ACADEMIS: A SECURE AND RELIABLE WEB-BASED EXAMINATION PORTAL FOR ST. CLARE COLLEGE

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Abstract

The transition to online learning has made digital examination systems essential, yet security and integrity remain major challenges. This study developed ACADEMIS, a secure web-based examination portal for St. Clare College, addressing problems of scoring inaccuracy, security vulnerabilities, and inefficient manual processes. The system was developed using the Software Development Life Cycle (SDLC) Waterfall Model with HTML, CSS, JavaScript, PHP, and MySQL. Key features include role-based secure authentication (with bcrypt password hashing), automated grading, tab switching detection with screenshot capture and a three-strike warning system, and real-time activity logging. A quantitative evaluation was conducted with 100 respondents (97 BSCS students, 3 faculty) using a adapted System Usability Scale (SUS) questionnaire. Results showed strong user acceptance (Grand Mean = 4.29, Strongly Agree), with respondents strongly agreeing on the importance of data security (4.47), encryption (4.36), and automatic scoring (4.39). While preliminary testing was conducted with five concurrent users, the system demonstrated stable performance. The study concludes that ACADEMIS provides a viable, secure alternative to paper-based examinations, though future work should include large-scale load testing and AI-based proctoring features.

Keywords: online examination system, web-based portal, automated grading, activity monitoring, academic integrity, tab switching and screenshot detection.

Background of the Study

With the increasing adoption of digital technologies in education, online examination systems have become essential tools for academic assessment. These

systems provide flexibility and accessibility for students, allowing them to take exams remotely and conveniently. However, ensuring the security and integrity of online exams remains a major challenge. Issues such as cheating, unauthorized access to exam questions, and technical disruptions can compromise the fairness of the assessment process. These challenges can affect student confidence in the evaluation system and create inconsistencies in academic performance measurement. Consequently, educational institutions must prioritize robust security measures to uphold the validity of online assessments.

A secure examination portal must incorporate advanced features such as encryption, secure login protocols, real-time monitoring, and automated proctoring to detect and reduce opportunities for cheating during examinations. Encryption helps protect exam questions and student data from unauthorized access, while secure login protocols, such as multi-factor authentication, help verify the identity of students before they can take the exam. Real-time monitoring and automated proctoring can identify suspicious activities, such as opening unauthorized browser tabs or attempting to access restricted materials, thereby minimizing opportunities for academic dishonesty. Additionally, the system should support various question formats such as multiple-choice, identification, and essay-type questions and provide a user-friendly interface to cater to diverse student needs. The system should also ensure efficient exam scheduling and provide timely feedback to students after completing their assessments.

Implementing a secure and efficient online examination portal is essential for St. Clare College to uphold academic standards and enhance the overall learning experience. Such

a system will enable reliable and streamlined assessment processes while reducing administrative workload and providing students with a smooth and accessible testing environment. It also improves accessibility by allowing students to take exams through a secure online platform. Moreover, it enhances the efficiency of examination management through automated processes and real-time data handling. This study aims to design and develop an examination portal tailored to the specific needs of St. Clare College, focusing on optimizing security measures and operational efficiency to improve the management and delivery of examinations.

As a result, the proposed system aims to strengthen trust in digital assessments, reduce opportunities for student cheating through enhanced security features, and ensure fair and accurate evaluation of student performance.

Statement of the Problem

The security and efficiency of St. Clare College's academic evaluations are affected by several issues in its existing examination system. Traditional paper-based examinations are often time-consuming and resource-intensive due to the need for manual preparation and checking, which can lead to marking errors and delays in releasing results. Research shows that human errors in test preparation and manual checking can introduce mistakes such as ambiguous questions and incorrect formatting, which may reduce the reliability of assessments (Constantinou, 2024). Furthermore, paper-based examinations are vulnerable to security risks, including the loss or theft of

examination materials, which increases the possibility of question leakage and compromises assessment integrity. In addition, delayed feedback caused by manual checking processes can negatively affect academic performance and learning efficiency. These limitations highlight the need for more secure and efficient examination systems that ensure data protection, accuracy, and timely result processing.

In the face of rapid digital transformation and the increasing need for flexible, remote learning solutions, especially in post-pandemic academic setups, the college must adapt by implementing a secure and efficient digital examination system. The absence of such a system hinders the institution's ability to conduct scalable, tamper-proof, and seamless examinations while also affecting administrative productivity and student satisfaction.

This system proposes the development of a secure and efficient examination portal tailored to meet the specific needs of St. Clare College. The platform is envisioned to offer safe user authentication, effective question management, real-time proctoring capabilities, and automated grading functionalities all aimed at improving the quality and integrity of the college’s academic assessments.

This study seeks to answer the following questions:

- How can the system ensure secure authentication?
- How can the system automate grading?
- How can the system improve exam management?
- How can real-time monitoring prevent cheating?

- How can data integrity and confidentiality be maintained?

Review of Related Literature

This study is grounded in three key thematic areas from existing literature.

Security and Integrity in Online Assessments: Maintaining academic integrity is the paramount concern in digital examinations. Noorbehbahani et al. (2022) systematically identified common cheating methods, including impersonation, collaboration, and content sharing. To counter these, researchers have proposed various countermeasures. Singh and Patel (2025) emphasized the necessity of multi-layer authentication, including encryption and role-based access control. Locally, Revano and Habal (2021) demonstrated that browser/server architectures can automate test generation and improve basic security, though they noted limitations in advanced proctoring.

Automated Grading and System Efficiency: Manual grading is a significant bottleneck. Kumar and Prasad (2024) highlighted that automated monitoring and structured grading features not only improve efficiency but also support fairness by ensuring consistent application of scoring rules. Pan, Yang, and Lee (2023) added that network-level protection and a centralized architecture are essential for maintaining system stability during high-demand periods.

User Acceptance and Local Context: Technological features alone are insufficient without user acceptance. Al-Fadhli and Rahman (2021) found that user-friendly design and system reliability are critical drivers of student satisfaction. In the Philippines, Ramos and Castillo (2024) and Illescas et al. (2023) noted that while students value the

convenience of online exams, their overall acceptance is heavily influenced by concerns over connectivity, security, and perceived fairness. Thus, any successful system must balance robust security with an intuitive user interface.

Methods

3.1 Research Design

This study employed a Developmental Research Design, following the Software Development Life Cycle (SDLC) Waterfall Model (Requirements Analysis, System Design, Development, Testing, Implementation).

3.2 System Development

The ACADEMIS portal was developed using HTML, CSS, and JavaScript for the frontend, PHP for server-side processing, and MySQL for database management. The system was hosted locally using XAMPP/Apache during development and testing.

Key modules included:

- **Secure Authentication:** Role-based login for students and faculty. Passwords are securely hashed using bcrypt via PHP's password_hash() function. Even the database administrator cannot view plain-text passwords. The login interface includes a "show/hide password" (eye button) feature, allowing users to verify their input before submission. All database queries use prepared statements (PDO) to prevent SQL injection attacks.

- **Exam Management:** Tools for faculty to create, schedule, and manage various question types (MCQ, True/False, Essay).

- **Real-Time Proctoring & Monitoring:** The system includes **tab switching detection** — when a student attempts to switch to another browser tab or application, the system logs the event and displays a warning on the student's screen. **After three warnings (attempts), the system automatically submits the exam** to prevent further cheating. Additionally, the system **captures screenshots** at random intervals during the exam for post-exam review by faculty. All activities (login, logout, question navigation, tab switches) are logged server-side with timestamps.

- **Automated Grading:** Instant scoring for objective questions and secure storage for subjective answers.

3.3 Respondents and Sampling

The study was conducted at St. Clare College, Caloocan. The target population was Bachelor of Science in Computer Science (BSCS) students and faculty for A.Y. 2025-2026. Using Slovin's formula with a 5% margin of error ($n = N / (1+Ne^2)$), a sample size of 100 was derived from a student population of 135. Stratified Random Sampling was used, resulting in 97 student respondents and 3 faculty respondents.

3.4 Research Instrument and Data Collection

A structured questionnaire adapted from the System Usability Scale (SUS) was used. It consisted of six parts: (I) Profile, (II) Problems Encountered, (III) Needs & Expectations,

(IV) System Features, (V) Security & Privacy, and (VI) Acceptance. A 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) was used. The data gathering involved a pre-development needs assessment, system demonstration, hands-on testing by respondents, and final survey administration.

3.5 Data Analysis

Data were analyzed using descriptive statistics: frequency, percentage, and mean. The mean scores were interpreted based on the Likert scale ranges.

Results and Discussion

4.1 Respondent Profile

Of the 100 respondents, 97 (97%) were students and 3 (3%) were faculty. Among students, the majority (58.8%) were 4th-year students, and 75% reported taking online examinations "Always" or "Often," confirming the high relevance of the study.

4.2 Problems Encountered with Current Systems

As shown in Table 1, respondents identified scoring inaccuracy (Mean=3.44, Agree) and incorrect result display (Mean=3.54, Agree) as significant problems. Basic functional issues like navigation (2.98) or device access (3.11) were neutral, indicating that core functionality exists but reliability is lacking.

Table 1. Problems Encountered in Current Examination Systems

No.	Problem Statement	Mean	Interpretation
1	Difficulty navigating the exam interface.	2.98	Neutral
2	The system fails to save answers properly.	3.11	Neutral
3	Trouble accessing exams using my device.	3.11	Neutral
4	The scoring system does not accurately reflect results.	3.44	Agree
5	Correct answer displayed as incorrect result.	3.54	Agree
Grand Mean		3.24	Neutral

Note: Interpretations are based on a 5-point Likert scale (1.00-1.80=Strongly Disagree; 1.81-2.60=Disagree; 2.61-3.40=Neutral; 3.41-4.20=Agree; 4.21-5.00=Strongly Agree).

4.3 System Feature and Security Expectations

Table 2 shows that respondents Strongly Agreed (Grand Mean = 4.29) on the importance of all key system features. The highest-rated features were automatic scoring (4.39) and secure login (4.33). Regarding security and privacy (Grand Mean = 4.42), respondents placed the highest importance on student data security (4.47) and the privacy of exam results (4.45). These findings align with Singh & Patel (2025), who emphasized that strong authentication and data protection are essential for user trust.

Table 2. Summary of Expectations for System Features & Security

Category	Grand Mean	Interpretation
Part IV: System Features Expectation	4.29	Strongly Agree
Secure login/authentication	4.33	Strongly Agree
Automatic scoring/results	4.39	Strongly Agree

System stability with many users	4.28	Strongly Agree
Part V: Security & Privacy Expectation	4.42	Strongly Agree
Student data security	4.47	Strongly Agree
Encryption of exam data	4.36	Strongly Agree
Prevention of impersonation	4.40	Strongly Agree

4.4 System Acceptance

As detailed in Table 3, overall acceptance of the ACADEMIS portal was very high (Grand Mean = 4.29, Strongly Agree). Respondents strongly agreed that they are willing to use the system (4.28), believe it will improve their exam experience (4.25), and trust that their personal information is safe (4.35). This high acceptance rate is consistent with Al-Fadhli & Rahman (2021), who found that a secure yet simple interface improves both usability and trust.

Table 3. Level of Acceptance for the ACADEMIS Portal

No.	Statement	Mean	Interpretation
1	I am willing to use the exam portal.	4.28	Strongly Agree
2	I believe it can improve my exam experience.	4.25	Strongly Agree
3	It would benefit future BSCS exams.	4.30	Strongly Agree
4	I support implementing this system.	4.28	Strongly Agree
5	I believe my personal information is safe.	4.35	Strongly Agree
Grand Mean		4.29	Strongly Agree

4.5 Technical Implementation and Security Measures

The ACADEMIS system implements several security mechanisms aligned with

best practices identified in the literature. As shown in Table 4, the system incorporates multiple layers of protection.

Table 4. Security Features Implemented in ACADEMIS

Security Layer	Implementation	Purpose
Password Storage	bcrypt hashing (password_hash() in PHP)	Prevents plain-text password exposure even if database is compromised
SQL Injection Prevention	Prepared statements (PDO)	Blocks unauthorized database queries
Authentication	Role-based login (Student/Faculty)	Restricts access to authorized users only

Tab Switching Detection	JavaScript event listeners + server-side logging	Detects and limits cheating attempts (max 3 warnings)
Screenshot Capture	Random-interval canvas capture	Provides evidence for post-exam review
Activity Logging	Server-side timestamped logs	Tracks all user actions for audit trails
Password Visibility	Eye button (show/hide toggle)	Improves user experience and reduces login errors

The tab switching detection system provides students with up to three warnings. On the first two offenses, a warning message appears. On the third offense, the exam is automatically submitted. This mechanism directly addresses the cheating behaviors identified by Noorbehbahani et al. (2022), such as accessing unauthorized browser tabs or external resources.

4.6 System Limitations and Challenges

Despite its successful development and positive user feedback, the ACADEMIS system has several limitations that should be acknowledged.

First, limited scalability testing. The system was tested with only five concurrent users due to the small BSCS population available during development. While the system performed stably under this load, we have not yet conducted formal load testing or stress testing with 50 or more simultaneous users. Actual performance during major examinations (e.g., midterms or finals) may vary depending on server capacity and network conditions.

Second, no formal penetration testing was conducted. While the system implements bcrypt hashing and prepared statements, we did not perform vulnerability assessments or ethical hacking tests. Potential unknown security flaws may exist.

Third, the sample is limited to BSCS students only. The findings may not be generalizable to other academic programs (e.g., Nursing, Business, Education) where students have different technical proficiency levels or assessment needs.

Fourth, dependency on internet connectivity and device compatibility. The system requires a stable internet connection. Students with poor connectivity may experience lag, disconnections, or incomplete exam submissions. Additionally, the tab switching detection feature may behave differently across various web browsers (e.g., Chrome vs. Safari vs. mobile browsers).

Fifth, privacy considerations. The screenshot capture feature, while useful for proctoring, raises privacy concerns. Students should be properly notified before exams. Future versions should provide clearer disclosures and options for students with privacy objections.

Conclusion

This study successfully developed ACADEMIS, a secure and reliable web-based examination portal for St. Clare College. The system directly addressed the identified problems of scoring inaccuracy, security vulnerabilities, and inefficient manual processes. By integrating secure authentication (bcrypt hashing, prepared statements),

automated grading, and advanced monitoring features including tab switching detection, screenshot capture, and three-strike warnings, ACADEMIS provides a robust alternative to traditional paper-based exams.

The key findings demonstrate strong alignment between user expectations and system features. Respondents strongly agreed on the necessity of data encryption (4.47), impersonation prevention (4.40), and automatic scoring (4.39). Most importantly, the high level of user acceptance (Grand Mean 4.29) validates the system's usability and perceived effectiveness.

However, the study has limitations including small-scale testing (five concurrent users only), lack of formal penetration testing, and a sample restricted to BSCS students. These limitations do not invalidate the findings but should be considered when interpreting results.

Recommendations:

Based on the findings, the following are recommended:

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1. **Institutional Adoption:** St. Clare College should adopt ACADEMIS as its official examination platform to enhance academic integrity and reduce administrative workload.

2. **Large-Scale Load Testing:** Before full deployment, the institution should conduct load testing with 50–100 concurrent users to validate system performance during peak examination periods. This should include measuring page load times, server response times, and error rates under stress.

3. **Penetration Testing and Security Audit:** A formal vulnerability assessment should be conducted by an independent security specialist to identify and address potential weaknesses in authentication, database protection, and session management.

4. **AI-Based Proctoring Enhancement:** Future versions should explore integrating AI-powered proctoring features such as facial recognition (to verify student identity), webcam monitoring (to detect suspicious behaviors like looking away or using phones), and browser lockdown mode (to prevent all unauthorized activities). These enhancements, while increasing privacy concerns, would further strengthen academic integrity.

5. **Mobile Application and Offline Mode:** A mobile app version should be developed for students who primarily use smartphones. Offline exam functionality (where answers are stored locally and synced when connectivity returns) would address internet instability issues.

6. **Cross-Departmental Expansion:** The system should be tested with students from other departments (e.g., Nursing, Business Administration, Education) to improve generalizability and identify program-specific requirements.

7. **Continuous Evaluation:** Regular usability testing and security audits should be conducted to ensure the system remains effective and secure against evolving threats.

8. **Accessibility Features:** Future versions should include features for students with disabilities (e.g., screen reader compatibility, keyboard navigation, adjustable font sizes) and those with poor internet connectivity (e.g., low-bandwidth mode, offline synchronization).

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