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EXAMMASTER: A DIGITAL ASSESSMENT PLATFORM

MINA N. DE LOS SANTOS
JOSEFINA R. SARMIENTO, PhD

Aemilianum College Inc. Sorsogon City, Sorsogon, Philippines

Abstract

The advent of digital assessment platforms has revolutionized the landscape of academic evaluation, offering enhanced efficiency and flexibility. This paper presents ExamMaster, a digital assessment platform tailored specifically for the College of Law at Aemilianum College Inc. ExamMaster aims to address the evolving needs of modern education by integrating advanced proctoring systems, ensuring data integrity, implementing robust exam-point tracking, and evaluating system performance using ISO 25010 criteria.

ExamMaster is an advanced proctoring system that employs AI-driven monitoring techniques for heightened surveillance during examinations. This system includes user authentication and verification mechanisms to ensure the integrity and credibility of assessment processes. By leveraging artificial intelligence, ExamMaster not only monitors test-takers but also detects any suspicious behavior, thus enhancing the overall security of examinations.

Data integrity is paramount in any assessment platform, and ExamMaster achieves this through integrated encryption. By implementing robust encryption protocols, the platform safeguards sensitive exam data, ensuring confidentiality and preventing unauthorized access. Exam verification mechanisms further bolster data integrity by validating the authenticity of exams, mitigating the risk of tampering or manipulation.

To facilitate comprehensive assessment tracking, ExamMaster incorporates features for exam-point tracking and secure storage. This enables transparent and accountable evaluation processes, enhancing trust and reliability in assessment outcomes. Moreover, the platform ensures compliance with ISO 25010 standards by evaluating its functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

In conclusion, ExamMaster represents a sophisticated solution tailored to the specific needs of the College of Law at Aemilianum College Inc. By integrating advanced proctoring systems, ensuring data integrity, implementing robust exam-point tracking, and adhering to ISO 25010 standards, ExamMaster promises to elevate the standards of academic assessment, fostering a secure, reliable, and efficient evaluation environment.

Key Words: Academic assessment, Aemilianum College Inc., AI-driven monitoring, Digital assessment platform, Evaluation environment, Exam-point tracking, and Proctoring system.

Scope and Delimitation

The project's scope encompasses the development of a tailored solution for practicing and testing for the Online Bar examination, addressing the pressing need for advanced exam integrity. It includes the creation and implementation of an advanced proctoring system, leveraging AI and machine learning for real-time monitoring and security measures using behavior analysis. Additionally, encryption technology will be integrated to ensure the secure storage and verification of exam data and results, upholding the assessments' integrity. The project will prioritize the creation of a user-friendly interface designed specifically for law students, enhancing their examination experience. Furthermore, it will establish a robust exam point tracking system to ensure the accurate recording of results.

Though, it's essential to note that the project's delimitations include a focused scope solely on ACI College of Law, potential technical and operational constraints, careful consideration of ethical and legal aspects, a limited validation period within the confines of a capstone project, and resource constraints dictated by the available budget. These delimitations are integral to maintaining a clear project focus while striving for innovation and practicality in addressing the unique integrity challenges of legal education.

After system development, it will be tested and evaluated using accepted industry-standard evaluation tools by ten (10) College of Law students, ten (10) IT professionals, and five (5) College of Law professors.

Gap Bridged by the study

The study effectively bridges significant gaps in the current landscape of online bar examinations. In this digital age, where the demand for secure and efficient online assessment methods continues to grow, the software's development provides a crucial solution. The existing systems and literature the researchers' explored offer valuable insights, but a comprehensive, purpose-built framework tailored to the unique needs of ACI College of Law examinations has been lacking. This study addresses this gap by combining the best practices and lessons learned from related systems and literature into a unified, cutting-edge software platform. It not only ensures exam integrity and academic honesty but also enhances the overall student experience and the credibility of online examinations. In essence, this study takes a significant step forward in meeting the contemporary challenges faced by legal education institutions, providing a robust, secure, and user-friendly solution that aligns seamlessly with the evolving landscape of online assessment.

Conceptual Framework

The conceptual framework used by the study is input-process-output model. It displays a series of boxes which is connected to each other, start from the conceptualization up to the development.

The Input stage of the ExamMaster study involved the development of an advanced proctoring system, incorporating AI-driven monitoring, user authentication, and verification to ensure the integrity of the examination process. Additionally, measures

were taken to ensure data integrity through encryption integration, employing techniques such as data encryption and exam verification. Furthermore, the implementation of robust exam-point tracking mechanisms was prioritized, involving the tracking and secure storage of points to maintain transparency in assessment procedures. Finally, the system's evaluation was conducted using ISO 25010 criteria, focusing on functionality, efficiency, usability, and security aspects. This comprehensive approach aimed to address various challenges in digital examination administration, ensuring a secure, transparent, and efficient assessment process for pre-bar law students.

The Process stage of the ExamMaster study aligns with the Rational Unified Process (RUP), which consists of four phases: Inception, Elaboration, Construction, and Transition. During the Inception phase, the initial examination requirements and objectives were defined, laying the groundwork for subsequent development stages. In the Elaboration phase, detailed examination features and functionalities were specified, ensuring a comprehensive understanding of system requirements. The Construction phase involved the actual implementation of the examination platform, followed by the Transition phase, where the completed system was deployed and transitioned into operational use. This adherence to the RUP framework facilitated a structured and iterative approach to system development, ensuring that the ExamMaster platform met the specified examination needs effectively.

In the Output phase of the ExamMaster study, the culmination of the development process resulted in the creation of ExamMaster: A Digital Assessment Platform. This platform represents the tangible outcome of the project, providing a comprehensive solution for conducting digital examinations in the context of legal education. ExamMaster offers advanced proctoring features, user authentication, and verification mechanisms to ensure the integrity and security of examinations. Additionally, the platform incorporates robust exam-point tracking and encryption integration to safeguard data integrity and enhance transparency in assessment processes. Overall, ExamMaster serves as a sophisticated digital tool tailored specifically for pre-bar law students, offering a dynamic and interactive environment for conducting examinations with efficiency and fairness.

Feedback on ExamMaster: A Digital Assessment Platform has been largely positive, with users expressing appreciation for its advanced proctoring features, user authentication, and verification mechanisms, which have significantly enhanced the security and integrity of examinations. Many users have praised the platform's robust exam-point tracking and encryption integration, which have helped ensure data integrity and transparency in assessment processes. However, some users have provided feedback on areas for improvement, such as the need for further customization options, enhanced user interface design, and additional features to support diverse examination formats. Overall, the feedback has been instrumental in guiding further iterations and enhancements to ExamMaster, ensuring that it continues to meet the evolving needs of pre-bar law students and educators in the digital examination landscape.

Resources

To realize the proposed system, the researcher considered the following resources along with her eagerness, involvement, and influence in the development of the study. The hardware and software requirements used in the development of the Comprehensive Software for Advanced Online Exam Integrity.

Table 3.1.

Hardware Requirements

Required Hardware	Recommended Hardware Specifications
CPU / Development Server	3.3 gigahertz (GHz) or faster 64-bit dual core processor 4 GB RAM or Higher 10 GB of Disk Space
Display	VGA with a resolution of 1366 x 768 widescreen
Input / Output	PS2 or USB keyboard / mouse
Internet Connection	At least 5mbps or higher

Table 3.1. depicts the hardware system requirement needed to view and navigate the web-based application system. The system required a stable internet connection as well as high hardware specifications for fast transaction and to meet its maximum potential.

Table 3.2.

Software Requirements

Particulars	Recommended Specifications
Operating System	Windows 10 or higher, macOS
Database	MySQL
Web Browser	Any browser that is JavaScript compatible
Development Environment	Visual Studio Code
Frameworks and Libraries	NuxtJS, WebGazer

Table 3.2 delineates the requisite software specifications vital for the seamless operation of the web-based application, catering to both desktop and mobile platforms. Each listed requirement plays a pivotal role in ensuring the application's smooth functionality and optimal performance across various devices and operating systems.

Firstly, the specified Operating System recommendations include Windows 10 or higher and macOS, offering compatibility with widely used desktop platforms. This ensures that users can access the application

seamlessly, irrespective of their preferred operating system.
Secondly, MySQL is designated as the preferred database system. Renowned for its scalability and performance, MySQL serves as a reliable relational database management system crucial for efficient data storage and retrieval, essential for handling the substantial volumes of data typically associated with web-based applications.

The stipulated Web Browser requirement necessitates compatibility with any browser that supports JavaScript. This ensures flexibility and accessibility for users across a spectrum of browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge, facilitating the execution of client-side scripts and interactive features integral to the application's functionality.

Visual Studio Code is recommended as the development environment. Renowned for its versatility and robust features, Visual Studio Code provides developers with a lightweight yet potent code editor, facilitating efficient code writing, debugging, and deployment processes throughout the application's lifecycle.

NuxtJS and WebGazer are specified as the frameworks and libraries utilized in the application's development. NuxtJS, a progressive Vue.js framework, simplifies the creation of server-side rendered Vue.js applications, offering features such as server-side rendering and automatic code splitting. On the other hand, WebGazer, a JavaScript library for eye tracking, enables the integration of eye-tracking functionality into web applications, opening avenues for user behavior analysis and accessibility enhancements.

Table 3.2 furnishes clear guidance on the essential software prerequisites imperative for the successful implementation and operation of the web-based application. By ensuring compatibility, performance, and usability across diverse platforms and devices, these specifications lay the foundation for a robust and user-friendly application experience.

Inception

In the study titled "ExamMaster: A Digital Assessment Platform," the project researcher conducted thorough research and analysis to assess the feasibility and viability of the proposed digital assessment platform. This involved identifying the specific needs and requirements of pre-bar exam candidates, understanding the challenges and limitations of existing assessment methods, and exploring technological solutions that could address these needs effectively. Additionally, stakeholders collaborated to define the project vision, objectives, and success criteria, ensuring alignment with the overarching goal of enhancing the efficiency and effectiveness of pre-bar exam preparation and evaluation. Key activities in the inception phase included conducting stakeholder interviews and surveys, analyzing market trends and competitors, defining user personas, and establishing a high-level project plan and timeline. By carefully laying the groundwork during the inception phase, the project team established a solid foundation for subsequent phases of development, ensuring that the digital assessment platform met the unique needs of pre-bar exam candidates while aligning with the broader goals of the educational institution or organization implementing the system.

Elaboration

During the Elaboration phase of the study on "ExamMaster: A Digital Assessment Platform," the project researcher progressed from the initial groundwork laid during the inception phase to delve deeper into the detailed planning and design aspects of the digital assessment platform. Building upon the insights gathered and requirements defined in the inception phase, the researcher focused on refining the project scope, architecture, and functionalities. This involved translating high-level requirements into detailed system specifications, designing user interfaces, and defining the underlying technical infrastructure required for the platform's development. Additionally, the researcher worked closely with stakeholders to prioritize features, establish project milestones, and refine the project plan and timeline. Prototyping and iterative development may have also been undertaken during this phase to validate design concepts and gather feedback from potential users. The Elaboration phase aimed to solidify the project's direction and ensure alignment with stakeholders' expectations while laying the groundwork for the subsequent Construction phase, where the actual implementation of the digital assessment platform would take place. Through meticulous planning and collaboration, the researcher advanced the project towards its ultimate goal of providing a comprehensive and effective digital assessment solution for pre-bar exam examinations.

Construction

During the Construction phase of the study on "ExamMaster: A Digital Assessment Platform," the project researcher transitioned from planning and design to the actual implementation and development of the digital assessment platform. This phase involved the execution of the detailed plans and specifications outlined during the Elaboration phase. The researcher, focused on coding, testing, and integrating the various components of the platform. The researcher ensured that the platform adhered to industry standards and best practices in software development, such as scalability, security, and usability. Continuous communication and collaboration with stakeholders were essential during this phase to address any emerging requirements or changes in project scope. As the Construction phase progressed, the digital assessment platform began to take shape, with iterative improvements and refinements made based on feedback from testing and user validation. The researcher closely monitored progress, resolved any development challenges, and ensured that the project remained on track towards its completion. Ultimately, the Construction phase marked a crucial stage in the project lifecycle, where the vision outlined during inception and elaboration was transformed into a tangible and functional digital assessment platform, ready for deployment and use in pre-bar exam examinations.

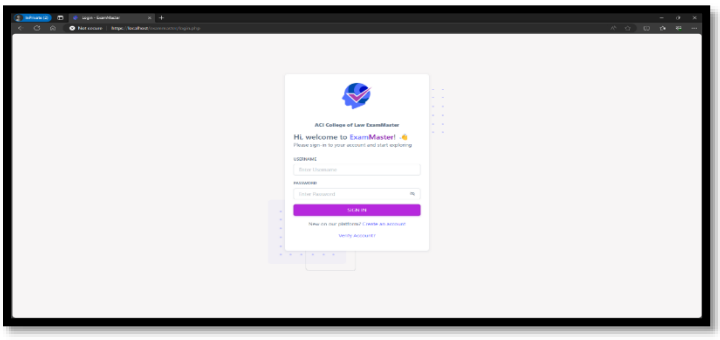

Figure 4.1 Login Screen

Figure 4.1 displays the Login Screen for 'ExamMaster: A Digital Assessment Platform,' featuring a minimalist design with fields for username, password, and options for password recovery, ensuring intuitive access for users.

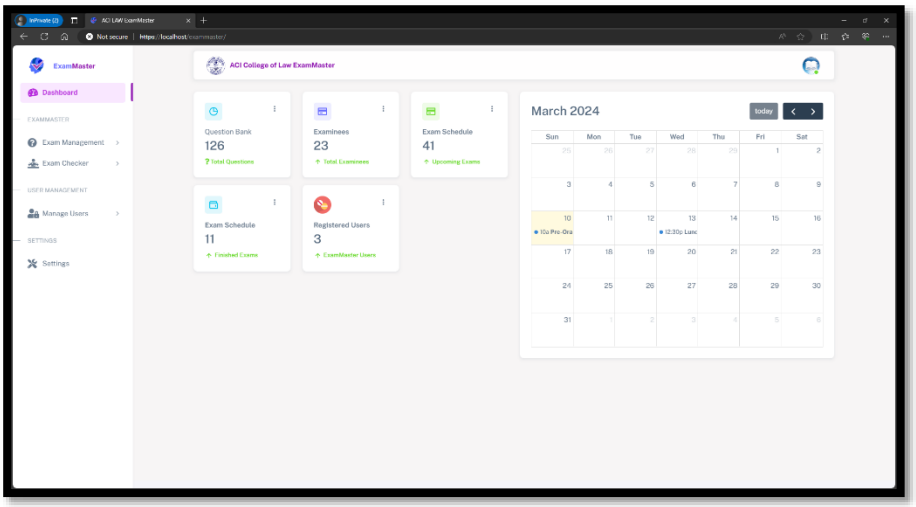

Figure 4.2 Administrator Dashboard

In Figure 4.2, the Administrator Dashboard of ExamMaster: A Digital Assessment Platform presents a visually organized interface, facilitating efficient system management. The comprehensive tools visible in the dashboard empower administrators with functionalities for overseeing user accounts, creating and scheduling assessments, and analyzing assessment data. This centralized control hub ensures administrators can effectively monitor and optimize the platform to meet the institution's assessment needs.

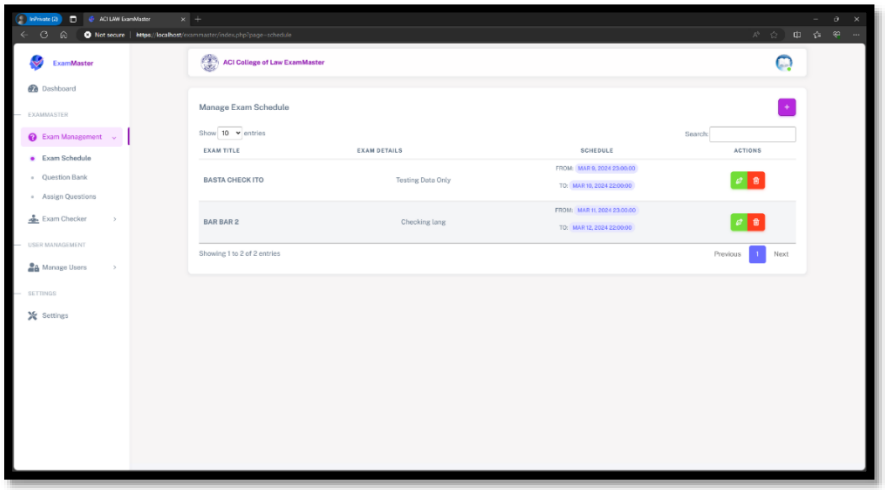

Figure 4.3 Exam Schedule

Figure 4.3: Exam Schedule Interface of ExamMaster: A Digital Assessment Platform, facilitating streamlined scheduling and management of exams.

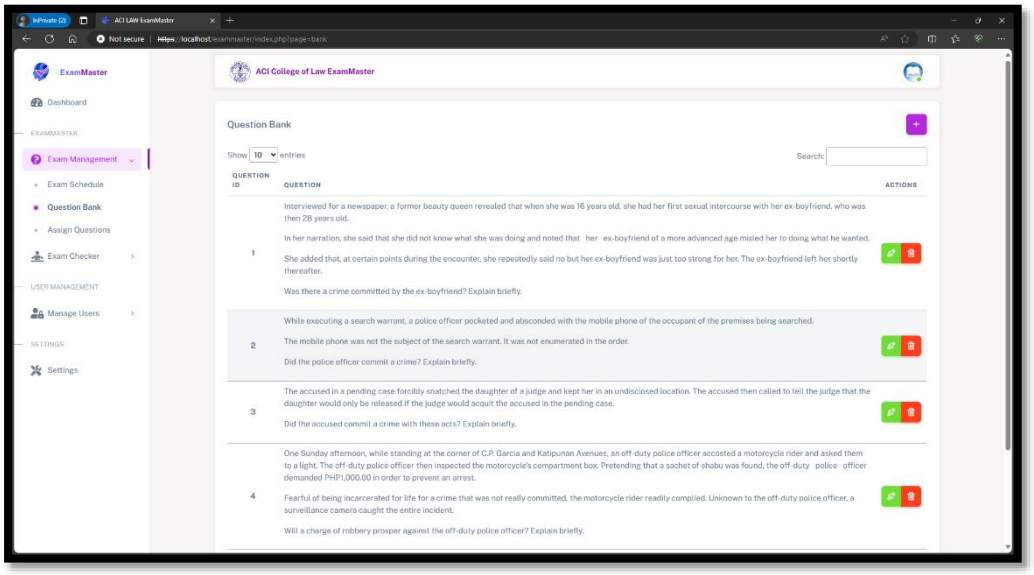

Figure 4.4 Question Bank

Figure 4.4: Question Bank Interface of ExamMaster: A Digital Assessment Platform, enabling convenient organization and access to a repository of exam questions.

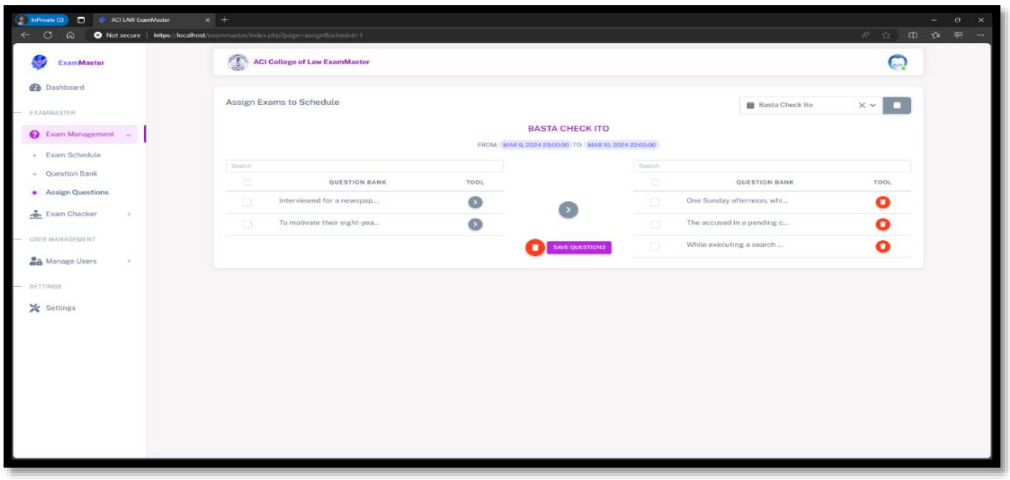

Figure 4.5 Question Assignment to Schedule

In Figure 4.5, the Question Assignment Interface of ExamMaster: A Digital Assessment Platform offers a user-friendly experience for administrators tasked with assigning questions to scheduled exams. The interface likely provides intuitive navigation and tools for selecting, categorizing, and allocating questions to specific assessments, enhancing efficiency in exam preparation. Through streamlined question assignment processes, administrators can ensure the accuracy and relevance of exam content, ultimately contributing to a more effective assessment experience for users.

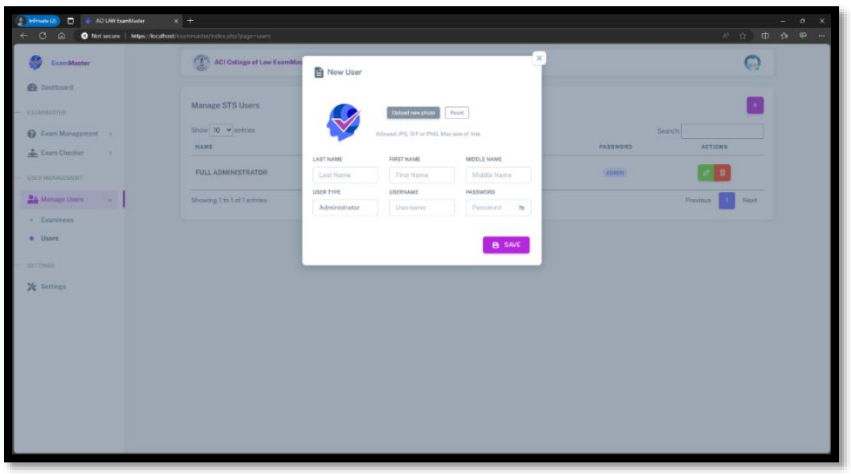

Figure 4.6 Users Management

Figure 4.6: Users Management Interface of ExamMaster: A Digital Assessment Platform, facilitating efficient management of user accounts and permissions.

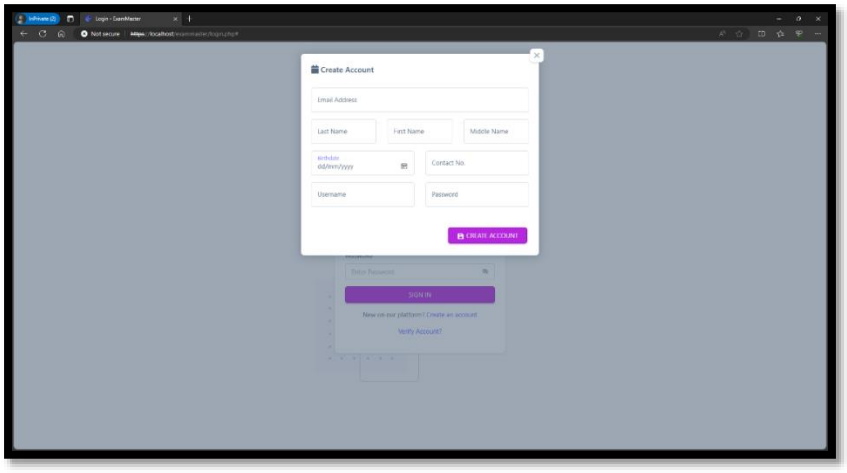

Figure 4.7 Examinee Registration

Figure 4.7: Examinee Registration Interface of ExamMaster: A Digital Assessment Platform, enabling seamless registration and enrollment of examinees into the system.

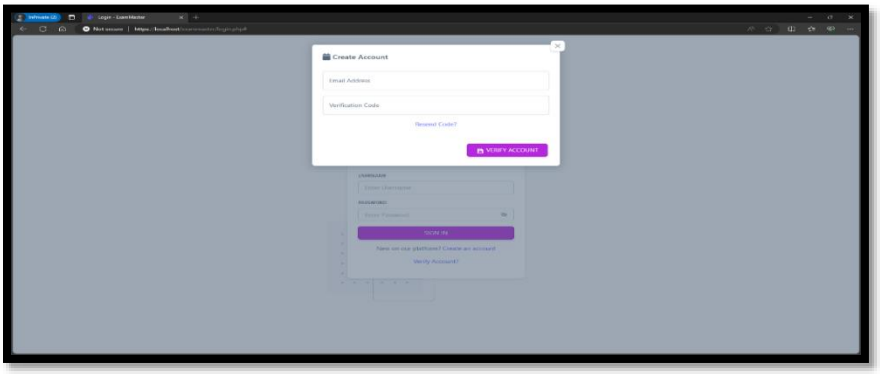

Figure 4.8 Verification of User

Figure 4.8: User Verification Interface of ExamMaster: A Digital Assessment Platform, ensuring secure authentication and verification processes for user access.

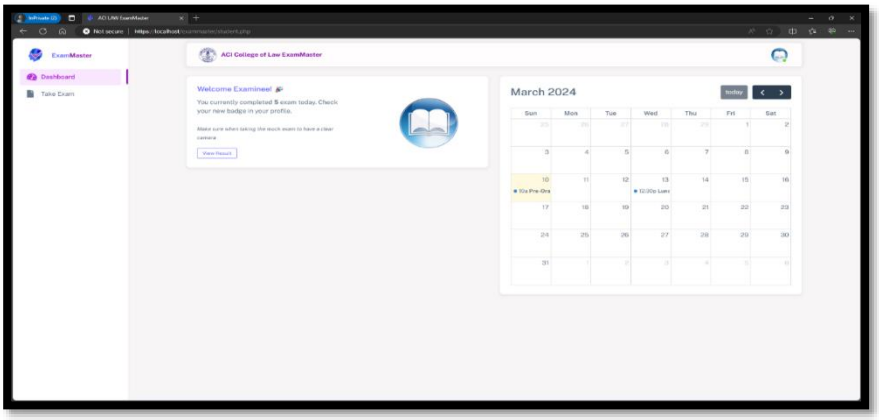

Figure 4.9 Examinee Dashboard

Figure 4.9: Examinee Dashboard Interface of ExamMaster: A Digital Assessment Platform, providing examinees with an intuitive and informative overview of their assessments and progress.

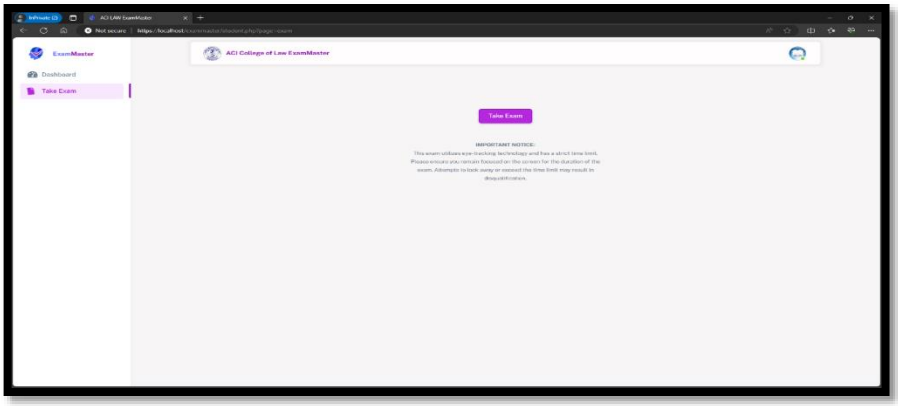

Figure 4.10 Examination Start

Figure 4.10: Examination Start Interface of ExamMaster: A Digital Assessment Platform, initiating the assessment process for examinees with user-friendly controls and instructions.

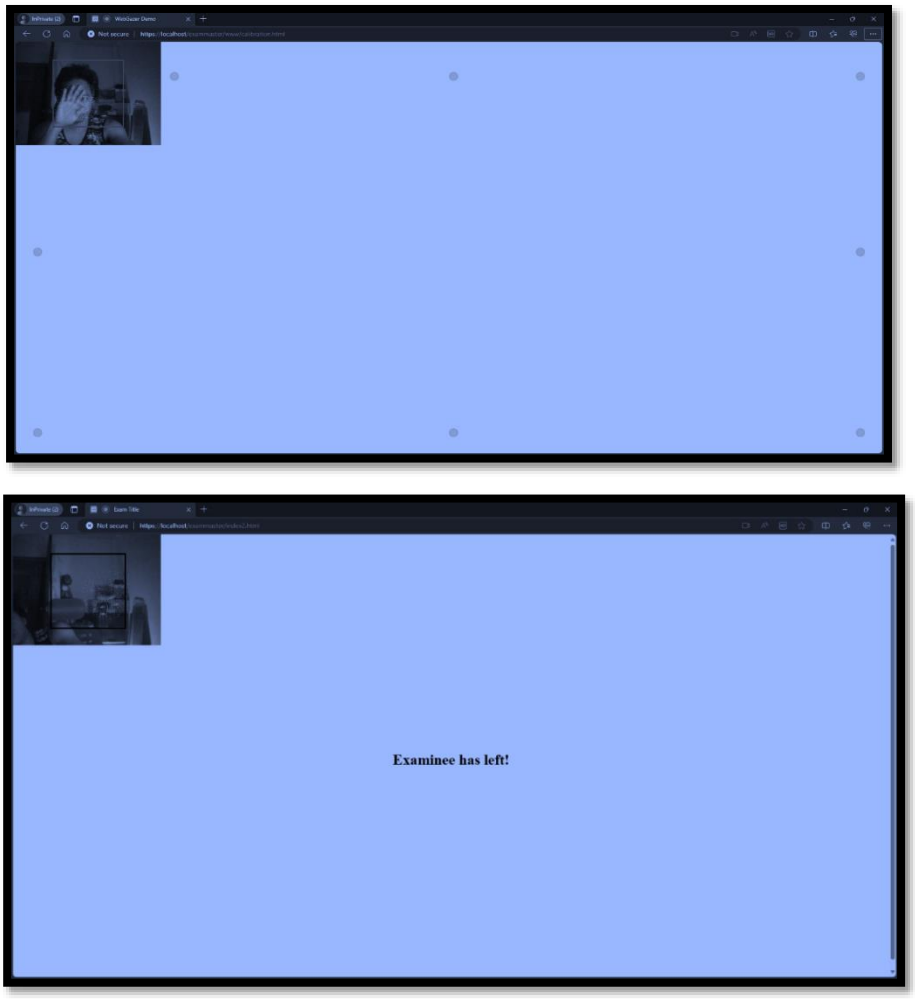

Figure 4.11 Calibration Start

In Figure 4.11, the Calibration Start Interface of ExamMaster: A Digital Assessment Platform incorporates advanced features for biometric authentication, where the system recognizes the examinee's face and establishes the range of their eyes on the screen through displayed dots. This innovative functionality ensures the integrity of the examination process by verifying the examinee's identity and helping prevent unauthorized access or cheating attempts. Additionally, to maintain security and prevent disruptions, if the examinee's eyes move out of the designated range or if they leave the examination area, the

system automatically closes the examination module and displays a notification on the screen stating "Examinee has left", enhancing the overall reliability and fairness of the assessment process.

Table 4.11.

Overall Evaluation of the System

Quality Characteristics		IT Experts (10)	College of Law Students (10)	Professors (5)	Average	Interpretation
1.0	Functional suitability	5.00	5.00	4.25	4.75	**Far more that what is expected**
2.0	Performance Efficiency	4.50	4.50	4.33	4.33	
3.0	Compatibility	4.50	4.50	4.33	4.33	
4.0	Usability	4.50	4.50	4.33	4.33	
5.0	Reliability	4.50	4.40	4.25	4.38	
6.0	Security	4.50	4.40	4.25	4.38	
7.0	Maintainability	4.00	4.00	4.00	4.00	
8.0	Portability	4.50	4.50	4.50	4.50	
Mean		**4.50**	**4.48**	**4.28**	**4.37**	
Overall Mean		**4.42**				

Table 4.11 presents the comprehensive evaluation of the system's quality characteristics by different evaluator groups, including IT experts, College of Law students, and professors. Each quality characteristic such as functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability, was rated on a scale. Functional suitability received notably high ratings from all groups, indicating that it surpasses expectations. Performance efficiency, compatibility, usability, reliability, and security received consistently high ratings, suggesting that the system performs well across these dimensions. Maintainability was rated satisfactorily, while portability was deemed highly favorable. The overall mean rating across all quality characteristics was 4.37, with the system garnering an overall mean of 4.42, indicating that it generally meets or exceeds expectations in terms of its quality characteristics, as evaluated by the different groups.

Findings

During the development and after testing and evaluation of the developed system the following findings have been established:

1. It indicates the necessity of developing an advanced proctoring system integrating AI-driven monitoring, user authentication, and user verification functionalities.
2. It is important to ensure data integrity in educational settings by integrating encryption and exam verification mechanisms.
3. The results underscore the critical importance of implementing robust exam-point tracking, ensuring the secure storage of points, and fostering transparency in assessment processes.
4. The study reveals that the system's quality characteristics, evaluated by various evaluator groups including IT experts, College of Law students, and professors,

received high ratings across functional suitability, performance efficiency, compatibility, usability, reliability, and security. Additionally, maintainability was rated satisfactorily and portability highly favorable, indicating that the system generally meets or exceeds expectations.

Conclusions

Based on the findings of this study the following conclusions were formulated:

1. Indicated the necessity of developing an advanced proctoring system integrating AI-driven monitoring, user authentication, and user verification functionalities.
2. It was important to ensure data integrity in educational settings through the integration of encryption and exam verification mechanisms.
3. The critical importance of implementing robust exam-point tracking, ensuring the secure storage of points, and fostering transparency in assessment processes.
4. The system's quality characteristics, evaluated by various evaluator groups including IT experts, College of Law students, and professors, received high ratings across functional suitability, performance efficiency, compatibility, usability, reliability, and security. Additionally, maintainability was rated satisfactorily and portability highly favorable, indicating that the system generally met or exceeded expectations

Recommendations

Based on the conclusions drawn from this study, the following recommendations were formulated:

1. Based on the indication of the necessity of developing an advanced proctoring system integrating AI-driven monitoring, user authentication, and user verification functionalities, it is recommended that further research be conducted to explore the implementation of such a system in educational settings.
2. Based on the importance of ensuring data integrity in educational settings through the integration of encryption and exam verification mechanisms, it is recommended that educational institutions prioritize the implementation of robust data security measures.
3. It is recommended that educational institutions invest in comprehensive assessment management systems to enhance accountability and integrity in academic evaluations.
4. Based on the conclusion that the system's quality characteristics, evaluated by various evaluator groups including IT experts, College of Law students, and professors, received high ratings across functional suitability, performance efficiency, compatibility, usability, reliability, and security, with maintainability rated satisfactorily and portability highly favorable, it is recommended that the system be implemented widely in educational institutions to improve overall effectiveness and user satisfaction.
5. Based on these suggestions, it is recommended to enhance the developed system by incorporating additional models for eye tracking, exploring alternative machine learning libraries, integrating features such as SMS functionality, and optimizing the frequency of alerts generated by the eye tracker.

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