

# Development of an Online Academic Staff Evaluation System for Quality Assurance in Tertiary Institutions

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## ABSTRACT

*This study aims to develop an Online Academic Staff Evaluation System to enhance quality assurance in tertiary institutions. The system was designed using a multi-tier architecture, with HTML5, CSS3, JavaScript, and Bootstrap for the frontend, and Python (Django framework) with MySQL for backend processing and data management. The system was evaluated over three months using 120 participants, including students and academic staff, utilizing System Usability Scale (SUS) metrics, functional testing, and performance analysis. The system significantly improved evaluation efficiency, ensured data confidentiality, enhanced transparency in performance assessment, and improved user satisfaction. It achieved a high usability score (SUS = 78.7) and demonstrated strong reliability under synchronized user conditions. The proposed system offers a scalable, secure, and efficient solution for academic staff evaluation, with strong potential to enhance data-driven decision-making and contributing to institutional quality assurance practices.*

**Keywords**— Academic Personnel Assessment, Higher Education Institutions, Online System, Quality Assurance, Student Evaluations.

## I. INTRODUCTION

Quality assurance in higher education (tertiary institutions), as articulated by [1] has become a paramount issue worldwide, especially amid escalating student enrolment, transnational education, and heightened demands for accountability and performance transparency [1]. Academic personnel are crucial for fulfilling institutional objectives in teaching, research, and community engagement, and their ongoing evaluation is vital for maintaining educational quality and institutional integrity [2]. Conventional approaches to evaluating academic staff – typically manual, paper-based, or intuitively managed – have demonstrated inadequacy in meeting the requirements of contemporary higher education settings, particularly regarding scalability, accuracy, promptness, and actionable feedback [3].

The growing demand for accountability and performance measurement in higher education has intensified the need for effective academic staff evaluation systems. Digital technologies have increasingly been adopted to enhance transparency, efficiency, and data-driven decision-making within institutional quality assurance frameworks. Web-based evaluation systems enable automated data collection, large-scale participation, and real-time analytics, thereby improving the overall effectiveness of evaluation processes [7]. Academic staff evaluation remains a fundamental component of internal quality assurance, as it directly impacts teaching quality, professional development, and institutional performance [8]. Globally, regulatory bodies such as the Quality Assurance Agency (QAA), National Assessment and Accreditation Council (NAAC), and National Universities Commission (NUC) emphasize structured and continuous evaluation as a basis for maintaining academic standards and accountability [9]. These frameworks highlight the importance of systematic feedback in informing decisions on promotion, curriculum development, and instructional improvement.

Existing evaluation approaches often adopt multi-source feedback mechanisms; incorporating student evaluations, peer reviews, self-assessment, and administrative input to provide a holistic assessment of academic performance [10]. However, student evaluations of teaching (SETs), despite their widespread use, are frequently criticized for potential bias and subjectivity. Factors such as grading leniency, course difficulty, and instructor characteristics can influence student ratings, thereby affecting the reliability of evaluation outcomes [11].

To address the limitations of traditional methods, web-based evaluation systems have been developed to enhance efficiency and data management. These systems offer advantages such as anonymity, scalability, accessibility, and rapid data processing [12]. Empirical studies suggest that digital evaluation platforms can reduce administrative burden while improving stakeholder engagement. For instance, [13] demonstrated the potential of structured digital models to support quality assurance in Nigerian higher education, while [14] emphasized their role in promoting accountability and institutional improvement.

Despite these benefits, several challenges persist, particularly in developing countries. Many existing systems are institution-specific, limiting their scalability and adaptability across diverse educational contexts. Additionally, infrastructural constraints, limited technical capacity, and resistance to change hinder effective implementation [6]. Concerns regarding data privacy, security, and ethical handling of sensitive evaluation data further complicate adoption [15].

Another critical limitation is the weak integration of evaluation systems with institutional quality assurance

policies. In many cases, evaluation outcomes are underutilized in strategic decision-making, reducing their overall impact [16]. Furthermore, several studies focus primarily on system development without rigorous empirical validation of usability, performance, and user acceptance, limiting their generalizability.

The design and implementation of evaluation systems are often guided by theoretical frameworks such as Total Quality Management (TQM), which emphasizes continuous improvement and stakeholder satisfaction [17], Kirkpatrick's Four-Level Model, which evaluates outcomes across multiple dimensions [18], and the Technology Acceptance Model (TAM), which explains user adoption based on perceived usefulness and ease of use.

While digital evaluation systems offer significant potential for improving academic staff assessment, existing solutions remain constrained by limited contextual adaptability, insufficient integration with quality assurance frameworks, and inadequate empirical validation. These gaps underscore the need for a scalable, secure, and user-centred evaluation system tailored to the realities of developing countries. This study addresses these challenges by developing and validating a context-aware online academic staff evaluation system for tertiary institutions.

Despite the acknowledged importance of academic staff evaluation, numerous higher education institutions – especially in developing nations – persist in utilizing ineffective and antiquated methods that constrain the breadth, trustworthiness, and applicability of the evaluation results. Current methodologies frequently encounter issues like human bias, delayed reporting, insufficient confidentiality, limited stakeholder involvement, and inadequate integration with institutional quality assurance systems. The absence of an automated, centralized system impedes management and quality assurance units from making timely, data-driven choices [7].

The absence of a dedicated, safe, and user-friendly online academic staff evaluation system is a significant obstacle to quality assurance processes at numerous higher education institutions. A pressing necessity exists to create, implement, and authenticate a system that streamlines the evaluation process while conforming to quality assurance standards and institutional strategic objectives [8].

The aim of this study is to develop and validate a context-aware online academic staff evaluation system that enhances quality assurance processes in tertiary institutions. To achieve this aim, the study specifically seeks to design a multi-tier web-based evaluation system incorporating role-based access control and real-time reporting functionalities; implement secure data management mechanisms that ensure user anonymity,

data confidentiality, and system integrity; evaluate the system's usability using the System Usability Scale (SUS) and analyze its performance under concurrent user conditions; and assess the system's effectiveness in improving evaluation efficiency, transparency, and decision-making within institutional quality assurance frameworks.

## II. MATERIALS AND METHODS

### A. System Architecture

The proposed Online Academic Staff Evaluation System adopts a multi-tier architecture (see Fig. 1) comprising three interconnected layers to ensure scalability, modularity, and efficient data management. The presentation layer provides an interactive user interface for students, academic staff, administrators, and quality assurance officers, developed using HTML5, CSS3, JavaScript, and Bootstrap to support responsive access across devices. The application layer, implemented using the Django framework in Python, handles core system functionalities including user authentication and authorization, evaluation form generation and processing, role-based access control, reporting and analytics, and administrative operations, while also supporting API-based interactions. The data layer utilizes a MySQL relational database for the structured storage and retrieval of user information, evaluation records, course data, and generated reports, ensuring data integrity and efficient querying. Communication between layers is secured through standard web protocols, enabling seamless data flow, real-time processing, and reliable system performance under concurrent user conditions.

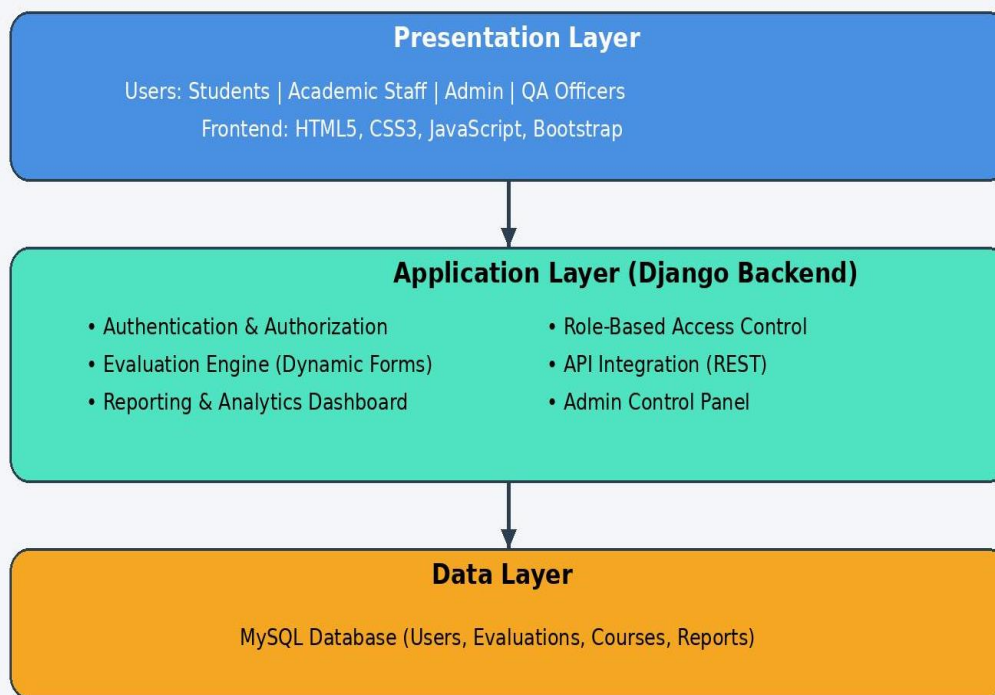
### B. Design Framework

The design framework of the proposed Online Academic Staff Evaluation System was modelled using Unified Modelling Language (UML) to provide a structured representation of system components, relationships, and user interactions. The system design was expressed through a class diagram and a use-case diagram, capturing both the static structure and dynamic behaviour of the system.

The class diagram defines key entities including Staff, Student, Course, Evaluation, and Administrator, along with their attributes, operations, and relationships. The Staff class supports performance monitoring, while the Student class enables evaluation submission. The Course class manages course information and instructor associations. The Evaluation class acts as a central entity linking students, staff, and courses, capturing responses, timestamps, and ratings for analysis and reporting. The Administrator class manages user roles, system configuration, and evaluation schedules. Relationships among classes were modelled through associations, including one-to-many mappings such as staff-to-courses and course-to-evaluations,

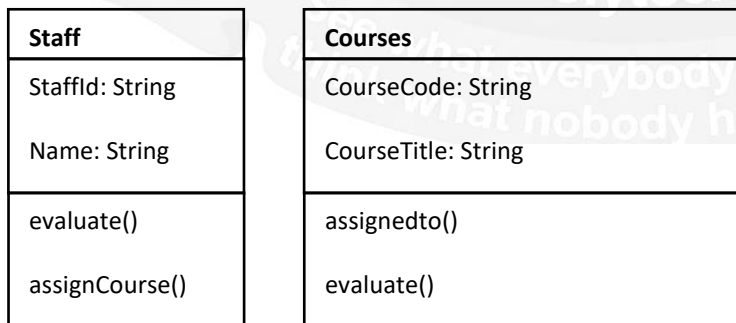
ensuring modularity and data integrity.

The use-case diagram models system functionality through interactions between actors—Student, Academic Staff, Administrator, and Quality Assurance Officer—and system processes. Students complete and submit evaluations anonymously, staff access performance reports, administrators manage system operations, and quality assurance officers analysed evaluation data. Core use cases include authentication, evaluation form handling, report generation, and system administration, ensuring a secure, role-based, and comprehensive evaluation workflow.

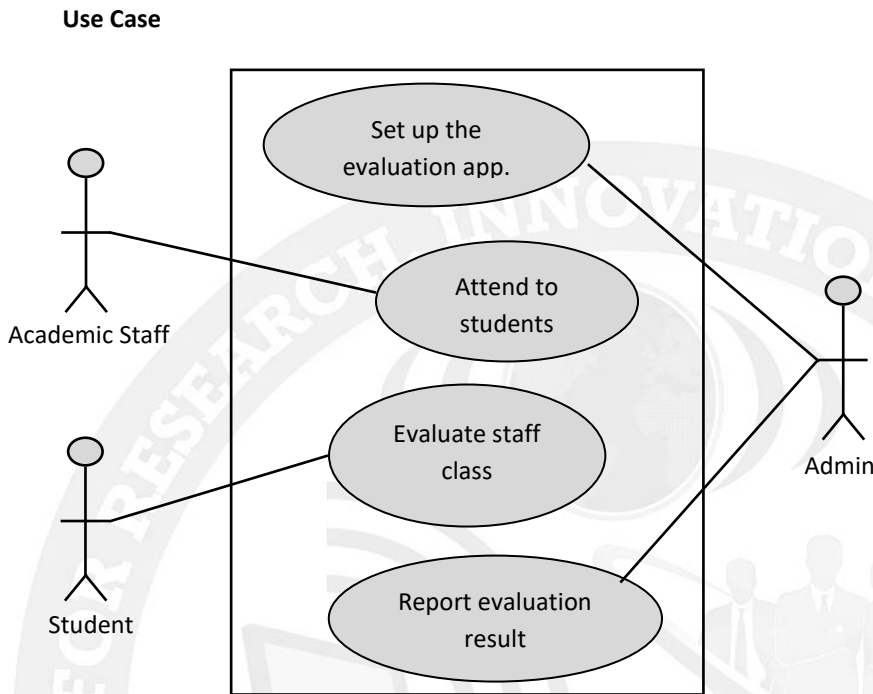


**Fig. 1: System Architecture**

**Class Diagram**



**Fig. 2: Class diagram for the application**



**Fig. 3: Use case diagram for the application**

### C. Data Collection

Data for this study were obtained from both primary and secondary sources to ensure comprehensive system design and evaluation. Primary data were collected through semi-structured interviews and structured questionnaires. A total of 30 stakeholders, including academic administrators, department heads, and quality assurance officers, participated in the interviews to provide insights into existing evaluation practices, challenges, and system requirements. Additionally, questionnaires were administered to 90 students across multiple faculties to capture user expectations, usability preferences, and perceptions regarding confidentiality and evaluation processes.

The collected primary data comprised both qualitative responses (opinions, experiences, and system expectations) and quantitative data (Likert-scale responses and usability ratings), enabling a balanced analysis of user needs. Secondary data were sourced from institutional reports, quality assurance guidelines, and policy documents, which provided contextual understanding of existing frameworks and informed system requirements specification. All data collected were anonymized and processed in accordance with ethical research standards, ensuring confidentiality and reliability. The combination of qualitative and

quantitative data enhanced the validity of the findings and supported the development of a user-centred and context-aware evaluation system.

#### D. Evaluation Techniques

The developed system was evaluated using a combination of usability, functional, performance, and expert-based assessment techniques to ensure a comprehensive validation of its effectiveness, reliability, and user acceptance.

#### E. System Usability Scale (SUS)

Usability evaluation was conducted using the System Usability Scale (SUS), a standardized instrument for assessing perceived usability. The SUS consists of ten items rated on a five-point Likert scale. The overall SUS score is computed as:

$$SUS = \left( \sum_{i=1}^{10} s_i \right) \times 2.5 \quad (1)$$

Where  $s_i$  represents the adjusted score for each item. For odd-numbered items,  $s_i = x_i - 1$ , and for even-numbered items,  $s_i = 5 - x_i$ , with  $x_i$  being the user response. The final SUS score ranges from 0 to 100, with scores above 68 indicating above-average usability. This metric provides a reliable measure of system learnability, efficiency, and user satisfaction.

#### F. Functional Testing

Functional evaluation was performed using black-box testing techniques to verify whether the system meets specified requirements. The effectiveness of functional testing can be expressed using the pass rate:

$$\text{Pass Rate (\%)} = \frac{\text{Number of Passed Test Cases}}{\text{Total Number of Test Cases}} \times 100 \quad (2)$$

This metric quantifies system correctness by assessing the proportion of successfully executed functionalities, including authentication, evaluation submission, and report generation.

#### G. Performance Evaluation

System performance was assessed under simulated load conditions to determine responsiveness, scalability, and stability. Key metrics include:

##### (i) Average Response Time

$$RT_{avg} = \frac{\sum_{i=1}^n RT_i}{n} \quad (3)$$

(ii) Throughput

$$\text{Throughput} = \frac{\text{Total Requests Processed}}{\text{Time Interval}} \quad (4)$$

(iii). System Efficiency

$$\text{Efficiency} = \frac{\text{Useful Processing Time}}{\text{Total Processing Time}} \times 100 \quad (5)$$

These measures evaluate how efficiently the system handles concurrent users and maintains performance under varying workloads.

#### H. Expert Evaluation

Expert-based evaluation was conducted using a structured assessment framework involving domain specialists. The overall expert score can be modelled as a weighted aggregation:

$$E = \sum_{j=1}^m w_j \cdot r_j \quad (6)$$

where  $r_j$  represents the rating for criterion  $j$  (e.g., usability, security, maintainability), and  $w_j$  is the corresponding weight assigned based on importance, with  $\sum w_j = 1$ . This approach ensures a balanced and objective assessment of system quality across multiple dimensions.

### III. RESULTS AND DISCUSSION

#### A. Functional Evaluation

The system's functional correctness was assessed using black-box testing across all major modules. A total of 41 test cases were executed, covering authentication, evaluation submission, data anonymization, reporting, and administrative configuration. The overall pass rate was computed as:

$$\text{Pass Rate} = \frac{41}{41} \times 100 = 100\% \quad (7)$$

This indicates complete compliance with specified functional requirements. Notably, the reporting module initially recorded a slightly lower success rate (87.5%), suggesting minor rendering inconsistencies, which were subsequently resolved. The overall result demonstrates a high level of system reliability and functional completeness.

### *B. Usability Evaluation*

System usability was evaluated using the System Usability Scale (SUS), yielding a mean score of 78.7 across participants. This value exceeds the standard industry benchmark of 68, indicating above-average usability. Based on established SUS interpretation frameworks, a score of 78.7 corresponds approximately to a “Grade B+” rating and falls within the 75th–85th percentile, suggesting that the system is highly acceptable to users.

A comparative analysis across user groups shows variability in perception: students reported the highest usability (mean = 82.6), followed by administrators (mean = 81.1), while academic staff reported a relatively lower score (mean = 72.3). The dispersion across groups suggests differences in interaction complexity and familiarity with digital systems. Nevertheless, all group means remain above the acceptability threshold, confirming consistent usability performance.

### *C. Performance Analysis*

Performance evaluation under simulated load conditions indicates that the system maintains stable operation with an average page load time of 1.2 seconds, which falls within acceptable web performance standards (<2 seconds). The system supported over 500 concurrent users without observable degradation, demonstrating strong scalability.

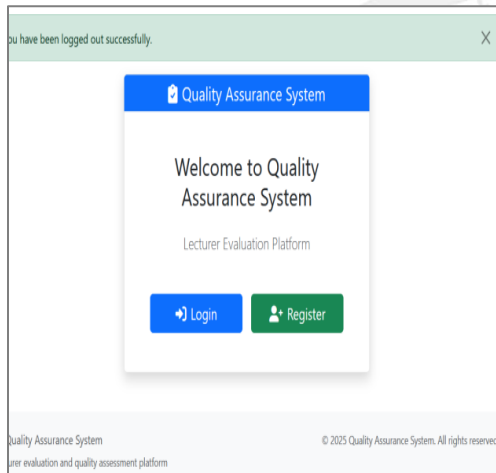
The average data processing time per evaluation was recorded at <100 ms, indicating efficient backend processing. System uptime during the observation period was 99.98%, reflecting high availability and reliability. These metrics collectively suggest that the system can handle high transaction volumes with minimal latency.

### *D. Integrated Analysis*

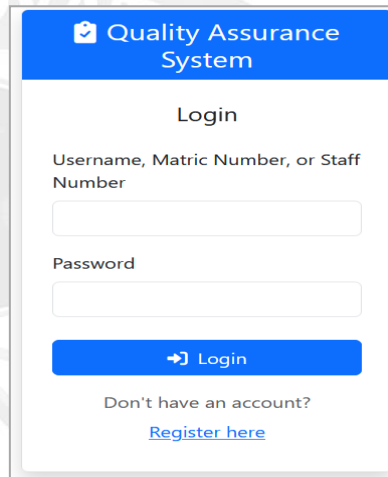
Combining functional, usability, and performance results provides a comprehensive assessment of system quality. The 100% functional pass rate confirms correctness, while the high SUS score (78.7) demonstrates strong user acceptance. Performance metrics further validate system efficiency and scalability.

From a statistical perspective, the convergence of high usability scores and optimal performance indicators suggests a positive correlation between system design efficiency and user satisfaction. The relatively lower SUS score among academic staff may indicate the need for targeted user training or interface refinement. Overall, the results provide empirical evidence that the system meets key quality attributes required for deployment in tertiary institutions.

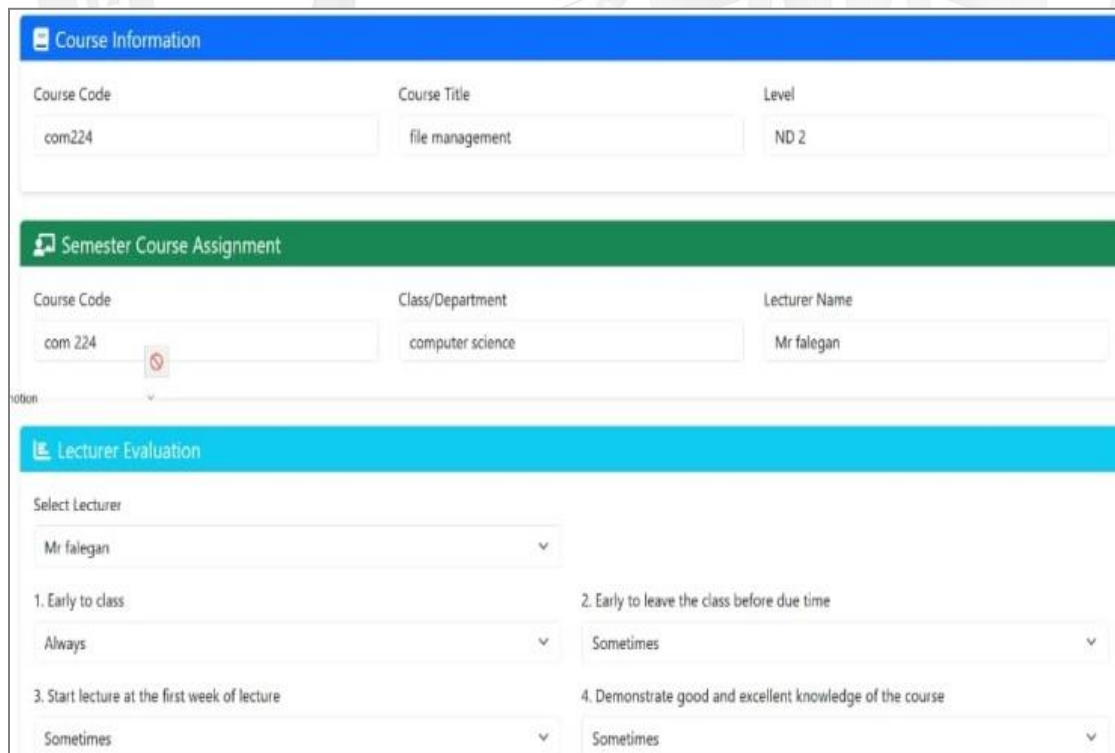
Fig. 4 to 8 present screenshots of the developed application interface, illustrating key system components and user interaction points, including the welcome page, login interface, evaluation form, confirmation page, and administrative dashboard. These interfaces demonstrate the system’s usability, responsiveness, and role-based functionality across different user categories.



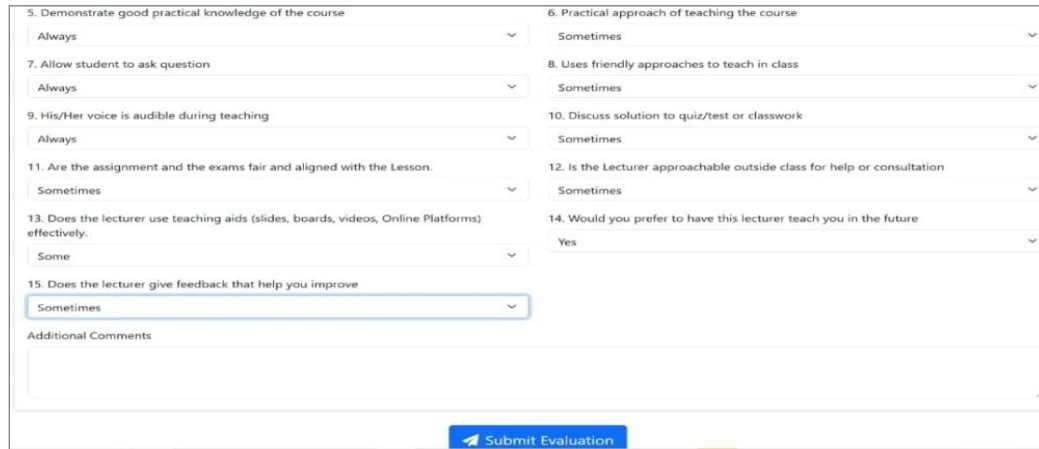
**Fig. 4: Welcome Screen**



**Fig. 5: Login Screen**



**Fig. 6a: Lecturer Evaluation Page**



5. Demonstrate good practical knowledge of the course  
Always

6. Practical approach of teaching the course  
Sometimes

7. Allow student to ask question  
Always

8. Uses friendly approaches to teach in class  
Sometimes

9. His/Her voice is audible during teaching  
Always

10. Discuss solution to quiz/test or classwork  
Sometimes

11. Are the assignment and the exams fair and aligned with the Lesson.  
Sometimes

12. Is the Lecturer approachable outside class for help or consultation  
Sometimes

13. Does the lecturer use teaching aids (slides, boards, videos, Online Platforms) effectively.  
Some

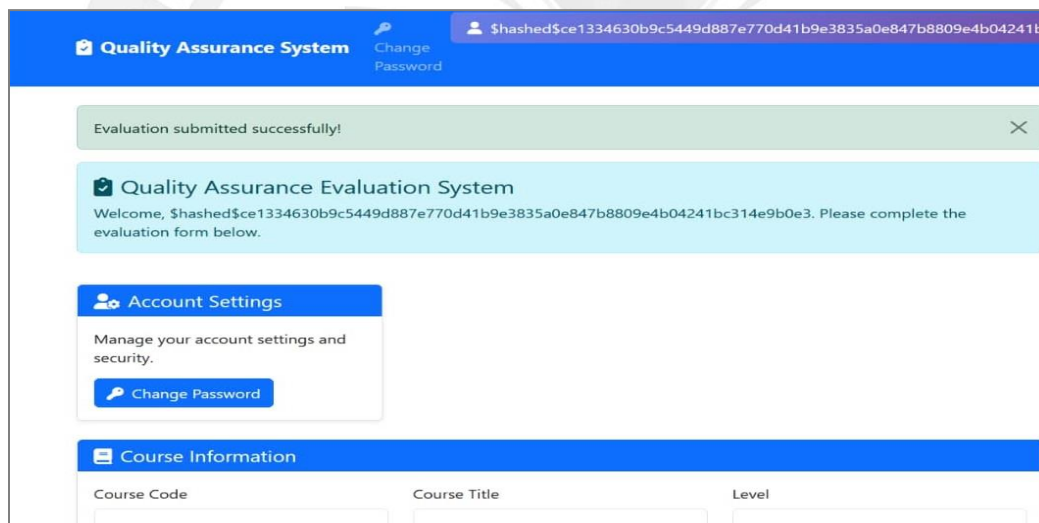
14. Would you prefer to have this lecturer teach you in the future  
Yes

15. Does the lecturer give feedback that help you improve  
Sometimes

Additional Comments

Submit Evaluation

Fig. 6b: Lecturer Evaluation Page



Quality Assurance System

Change Password

Evaluation submitted successfully!

Quality Assurance Evaluation System

Welcome, \$hashed\$ce1334630b9c5449d887e770d41b9e3835a0e847b8809e4b04241bc314e9b0e3. Please complete the evaluation form below.

Account Settings

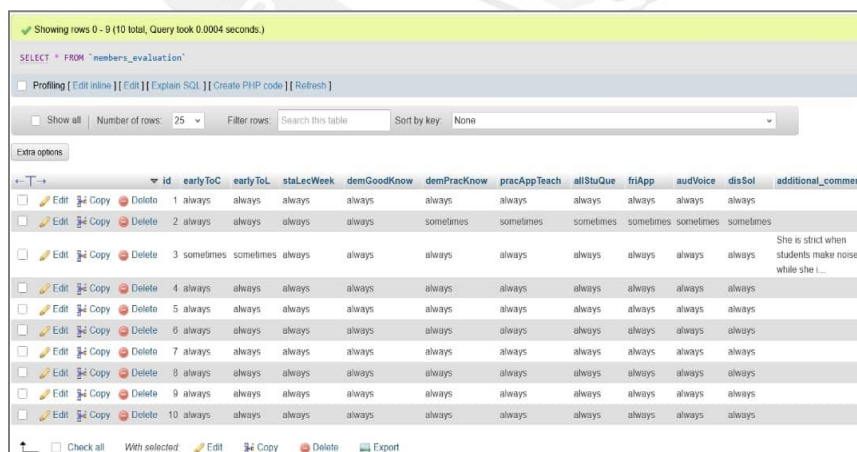
Manage your account settings and security.

Change Password

Course Information

Course Code	Course Title	Level

Fig. 7: Evaluation Confirmation Page



Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)

SELECT \* FROM `members\_evaluation`

Number of rows: 25

id	earlyToC	earlyToL	staLecWeek	demGoodKnow	demPracKnow	pracApp Teach	allStuQue	friApp	audVoice	disSol	additional_comments
1	always	always	always	always	always	always	always	always	always	always	
2	always	always	always	always	sometimes	sometimes	sometimes	sometimes	sometimes	sometimes	
3	sometimes	sometimes	always	always	always	always	always	always	always	always	She is strict when students make noise while she l...
4	always	always	always	always	always	always	always	always	always	always	
5	always	always	always	always	always	always	always	always	always	always	
6	always	always	always	always	always	always	always	always	always	always	
7	always	always	always	always	always	always	always	always	always	always	
8	always	always	always	always	always	always	always	always	always	always	
9	always	always	always	always	always	always	always	always	always	always	
10	always	always	always	always	always	always	always	always	always	always	

Fig. 8: Admin Database

The findings of this study demonstrate that the proposed system effectively addresses the limitations of traditional evaluation methods by improving efficiency, transparency, and data accessibility. The high usability score aligns with previous studies emphasizing the importance of user-centred design in educational systems [4]. The system's performance under concurrent usage conditions highlights its scalability, making it suitable for institutions with large student populations. Unlike many existing solutions that lack empirical validation, this study provides quantitative evidence of system effectiveness through usability metrics and performance indicators.

However, the study is limited by the relatively small sample size and controlled testing environment. Future research should incorporate larger, multi-institutional datasets and apply inferential statistical techniques, such as hypothesis testing and regression analysis, to further validate system impact.

#### IV. CONCLUSION

This study developed and validated a scalable, web-based academic staff evaluation system designed to enhance quality assurance processes in tertiary institutions. By integrating a multi-tier architecture with secure data handling, role-based access control, and real-time reporting capabilities, the system effectively addresses the limitations of traditional evaluation methods, including inefficiency, bias, and limited data accessibility. Empirical evaluation demonstrates that the system achieves high functional reliability, with a 100% test pass rate, and strong usability, as evidenced by a System Usability Scale (SUS) score of 78.7, which exceeds the industry benchmark and indicates high user acceptance. Performance analysis further confirms the system's efficiency and scalability, with low response time, high concurrency support, and near-continuous availability. These findings collectively validate the system's suitability for deployment in real-world academic environments.

The study contributes to the field by providing a context-aware, user-centred evaluation framework tailored to the operational realities of developing countries, particularly within Nigerian tertiary institutions. It also offers empirical evidence supporting the adoption of digital evaluation systems as a means of improving transparency, accountability, and data-driven decision-making in higher education.

However, the study is limited by its sample size and single-institution deployment context, which may affect the generalizability of the findings. Future research should extend the system to multiple institutions, incorporate advanced analytics such as machine learning for feedback interpretation, and apply inferential statistical methods to further validate system impact.

In conclusion, the proposed system represents a significant step toward the digital transformation of academic staff evaluation and provides a practical, scalable solution for strengthening quality assurance in tertiary education.

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