficulty.

b. *Performance*(System Performance)

The system must be able to respond quickly to every user request, such as opening a page or accessing the Bulletin Form. Furthermore, the system is expected to remain functional even when accessed by multiple users simultaneously.

c. *Reliability*(System Reliability)

The system must be able to operate stably and consistently without experiencing frequent disruptions or errors.

Prototype Modeling

The Web system is designed to facilitate interaction between a single primary actor, utilizing various features available on the institution's platform. General users have the functional ability to access comprehensive school profile information. In addition to informative features, the system also provides interactive channels for users to actively participate in the institution's development through features like:Bulletin.

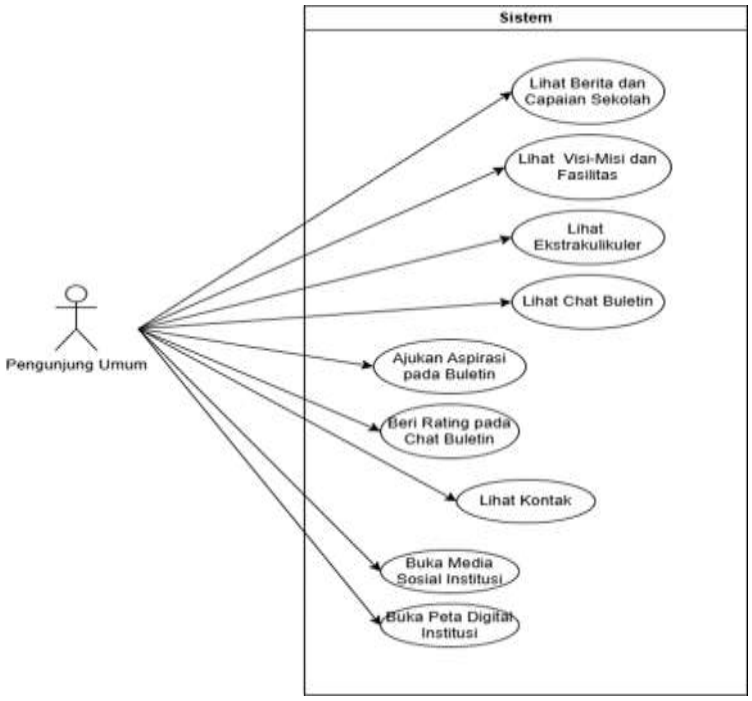


Figure 2. Use Case Diagram.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

As can be seen in Figure 3. Activity Diagram, the system workflow involves interaction between the User (in this case the General User) and the Web System. Once on the main page, users can select a menu that will direct the system to four main information flows, namely the Profile Page containing the vision and mission, workforce, and facilities. The Extracurricular Page that presents the activity schedule. The Bulletin Page that includes a content display and opinion form. And the Contact Page that displays the agency's contact details. Specifically in the bulletin section, users have the ability to interact actively by providing opinions or criticism through the Bulletin form feature. This entire activity is cyclical, where after accessing certain information, users are given the option to return to another menu or end the interaction.

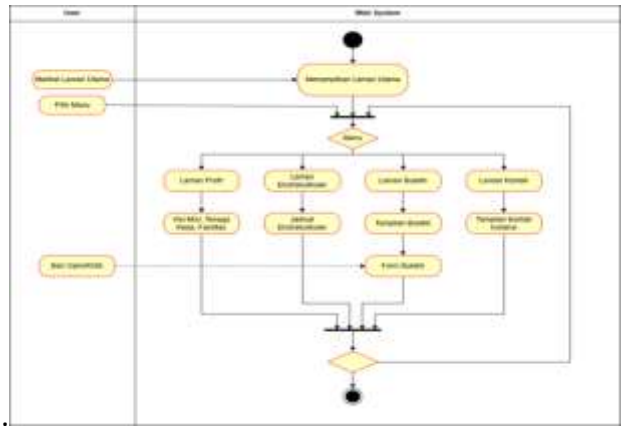


Figure 3. *Activity*Diagram.

Prototype Design

1. Home Page (Main Page)

   The Home page is the first page visitors see. It displays a brief history, news, and achievements of the school. It's designed to provide visitors with easy access to the latest information from the school.



Figure 4. Home Page.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

2. Profile Page

The second feature designed is the Profile. This page displays information such as the Vision and Mission, the number of teaching staff and students, and the school's facilities.



Figure 5. Profile Page

3. Extracurricular Page

The Extracurricular page displays information about the extracurricular activities offered by the school to develop students' talents and interests. It also displays the schedule for these extracurricular activities.



Figure 6.Extracurricular Page.

4. Bulletin Page

This Bulletin page is a feature that serves as a forum for student input and feedback. It will accommodate any criticism and suggestions submitted by parents or guardians.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

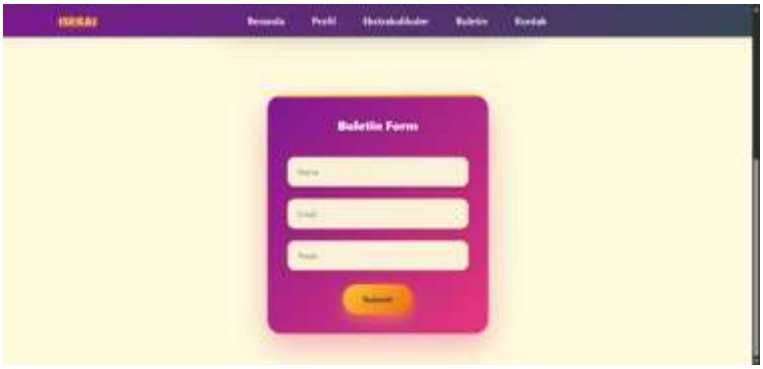


Figure 7. Bulletin Page

5. Contact Page

The final feature is Contact, which displays a number of pieces of information in the form of addresses, mobile phone numbers, digital maps, and school social media that can be accessed by website users.

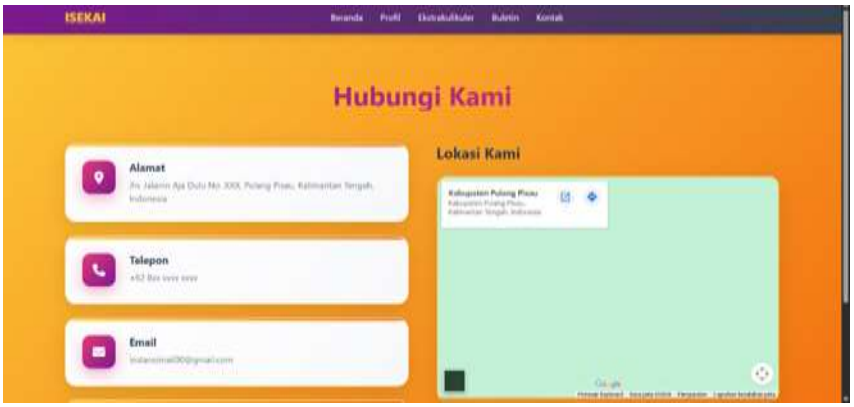


Figure 8. Contact Page

Prototype Testing

Table 2.*Black Box Testing*

Test Case	**Testing Scenario**	***Input***	***Output*****which are expected**	**Results**
TC-1	Provide opinions on bulletins with complete input data	Name: “Widya” Email: “widyxx@gmail.com" Message: “hello everyone”	Show chat Bulletin name “Widya”, email “widyxx@gmail.com" with the message "hello everyone"	Succeed

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

TC-2	Provide an opinion on a bulletin with one blank input data	Name: “Widya” Email: ... Message: “hello everyone”	The system displays a warning message to fill in the entire form.	Succeed
TC-3	Provide an opinion on a bulletin with one numeric input data	Name: “234” Email: “widyxx@gmail.com" Message: “hello everyone”	The system displays a warning message to fill in the name form with the alphabet.	Not successful
TC-4	Provide opinions on newsletters with emails without the '@' symbol.	Name: “234” Email: “widyxxgmail.com" Message: “hello everyone”	The system displays a warning message to fill in the email form with the correct characters.	Not successful
TC-5	Deleting Bulletin chat	Click the delete button	*Chat*the sent message was successfully deleted	Succeed
TC-6	Rate the Bulletin chat	Click the rate feature in the chat	*Chat*load user-given ratings	Not successful
TC-7	Open agency maps	Click Maps on the Contact page	The system switches to Google Maps	Succeed
TC-8	Switching from website to Agency Social Media	Click the Youtube button on the Contact page	System switches to Youtube	Succeed

The test results for TC-3, TC-4, and TC-6 indicate that the system is unable to produce output that meets expectations. The failures in TC-3 and TC-4 were due to the lack of input validation, which prevented the system from restricting the use of non-alphabetical characters in the name field and from verifying the user's email address format. Meanwhile, the failure in TC-6 occurred because the system prototype had not been integrated with the database, preventing the rating feature from displaying any data.

CONCLUSION

Researchers concluded that the development of this software successfully provided a digital solution that integrates the school information center with a bulletin feature as a forum for aspirations for parents and guardians of students. Through the application of the prototype

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

method, functional and non-functional requirements can be mapped in a structured manner, resulting in a responsive and easy-to-use interface. Although the results of black box testing showed that most of the main features functioned well, there were still several technical deficiencies such as the lack of input validation in the name and email columns and the rating feature that was not connected to the database. Overall, this platform has proven capable of digitizing the process of delivering information that was previously manual to be more transparent and interactive..

REFERENCES

Adu, EP, & Pramartha, C. (2023). INFORMATION MANAGEMENT SYSTEM DESIGN. 1(November 2022), 583–590.

Firmansyah, D. (2024). Website-Based Information System Design for Suhaid State Senior High School 1 (SMAN 1) Using the Waterfall Method. 1(Sman 1), 39–47.

Fitria, CN, Hermawan, HD, Sayekti, IC, & Selfia, KD (2021). Development of Website-Based School Digitalization in the Global Computing Era at Muhammadiyah Junior High School. 3(1), 1–10. https://doi.org/10.23917/bkkndik.v3i1.14665

Kustanto, P., Ramadhan, BK, & Noe, A. (2025). Application of the Prototype Method in the Design of Interactive Learning Media. 5(1), 83–94.

Paksi, AB, Hafidhoh, N., & Bimonugroho, SK (2023). Comparison of Software Development Models for Vocational Program Final Projects. 14(1), 70–79.

Suryadicka, F., Aspriyono, H., & Akbar, A. Al. (2025). IT-EXPLORE Design of a web-based school information system at Aisyiyah Bustanul Athfal 1 Kindergarten, Bengkulu. 04(32), 65–81. https://doi.org/10.24246/itexplore.v4i1.2025.pp65-81

Pradini, RS, & Rikatsih, N. (2023). DESIGN OF SCHOOL INFORMATION SYSTEM PROTOTYPE IN MTS. 7(4), 423–430.

Kustanto, P., Ramadhan, BK, & Noe, A. (2025). Application of the Prototype Method in the Design of Interactive Learning Media. 5(1), 83–94.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.