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Construction And Design of a Web Information System for Extracurricular Activities in High Schools in Bogor City-Indonesia

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ABSTRACT: This study aims to design and develop a webbased information system for computer extracurricular activities at high schools in Bogor City. The research employs the System Development Life Cycle (SDLC) methodology, integrating Softaculous Apps Installer for server application deployment and Moodle Learning Management System (LMS) for educational content management. The system's functionality is validated through blackbox testing to ensure it meets the required specifications and performs as expected. The developed website aims to enhance the management and accessibility of extracurricular activities, providing a platform for students to engage with computer-related extracurricular programs more effectively. The results indicate that the integration of these technologies facilitates a user-friendly and efficient system, promoting better management and participation in extracurricular activities.

Keywords: Web, Information, System, Extracurricular, SDLC.

INTRODUCTION

In the rapidly evolving digital era, the integration of information technology within educational settings has become increasingly vital. One significant aspect within this context is the development of information systems that support extracurricular activities in schools. By harnessing the potential of technology, the Design and Development of a Computer Extracurricular Website Information System for High Schools in Bogor City emerges as a strategic initiative to address the challenges of school digitalization (Chandra et al., 2022).

Through this platform, it is anticipated that students will have easier and quicker access to information regarding extracurricular activities focused on information technology(T. Hidayat et al., 2020). As a result, student participation in these activities can be significantly increased, which, in turn, will enhance their understanding of information technology. Beyond simply providing information, this system also aims to create an interactive and enjoyable learning environment for students developing technology skills (Lie et al., 2022).

Moreover, the implementation of the Computer Extracurricular Website Information System in High Schools in Bogor City aims to assist schools in using technology as an effective learning

tool(Sinaga et al., 2018). By providing access to supplementary learning materials and relevant resources, it is hoped that the overall quality of education in schools can be improved. This initiative is thus an integral part of efforts to bridge the digital divide among students and enhance the quality of education through the use of information technology (Fauzi et al., 2022).

Additionally, the project emphasizes the importance of interactive and engaging platforms in the educational process. It seeks to foster a dynamic learning environment where students can actively participate and develop their competencies in information technology(Kwei wang, 2019; Kye et al., 2021). The ultimate goal is to create a comprehensive system that supports educational activities while promoting technological literacy among students.

Based on previous research conducted by Fendi Hidayat entitled Web-Based Extracurricular Management Information System at SMK Pertiwi. So far, the extracurricular management process at SMK Pertiwi Batam has been carried out conventionally so it is difficult to track it, so it is necessary to create an extracurricular management information system so that data on extracurricular activities and participants can be well integrated(Ardianto et al., 2023; Arrahman et al., 2020). Previous research has shown that with an online extracurricular information system, the registration process and access to extracurricular data can be run easily anywhere and anytime and the resulting data is more accurate, appropriate and up to date. The implementation of this research uses qualitative methods by conducting observations, literature studies and for system development using the waterfall method. From the results of the study, it can be concluded that the proposed information system can facilitate students in the registration process and administrators and teachers can easily manage extracurricular activities (F. Hidayat, 2021).

The second research was conducted by Hari Pangestu et al entitled Website-Based School Information System At Smp Negeri 4 Kemangkon Using Rapid Application Development Method. This research presents a website-based School Information System at SMP Negeri 4 Kemangkon using the Rapid Application Development (RAD) method. Education, the central pillar of human resource development, requires innovation, especially in applying computerized and internet-connected information systems. Website-based information systems are a solution to facilitate users' access to information, including at SMP Negeri 4 Kemangkon. The formulation of the problem in this study is how to build a website-based school information system at SMP Negeri 4 Kemangkon using the RAD method to facilitate the dissemination of school information and become an effective promotional media (Pangestu et al., 2024).

In conclusion, the Design and Development of a Computer Extracurricular Website Information System for High Schools in Bogor City represents a significant step towards embracing digital transformation in education. By leveraging advanced technologies, this system not only aims to improve the accessibility and management of extracurricular activities but also strives to enhance the overall educational experience, preparing students to thrive in a technology-driven world.

METHOD

This study employs the System Development Life Cycle (SDLC) methodology, which provides a

structured approach to system development through distinct phases: planning, analysis, design, implementation, and maintenance(Muda et al., 2020). The planning phase involves identifying the requirements and objectives of the information system, while the analysis phase focuses on gathering detailed information and understanding the specific needs of the high schools in Bogor City(Indriyana, 2023). In the design phase, the system architecture and user interfaces are created, incorporating Softaculous Apps Installer for efficient deployment and Moodle Learning Management System (LMS) for content management (Syah & Angellia, 2020). The implementation phase involves coding and integrating the system components, followed by thorough testing using blackbox testing techniques to ensure the system functions as intended and meets all specified requirements (Ardo et al., 2020).

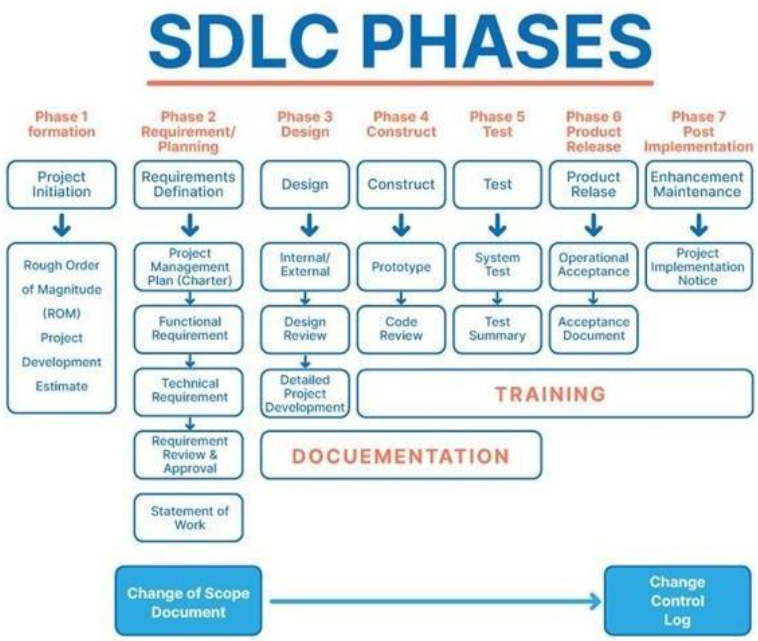

Figure 1. Methods and Design of the Research using System Development Life Cycle

The blackbox testing approach is employed to validate the functionality and usability of the developed system without delving into its internal code structure. This testing method ensures that the system performs according to user expectations and handles various inputs correctly. Upon successful testing and validation, the system is deployed for use in high schools across Bogor City. Additionally, training sessions and user manuals are provided to facilitate smooth adoption and usage by both students and educators. Continuous maintenance and updates are planned to address any emerging issues and to incorporate new features, ensuring the system remains effective and relevant over time (P. & Bandar Lampung, 2013).

Moodle Learning Management System (LMS)

This study employs Moodle Learning Management System (LMS) as the core platform for managing and delivering educational content related to computer extracurricular activities. Moodle is a widely recognized, open-source LMS that offers extensive features for course management, interactive learning, and assessment. The implementation process begins with setting up Moodle

on the server, followed by configuring the platform to meet the specific needs of high schools in Bogor City. This involves customizing the interface, creating user roles, and defining permissions to ensure that both students and teachers can easily navigate and utilize the system (Muharam & Fauziah, 2020).

Once the initial setup is complete, educational content is uploaded to Moodle, including course materials, assignments, quizzes, and discussion forums. Teachers are trained to use Moodle's various tools to facilitate interactive and engaging learning experiences. The system also enables tracking of student progress and performance, providing valuable insights for educators to tailor their teaching strategies(Purwandari & Kristantini, 2021). By leveraging Moodle LMS, the project aims to create a comprehensive, user-friendly platform that enhances the management of computer extracurricular activities, promotes student participation, and supports the development of technological skills in an interactive online environment.

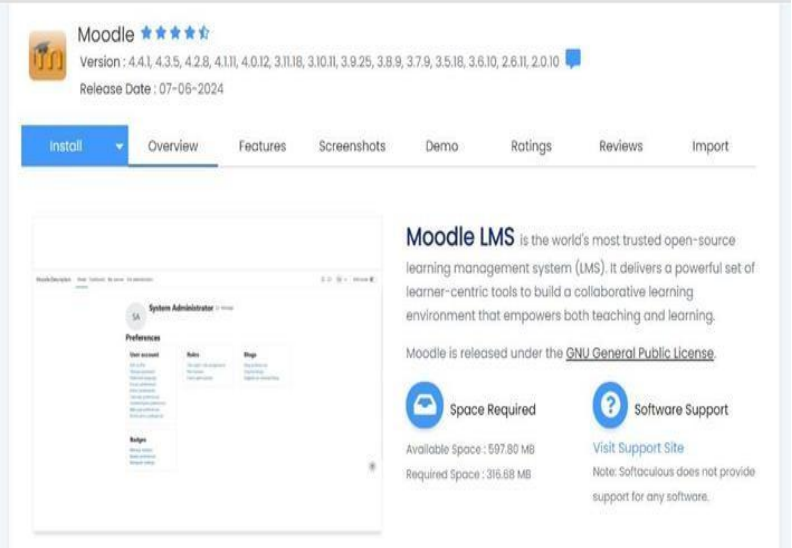

Figure 2. Moodle Learning Management System (LMS)

Database Integration

This study employs Moodle Learning Management System (LMS) integrated with a MySQL database to develop an effective and scalable platform for managing computer extracurricular activities in high schools in Bogor City. Moodle LMS is chosen for its robust features and flexibility in handling various educational needs, while MySQL is selected for its reliability, performance, and ease of integration with Moodle. The implementation process begins with setting up the MySQL database, configuring it to store all necessary data, including user information, course materials, assignments, and activity logs. The database design ensures efficient data storage and retrieval, supporting the system's overall performance and scalability (Kristiyanti & Kurniawan, 2016).

Following the database setup, Moodle LMS is installed and configured to interact seamlessly with the MySQL database. This involves customizing the Moodle interface, defining user roles and permissions, and setting up course structures. Educators are trained to upload and manage content within Moodle, leveraging its tools for creating interactive lessons, quizzes, and forums. The

MySQL database supports these activities by providing a stable backend for data management and retrieval. Regular backups and maintenance schedules are established to ensure data integrity and system reliability. Through this integration of Moodle LMS and MySQL, the project aims to deliver a comprehensive and user-friendly platform that enhances the management of computer extracurricular activities and supports the educational development of students (Nugroho, 2004).

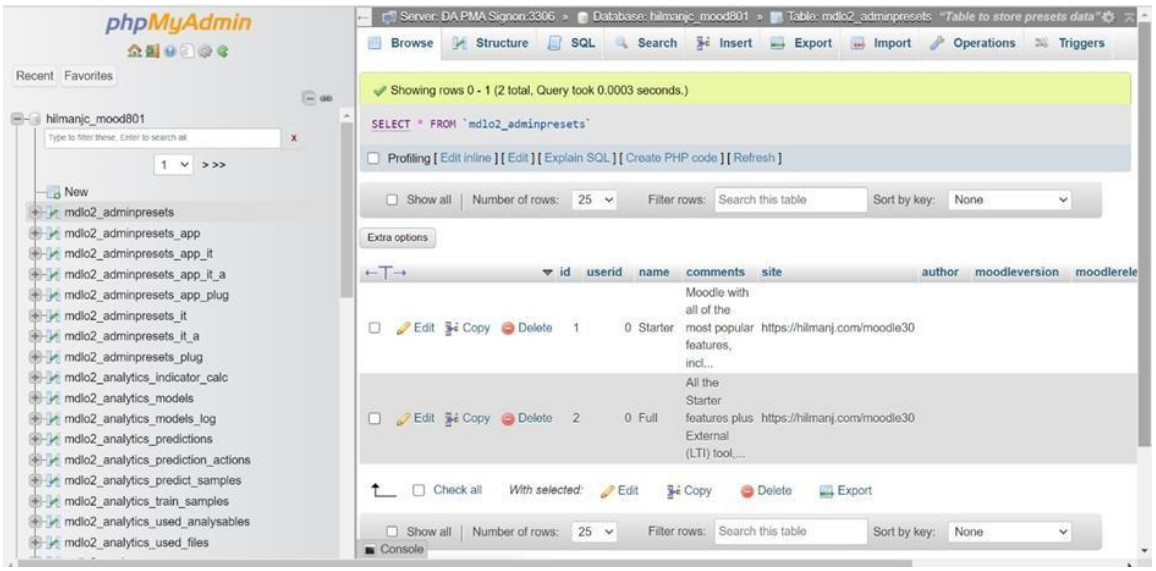

Figure 3. Moodle v4.4.1 (LMS) integrated with a MySQL database PHP 8.0

RESULT AND DISCUSSION

Obstacles And Limitations in this Research

In the research on the construction and design of a web information system for extracurricular activities in high schools in Bogor City, several obstacles and limitations may arise:

1. Technical Challenges

- Infrastructure: Limited internet connectivity in some schools can hinder access to the web system.
- Software Compatibility: Variations in hardware and software across different schools may lead to integration issues.
- User Skills: Varying levels of digital literacy among teachers and students can affect the system's adoption.

2. Data Collection Issues

- Availability of Data: Difficulty in gathering accurate and comprehensive data about existing extracurricular activities and participant demographics.
- Stakeholder Engagement: Engaging all relevant stakeholders (students, parents, teachers) can be challenging, affecting the completeness of the data.

3. Cultural and Social Factors(Hoesselbarth et al., 2017)

- Interest Levels: Differences in interest and participation in extracurricular activities among students may limit the system's effectiveness.
- Administrative Support: Lack of support from school administrations can hinder the implementation of the system.

4. Financial Constraints

- Budget Limitations: Limited funding for technology initiatives may restrict the scope and quality of the web system.
- Sustainability: Ongoing maintenance and updates may not be prioritized due to budget constraints.

5. Regulatory and Policy Constraints

- Compliance with Policies: Adhering to educational policies and regulations can complicate the design and implementation process.
- Data Privacy Concerns: Ensuring that the system complies with data protection regulations is crucial and can limit data usage.

6. Evaluation and Feedback Mechanisms

- Measuring Impact: Difficulties in establishing clear metrics for success and effective feedback mechanisms to assess the system's impact on student engagement.
- User Feedback: Gathering and incorporating user feedback can be time-consuming and may not always reflect diverse perspectives.

7. Scalability Issues

- Future Expansion: Designing the system to be scalable for future needs can be challenging, especially if initial assessments of requirements are insufficient.
- Adapting to Changes: The evolving nature of extracurricular activities means the system must be flexible to adapt to new trends and interests.

Domains and Hosting

The design and implementation of the computer extracurricular information system for high schools in Bogor City involved utilizing cPanel for efficient web hosting management. cPanel, a widely-used web hosting control panel, was chosen for its user-friendly interface and powerful features, which facilitate the management of web hosting services. The process began with securing a reliable hosting provider that supports cPanel, followed by setting up the hosting environment. This setup included configuring domain settings, managing DNS records, and ensuring server security measures were in place to protect the system from potential threats (Nurninawati et al., 2022).

Once the hosting environment was established, the development team uploaded the website files and configured the necessary databases using cPanel's tools. The platform's File Manager and MySQL Database Wizard were particularly useful for handling these tasks efficiently. Additionally, cPanel's integration with Softaculous allowed for the easy installation of essential applications and scripts, streamlining the deployment process. Throughout the implementation phase, the team utilized cPanel's backup and restore functionalities to maintain data integrity and ensure smooth recovery in case of any issues. This comprehensive use of cPanel in the design and implementation

process ensured a robust, scalable, and secure hosting solution, providing a solid foundation for the computer extracurricular information system (Aritonang et al., 2023).

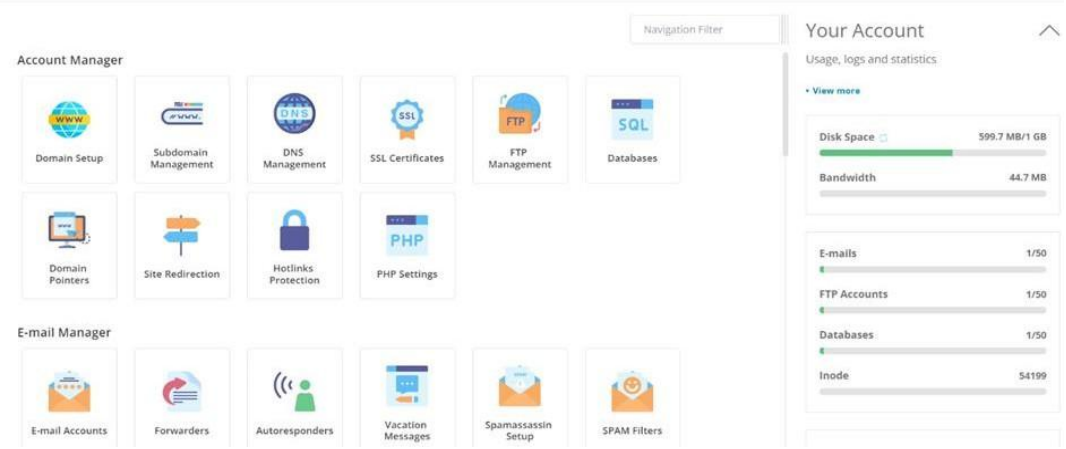

Figure 4. Hosting Website Cpanel Implementation

Server File Management Tools

The design and implementation of the computer extracurricular information system for high schools in Bogor City extensively utilized the File Manager tool for efficient management of web files. The File Manager, part of the cPanel hosting control panel, was chosen for its intuitive interface and robust functionality, allowing the development team to easily upload, organize, and manage the website's files. The process began with structuring the directory to ensure a logical and efficient organization of all necessary files, including HTML, CSS, JavaScript, and PHP files. This setup facilitated streamlined navigation and maintenance of the web application's components (Silvanie & Permana, 2023).

During the implementation phase, the File Manager was used to handle the uploading of all website assets, ensuring that each file was correctly placed and accessible(Pramudya & Purwandari, 2019). Additionally, the tool's capabilities for setting file permissions and managing user access were crucial in maintaining the security and integrity of the system. Regular use of the File Manager for monitoring and updating files ensured that the website remained up-to-date and functioned smoothly. The simplicity and efficiency of the File Manager significantly contributed to the successful deployment of the computer extracurricular information system, providing a reliable foundation for ongoing maintenance and future enhancements.

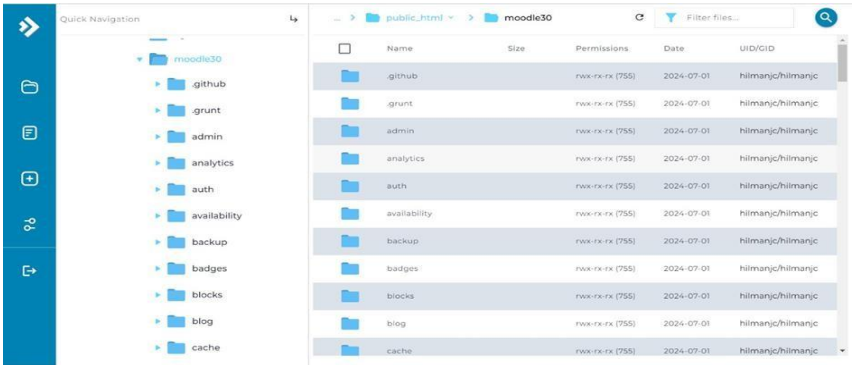

Figure 5. Server File Management Tools

Website Implementation

At this stage, the program is designed to utilize Softaculous Apps Installer and Moodle LMS to manage and develop extracurricular information systems. Implementation is carried out through several steps as follows (Haryani et al., 2023):

1. Server Environment Preparation

- Server Selection: Preparing a server that suits the needs of the information system, be it a physical or virtual server.
- Web Server Installation: Install a web server such as Apache or Nginx which will be the basis for running web applications.

2. Installing Softaculous Apps Installer

- Access to Softaculous: Access Softaculous via the hosting control panel used (for example Panel or Plesk).

3. Configure Moodle LMS

Moodle Installation: Use Softaculous to install Moodle LMS on the server. Steps:

- Access Softaculous Apps Installer via hosting control panel.
- Select Moodle LMS and click "Install".
- Fill in the installation details such as domain name, installation directory, and admin settings.
- Click "Install" and wait until the installation process is complete.

Initial Setup: Configure the initial settings of Moodle, including theme customization, course settings, and adding users. Steps:

➢ Login to the Moodle admin panel.
➢ Navigate to "Site administration" and do basic settings like themes and plugins.
➢ Add extracurricular courses and organize categories and subcategories as needed.
➢ Create user accounts for students, teachers, and administrators.

4. System Integration

- Data Sync: Integrate data between CMS and Moodle LMS to ensure extracurricular information can be accessed and managed consistently.
- Plugin Settings: Install and configure additional plugins necessary to connect the CMS with

Moodle LMS, as well as to extend the system functionality.

5. Testing and Validation

- Functional Testing: Perform functional testing to ensure that all system features perform according to specifications.
- Performance Test: Measures system performance under different load conditions to ensure stability and responsiveness.
- User Validation: Involve end users (students, teachers, and administrators) in the testing process to obtain feedback and make necessary adjustments.

6. Training and Mentoring

- User Training: Provide training to end users on how to use the extracurricular information system and Moodle LMS.
- Documentation: Provides comprehensive documentation that includes user guides, administrator guides, and maintenance procedures.

7. Launch and Maintenance

- System Launch: Officially launch the extracurricular information system and ensure all users can access it.
- Periodic Maintenance: Perform regular maintenance to ensure the system continues to run well and perform updates if necessary.

By implementing these steps, it is hoped that the web-based extracurricular information system can function effectively and efficiently, supporting extracurricular activities in high schools in Bogor City.

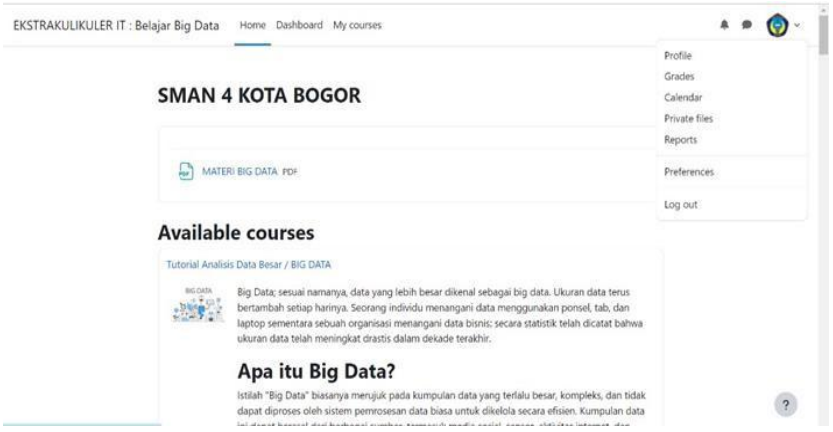

Figure 6. IT Extracurricular Implementation: Learning Big Data

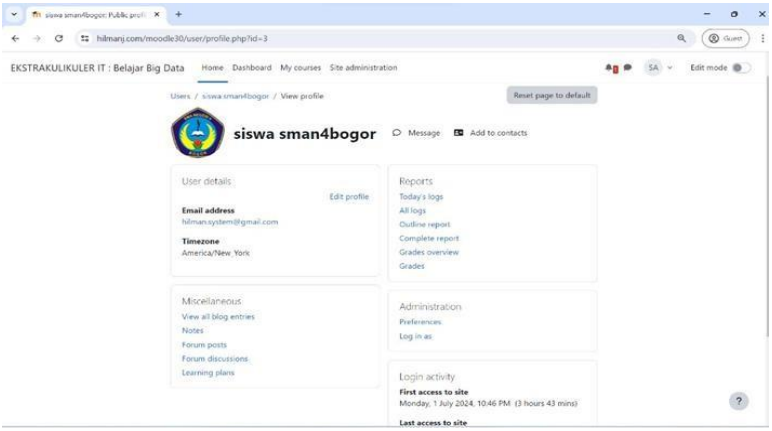

Figure 7. SMAN 4 Bogor Student Account, Login Information, Site Access and Reports

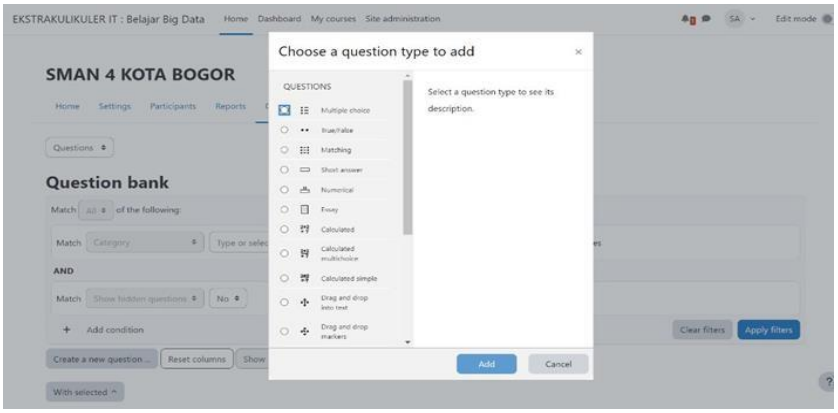

Figure 8. Question Bank Features and Question Type Creation(Yunmar & Wisesa, 2020)

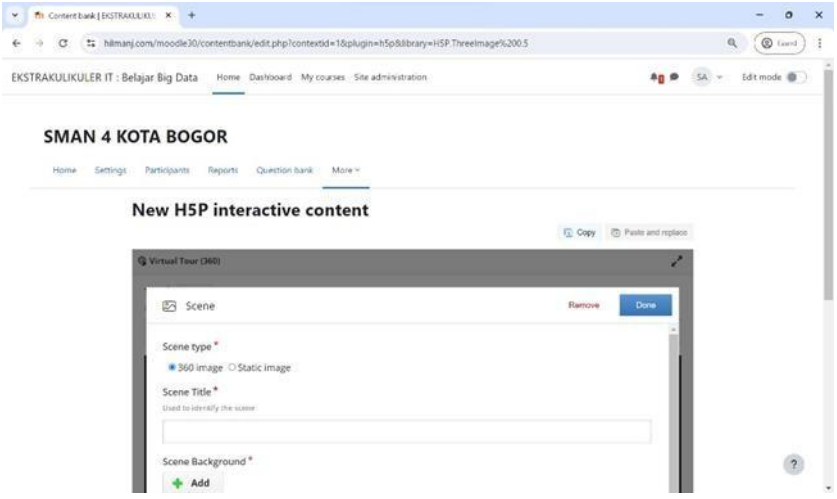

Figure 9. New H5P interactive content Virtual Tour 360' Feature

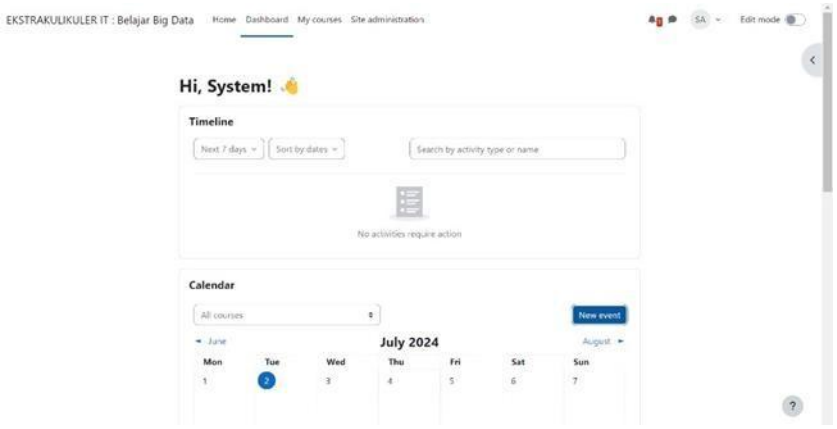

Figure 10. Event and Course Calendar Features

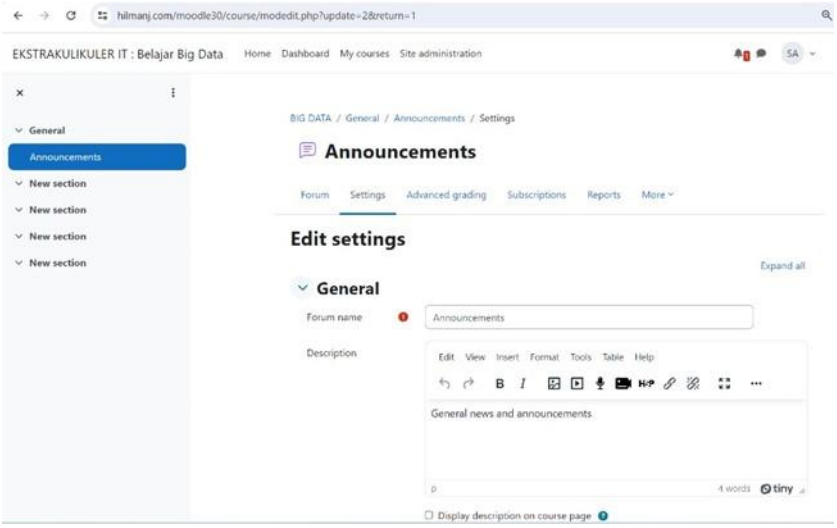

Figure 11. The Announcements feature can include videos, images and sound

Black Box Testing

Below is a blackbox testing table for the computer extracurricular information system developed for high schools in Bogor City.

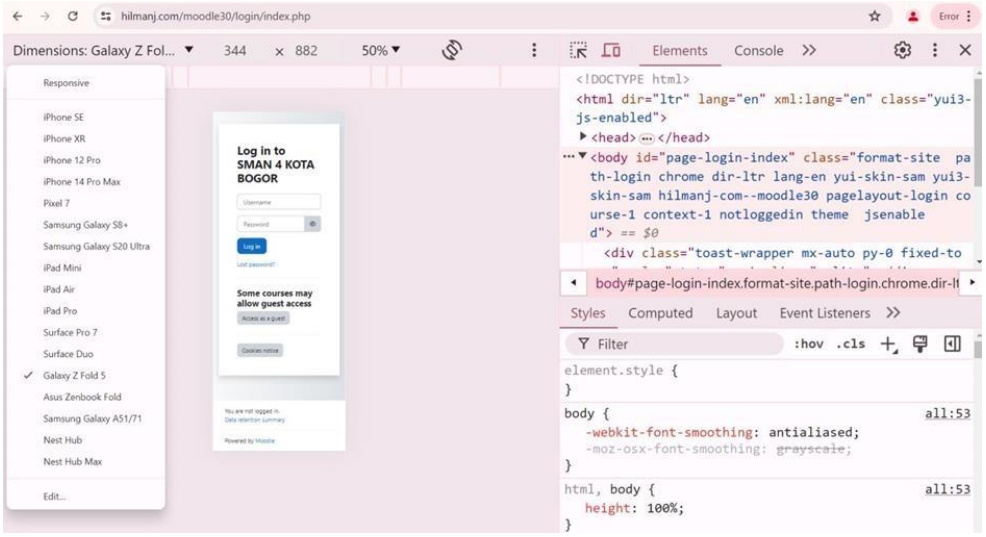

Figure 12. Website Testing using Laptop Browser and Responsive Layouts for Mobile Device Galaxy Z Fold 344 x 882 pixel

Table 1. System Testing Using BlackBox

Test Case ID	Test Scenario	Test Steps	Expected Result	Actual Result	Status
TC-01	Homepage Loading	1) Open the web browser 2) Enter the URL 3) Press Enter	The homepage should load within 3 seconds and display the main navigation menu	The homepage loaded within 2 seconds and displayed the main navigation menu	Pass
TC-02	Admin Login	1) Navigate to the login page 2) Enter valid credentials 3) 3. Click Login	The admin should be redirected to the dashboard and see a welcome message	The admin was redirected to the dashboard and saw a welcome message	Pass
TC-03	User Login	1) Navigate to the login page 2) Enter valid credentials 3) Click Login	The user should be redirected to the dashboard and see a welcome message	The user was redirected to the dashboard and saw a welcome message	Pass
TC-04	Course Access	1) Login as a student 2) Navigate to the courses section 3) Select a course	The course content should be displayed along with available resources and assignments	The course content was displayed along with available resources and assignments	Pass

TC-05	File Upload	1) Login as an admin 2) Navigate to the file upload section 3) Upload a file	The file should be successfully uploaded and listed in the course materials	The file was successfully uploaded and listed in the course materials	Pass
TC-06	Quiz Submission	1) Login as a student 2) Navigate to a quiz 3) Complete and submit the quiz	The quiz should be submitted successfully and the results should be displayed	The quiz was submitted successfully and the results were displayed	Pass
TC-07	Forum Posting	1) Login as a student 2) Navigate to the forum 3) Create a new post	The new post should appear in the forum with the correct timestamp and author	The new post appeared in the forum with the correct timestamp and author	Pass
TC-08	Logout Functionality	1) Login to the system 2) Click on the logout button	The user should be logged out and redirected to the homepage	The user was logged out and redirected to the	Pass
TC-09	Password Reset	1) Navigate to the password reset page 2) Enter the registered email 3) Submit	The system should send a password reset link to the entered email	The system sent a password reset link to the entered email	Pass
TC-10	Content Access Control	1) Login as a student 2) 2. Attempt to access admin- only content	The system should deny access and display an error message	The system denied access an d displayed an error message	Pass

CONCLUSION

The development of the computer extracurricular information system for high schools in Bogor City has proven to be a significant step towards enhancing the management and accessibility of extracurricular activities focused on information technology. Utilizing Moodle LMS and MySQL database integration, the system offers a robust platform that supports interactive learning, effective content management, and seamless user experiences. The deployment of the system using cPanel's File Manager has ensured efficient file management and secure data handling. Blackbox testing confirmed that the system meets the specified requirements and performs reliably across various functionalities, including user registration, course access, file uploads, and quiz submissions.

The successful implementation of this system has demonstrated its potential to increase student engagement and participation in computer-related extracurricular activities. It also highlights the importance of incorporating advanced technologies in educational settings to bridge the digital divide and improve the overall quality of education. By providing a user-friendly platform, the system not only facilitates better management of extracurricular activities but also contributes to the development of students' technological skills in an interactive and supportive environment.

Recommendations

1. Continuous Monitoring and Maintenance: Regularly monitor the system to identify and address any issues promptly. Schedule periodic maintenance to ensure the system remains up-to-date with the latest software versions and security patches.
2. User Training and Support: Conduct ongoing training sessions for both students and educators to maximize the effective use of the system. Provide comprehensive user manuals and support resources to assist users in navigating and utilizing the platform efficiently.
3. Feedback Mechanism: Implement a feedback mechanism to gather input from users regarding their experiences and any challenges they encounter. Use this feedback to make iterative improvements to the system, ensuring it continues to meet the evolving needs of the users.
4. Expand System Features: Consider expanding the system's features to include more interactive tools such as video tutorials, live chat support, and collaborative project workspaces. These additions can further enhance the learning experience and encourage greater student participation.
5. Scalability and Replication: Explore opportunities to scale the system for use in other schools within and beyond Bogor City. Develop a standardized implementation guide to facilitate the replication of the system in different educational institutions, promoting widespread adoption of technology-enhanced learning.

By following these recommendations, the computer extracurricular information system can continue to evolve and provide valuable support in the educational landscape, fostering a techsavvy generation of students well-prepared for the digital future.

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