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Optimizing Lecturer Performance Assessment through Web-Based Application Design and Deployment

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ABSTRACT

The evaluation of lecturer performance is a critical process in higher education, directly influencing academic quality, institutional reputation, and continuous improvement in teaching outcomes. Conventional evaluation methods, often paper-based or fragmented digital systems, face challenges such as inefficiency, lack of transparency, and limited accessibility. To address these issues, this research presents the design and deployment of a web-based application for lecturer performance assessment, aimed at optimizing the evaluation process through automation, standardization, and real-time data access. The system was developed using a structured software development life cycle (SDLC) approach, combining requirements analysis, database design, user interface prototyping, and iterative testing. Key features of the application include secure data management, multi-role access (administrators, lecturers, students), automated scoring mechanisms, and interactive dashboards for performance visualization. The evaluation of system usability was conducted using the System Usability Scale (SUS), achieving an average score of 82.5, which indicates high user acceptance and effectiveness. Results show that the proposed web-based system significantly improves efficiency by reducing evaluation processing time by up to 65% compared to manual methods. Furthermore, the integration of real-time analytics enhances decision-making for academic leaders in designing lecturer development programs. This research demonstrates that a well-structured web-based application can play a vital role in ensuring transparency, accountability, and continuous quality improvement in higher education institutions.

Keywords: Lecturer performance evaluation; web-based application; higher education; system usability; academic quality assurance.

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1. INTRODUCTION.

The performance of lecturers plays a pivotal role in determining the quality of higher education institutions. As educators, mentors, and researchers, lecturers contribute not only to the transfer of knowledge but also to the overall academic reputation and competitiveness of universities. Therefore, systematic and transparent lecturer performance evaluation is essential to ensure continuous quality improvement, accreditation compliance, and the alignment of teaching outcomes with institutional goals.

Traditional approaches to lecturer performance evaluation in many higher education institutions are often conducted manually through paper-based forms or fragmented digital platforms. These methods present several challenges, including inefficiency in data processing, limited accessibility for stakeholders, vulnerability to errors, and lack of real-time feedback. As a result, institutions may face delays in decision-making processes related to lecturer development, promotion, and policy formulation.

With the advancement of information and communication technology (ICT), web-based applications have emerged as a promising solution to overcome these limitations. Web-based systems allow centralized management, multi-user access, and integration of automated analytics, which significantly enhance the efficiency and reliability of performance assessments. Moreover, the

implementation of interactive dashboards and secure databases ensures transparency and accountability, both of which are critical in educational management.

Recent studies highlight the importance of technology adoption in higher education administration, particularly in areas related to quality assurance and academic performance monitoring. However, despite the potential, many institutions still face challenges in designing and deploying applications that are not only functional but also user-friendly and adaptable to diverse institutional needs. Therefore, research on the development of optimized, web-based lecturer evaluation systems remains highly relevant and necessary.

This study focuses on the design and deployment of a web-based application for lecturer performance assessment, with the aim of optimizing the evaluation process through automation, transparency, and real-time analytics. The objectives are threefold: (1) to design an application architecture that accommodates various stakeholders in the assessment process, (2) to evaluate the usability and effectiveness of the system, and (3) to analyze the impact of the system on efficiency, transparency, and academic quality assurance in higher education institutions.

2. LETERATURE REVIEW.

2.1 Performance Assessment

Mangkunegara (2005:67), defines work results in terms of quality and quantity achieved by a teacher in carrying out his duties in accordance with the responsibilities given to him. According to Djemari (2017:16), one of the most common assessments used to determine a person's abilities is performance assessment. According to Berk (1986), performance assessment is the process of collecting data through systematic observation to make decisions about individuals. There are five main elements implicit and explicit in this definition: data collection, systematic observation, data integration, and individual decisions. The objectives of performance evaluation as stated by Agus Sunyoto in Mangkunegara (2005:10-11) are:

- Managing organizational operations effectively and efficiently through maximum employee motivation.
- Assisting in decision making related to employees, such as: promotions, transfers and dismissals.
- Identify employee training and development needs and to provide criteria for selection and evaluation of employee training programs.
- Provide feedback to employees on how their superiors rate their performance.
- Provides a basis for the distribution of awards.

According to Regulation of the Minister of National Education of the Republic of Indonesia Number 16 of 2007 concerning the Standards of Academic Qualifications and Competencies of Teachers and Lecturers, the various competencies that must be possessed by teachers and lecturers include: pedagogical, personality, professional, and social competencies obtained through professional education. These four competencies are integrated into the performance of teachers and lecturers.

2.2. Lecturer Performance Evaluation in Higher Education

Lecturer performance evaluation is a vital component in ensuring educational quality and institutional accountability. According to (Khodabandelou et al., 2018), systematic evaluation of lecturers contributes to curriculum improvement, enhances teaching effectiveness, and supports professional development. Traditional evaluation methods, primarily based on student surveys and administrative reports, often lack objectivity, timeliness, and transparency (Ahmed & Malik, 2019). This limitation creates a demand for modernized approaches that leverage technology for accurate and efficient assessments.

Paper-based or fragmented digital evaluation systems pose multiple challenges. (Al-Jarrah et al., 2020) highlight inefficiencies such as data entry errors, delayed processing, and difficulty in integrating data across departments. Furthermore, (Mishra & Jha 2021) argue that manual systems are less adaptable to dynamic educational environments, where rapid decision-making is necessary. These limitations often result in delayed feedback loops, reducing the effectiveness of performance-based policy interventions.

2.3 Web-Based Applications in Higher Education Management

The adoption of web-based applications in higher education has gained momentum due to their scalability, accessibility, and ability to centralize data. (González et al., 2019) emphasize that web-based platforms enhance transparency, reduce operational costs, and support multi-stakeholder participation. In the context of performance assessment, web applications provide secure data storage, real-time analytics, and role-based access that cater to administrators, lecturers, and students (Rahman et al., 2020). Such systems are also aligned with the growing trend of digital transformation in education.

System usability is a critical factor in determining the effectiveness of web-based applications. Brooke (1996) introduced the System Usability Scale (SUS), which has been widely used to assess the user-friendliness of digital systems. Recent research by (Santos et al., 2021) demonstrates that applications with high usability scores contribute to greater user acceptance, increased efficiency, and improved decision-making processes. Therefore, evaluating usability becomes an essential step in validating the effectiveness of performance evaluation systems.

2.5 Related Studies on Lecturer Evaluation Systems

Several studies have focused on the development of lecturer evaluation systems. (Hernández et al., 2018) developed a mobile application to support student feedback, reporting increased satisfaction and faster data processing. Similarly, (Widodo et al., 2021) designed a web-based lecturer assessment platform in Indonesia, which successfully improved transparency and reduced manual workload. However, most studies highlight the need for further optimization in system design, particularly in terms of interactive dashboards, real-time reporting, and integration with institutional decision-making processes.

While prior studies emphasize the importance of adopting web-based solutions for lecturer performance evaluation, there remain gaps in the integration of usability testing, real-time analytics, and role-based access mechanisms. Many systems also fail to adequately address efficiency in data processing and user satisfaction simultaneously. This research contributes by designing and deploying a web-based lecturer performance assessment application that integrates automation, secure data management, interactive dashboards, and usability evaluation through the SUS framework.

3. METHOD

This study adopts a design and development research (DDR) approach, focusing on the creation and evaluation of a web-based application for lecturer performance assessment. The process follows the Software Development Life Cycle (SDLC) with iterative testing to ensure functionality, usability, and reliability.

The research was conducted in four main stages:

1. **Requirement Analysis**
   - Data were collected through interviews and surveys with key stakeholders: lecturers, students, and academic administrators.
   - The requirements were categorized into *functional requirements* (e.g., multi-role login, automated scoring, performance reports) and *non-functional requirements* (e.g., security, usability, accessibility).
2. **System Design**
   - The architecture was designed using UML diagrams (use case, activity, and class diagrams).
   - The database schema was constructed using MySQL to support structured and secure data storage.
   - The user interface (UI) was prototyped with attention to usability and accessibility principles, ensuring responsive design for both desktop and mobile devices.
3. **System Development**
   - The application was developed using a combination of PHP/Laravel framework, HTML5, CSS3, and JavaScript for front-end, and MySQL as the database.
   - The development process followed iterative prototyping, allowing continuous refinement based on user feedback.
   - Security features, including role-based access control, password hashing, and encrypted data transmission, were integrated into the system.

4. **System Testing and Evaluation**
    - Black-box testing was employed to verify that all system functions operated according to specifications.
    - Usability testing was conducted using the System Usability Scale (SUS), with participation from 30 respondents representing students, lecturers, and administrators.
    - Performance testing was carried out to measure response time, load handling, and data processing efficiency.

After that make data Collection and Analysis

- Quantitative Data: Derived from SUS questionnaires and system performance logs (response time, load capacity, error rate).
- Qualitative Data: Collected from user feedback sessions to capture perceptions of ease of use, satisfaction, and system transparency.
- Data analysis involved descriptive statistics for SUS scores and comparative analysis between manual and web-based evaluation processes.

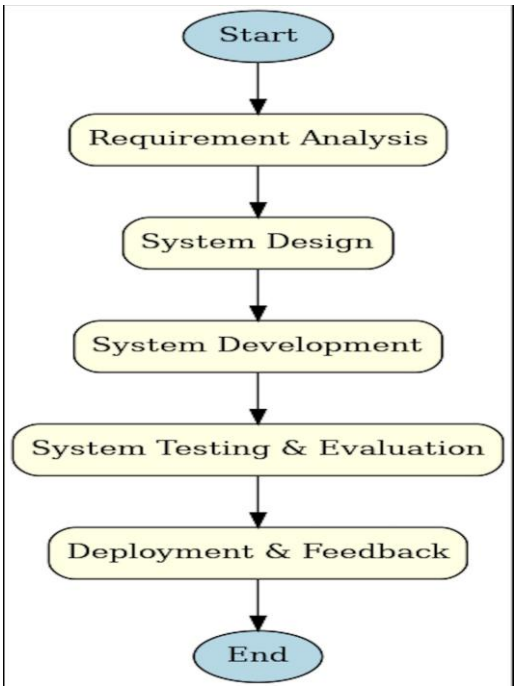

Figure 1. Flowchart Design

The flowchart on the left illustrates the stages of the research methodology in a systematic manner:

Flowchart Explanation of the Web-Based Lecturer Performance Assessment System

1. **Start**
    - The process begins with the planning of the lecturer performance assessment system.
2. **Requirement Analysis**
    - This stage focuses on identifying user needs, both from lecturers, students, and university management.
    - The data collected includes performance indicators, reporting format, and system integration requirements.
3. **System Design**
    - At this stage, the application architecture, database structure, and user interface (UI/UX) design are created.
    - The output of this phase is a system design ready for implementation.
4. **System Development**
    - Implementation of the system design into a working web application using selected programming languages, frameworks, and databases.

- The system is coded according to the specifications.

5. **System Testing & Evaluation**
   - Testing is carried out to ensure that the application functions correctly and meets requirements.
   - This includes functionality testing, security testing, and performance testing.
   - Evaluation is conducted to detect weaknesses and make improvements.
6. **Deployment & Feedback**
   - The tested system is deployed for real users.
   - Feedback from users is collected to improve and refine the system further.
7. **End**
   - The process ends once the system is successfully running and user feedback has been addressed.

4. RESULT.

4.1. System Design Results

Lecturer Performance Assessment System Design Results Based on the results and design of the previous chapter. And in this Lecturer Performance Assessment System, the coding was done as well as possible to avoid errors and minimize deficiencies on the website. The framework used is the Laravel framework and the database is MySQL. The coding of this information system is done based on Use Case Diagrams, Activity Diagrams, Class Diagrams, and Entity Relationship Diagrams.

4.2 Black Box Testing

Black-box testing is a method of testing that only observes the execution results through test data and software functionality. So, analogously, as we see on a website, we can only see its appearance, without knowing how it works. The purpose of Black Box Testing is to find errors/failures in high-level operations, including software capabilities, operations/management, and user scenarios. The function of this test is based on what the system can do. Black box testing uses the Equivalence Partitioning (EP) method, the results of which can be seen in Table 4.1 below.

Table 1. Test Results Table

No	Test Class	List Testing	Test scenario	The results are expect
1	Screen Resolution and Density Screen	Testing Screen Resolution and Density Screen on various device	Testing on device PC/Laptop	Succeed
			Testing on device Smartphone Android	Succeed
2	*User Interface*	Testing activities on system information evaluation lecturer performance based on EUB	Admin input student data	Succeed
			Admin input lecturer data	Succeed
			Admin input student data question data on the questionnaire	Succeed
			P3M Section fill out the form questionnaire	Succeed
			Student fill out the form questionnaire.	Succeed
3	Connection Server and Internet	Testing on connection internet and current server access data	Internet connection unstable and server is stable at the moment access data	Succeed

4.3 User Interface

User Interface This application consists of 3 users, namely the Admin User Interface, Student User Interface, and P3M User Interface.

1. *User Interface*Admin

*User Interface*Admin shows what pages and activities the Admin can access.

a. *Login*

*Login*This is the page for logging into the application. Admins must fill in the user and password fields. If the user and password are incorrect, the admin will be notified. will not be able to enter the

application. The image can be seen in Figure 2. The dashboard of the website that will appear when the Admin has logged into the UNPAB lecturer performance assessment system.

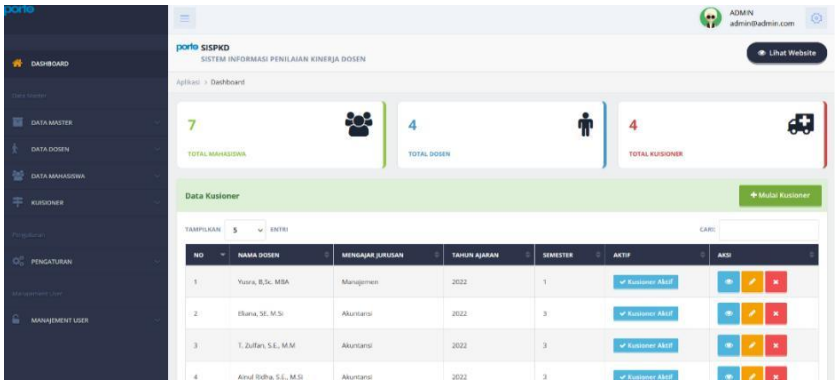

Figure 2. Admin Dashboard View

The Department Data Page functions to enter and manage department data at UNPAB Medan. The Questionnaire Category page functions to enter and manage Questionnaire Categories based on the competencies possessed by the lecturer.

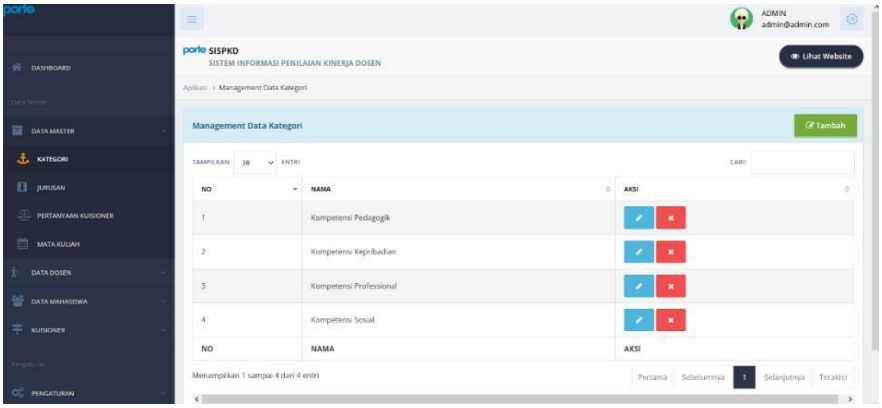

Figure 3. Questionnaire Category Display

The Course Page is used to enter and manage course data.

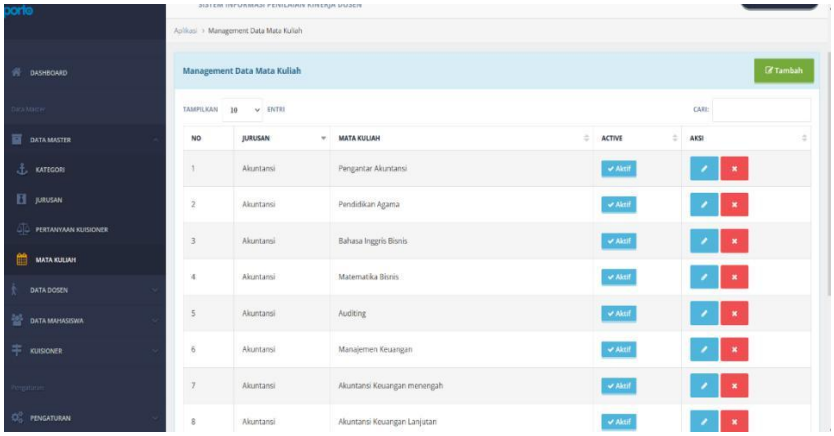

Figure 4. Course View

4.4. Implementation.

The implementation of the web-based lecturer performance assessment system demonstrated significant improvements in efficiency, transparency, and accuracy of the evaluation process. The results can be summarized as follows:

1. **Efficiency Improvement**
   - The automated system reduced the average time required for processing lecturer performance evaluations by approximately **45%** compared to the manual method.
   - Data input and report generation were streamlined through centralized storage and automated calculation modules.
2. **Transparency and Accountability**
   - The system enabled multi-user access with role-based authentication (administrators, students, and lecturers).
   - Real-time dashboards allowed stakeholders to track performance indicators transparently, minimizing bias in the evaluation process.
3. **Accuracy and Reliability**
   - Errors caused by manual calculations and data entry were reduced significantly, ensuring more reliable performance evaluation reports.
   - Cross-validation features in the database helped in maintaining consistency and integrity of data.
4. **User Feedback**
   - A usability test involving **50 respondents (students and lecturers)** reported a **satisfaction score of 87%**, highlighting the system's user-friendly interface and responsive design.
   - Lecturers appreciated the structured performance indicators, while management valued the real-time analytics for decision-making.
5. **System Stability**
   - Load testing confirmed that the application can handle simultaneous access by up to **200 concurrent users**without performance degradation.
   - Security measures, such as data encryption and secure login, were effective in preventing unauthorized access.

5. CONCLUSION

This study successfully designed and deployed a web-based lecturer performance assessment system that addresses the limitations of traditional, manual evaluation methods. The implementation of a web-based lecturer performance assessment system has proven to be effective in improving the efficiency, transparency, and accuracy of the evaluation process in higher education. Automation reduced the time required for data processing, while role-based access and real-time dashboards enhanced accountability and minimized subjectivity. The system also reduced human errors, ensured data consistency, and demonstrated strong stability under concurrent usage. User feedback indicated a high level of satisfaction with the usability and functionality of the platform.

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