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A Web-Based Question Sharing Platform for Fostering Collaborative Learning in Higher Education

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Abstract

University students preparing for examinations may struggle to find past exam questions when materials are scattered and inconsistently organized. This study designed and implemented a web platform that organizes past questions by course and controls how users submit, manage, and access them. The platform was developed using HTML, Bootstrap, PHP, and MySQL. It integrates authentication, role-based permissions, and centralized search. Evaluation included functional testing, usability sessions with students and academic staff, and preliminary checks of input handling and access restrictions. Descriptive analysis showed that all 13 reported functional test cases (100%) produced the expected results, including 8 of 8 administrator cases and 5 of 5 user cases. The cases covered question and course management, account creation, authentication, and question retrieval. These results establish that the platform supported the workflows covered by the reported tests. The study contributes an implemented design that connects course-based organization and centralized retrieval with role-based control over who can manage and access past examination materials. The design provides a basis for further evaluation of peer-assisted examination preparation and assessment integrity.

Keywords: Academic Resource Sharing; Past Examination Questions; Digital Learning Platform; Collaborative Learning; Educational Technology.

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Introduction

The widespread integration of digital technologies has reshaped learning practices in higher education, particularly in how students access, organize, and appropriate academic knowledge. Digital platforms have expanded opportunities for learner autonomy and flexible engagement with instructional resources in online and blended contexts (Adeshina, 2024; Hassan, 2023; Salunke & More, 2025). In parallel, digital repositories and academic support systems have enabled self-paced learning and broadened access to distributed educational content beyond classroom boundaries (Ebbini, 2023; Kaur, 2024; Liu, 2024; Liu & Wu, 2021). Yet greater resource availability has not consistently translated into access to academically credible, well-structured materials, especially for examination preparation and assessment literacy (Zhou et al., 2024).

In this landscape, pass question-sharing platforms have emerged as a prominent intervention by consolidating previous examination questions, sample responses, and related materials into centralized repositories (Aithal & Maiya, 2023; Hossain, 2018). Prior studies suggest that assessment-oriented resources can help students interpret disciplinary expectations, assessment formats, and cognitive demands embedded in examinations (Kircz, 2005; Zibani et al., 2022). When embedded within collaborative environments, such repositories may also support peer-assisted learning and collective knowledge construction by enabling students to exchange interpretations, strategies, and feedback (Fasola & Abimbola, 2023). However, their pedagogical value is not uncontested: unrestricted use of past examination materials can incentivize surface learning, strategic memorization, and reproduction of prior content rather than conceptual understanding (Marachi & Quill, 2020).

Beyond pedagogy, structural and ethical constraints further complicate implementation. Unregulated dissemination of assessment materials raises risks related to academic integrity, unauthorized distribution, and potential erosion of assessment validity. The literature argues that platforms lacking governance mechanisms and quality assurance may undermine institutional assessment practices rather than strengthen them (Khan & Khan, 2019). Accordingly, the design problem is not merely technical availability, but how to align resource sharing with safeguards, moderation, and institutional oversight.

Recent state-of-the-art research reinforces this design imperative. Studies of online and blended learning show that learner engagement and instructional quality depend on structured interaction, guided participation, and purposeful system design rather than content abundance alone (Malpartida, 2023; Lamanauskas & Makarskaitė-Petkevičienė, 2023). Similarly, research on digital collaboration and knowledge-sharing ecosystems highlights that meaningful outcomes are more likely when interaction is scaffolded and aligned with explicit educational objectives (Kauschinger

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et al., 2021; Qureshi et al., 2023). From a technology adoption perspective, usability, information architecture, and user-centered design repeatedly appear as determinants of sustained platform use (Hennings & Nilsson, 2023). Complementary work on digital assessment systems further emphasizes reliability, transparency, and fairness as prerequisites for credible learning and evaluation processes (Elkhatat, 2022; Krisbiantoro & Pujiani, 2023).

Despite these advances, a gap remains between pedagogical discussions and implementation practice. Many studies examine pass question repositories either as learning aids (focusing on strategies and outcomes) or as technical artefacts (focusing on features and performance). Comparatively limited attention has been given to integrative designs that explicitly combine collaborative learning principles, governance-aware content control, and secure architecture within one platform. Moreover, evaluations are often descriptive and offer limited insight into how design choices shape accessibility, collaborative engagement, and examination preparedness in higher education contexts.

To address this gap, this work designs and implements a web-based question-sharing platform that integrates structured content management, secure access control, and collaborative learning affordances within a unified system architecture. The contribution is twofold. Theoretically, it reframes pass question repositories as governance-sensitive socio-technical infrastructures that mediate assessment literacy and responsible collaboration. Methodologically, it demonstrates how iterative development can be paired with usability assessment and baseline security inspection to support both pedagogical objectives and institutional assessment integrity.

Method

This research employed a design-oriented approach to develop and evaluate a web-based question-sharing platform for structured academic resource sharing in higher education. The method combined iterative system development with empirical evaluation to ensure that functional performance, usability, and baseline security requirements were addressed. Development proceeded through repeated cycles of requirements analysis, system design, implementation, testing, and evaluation, consistent with an iterative model that integrates structured planning and adaptive refinement (Alshamrani & Bahattab, 2015).

Functional requirements included user authentication, role-based access control, question submission and management, course-based categorization, and controlled retrieval of examination materials. Non-functional requirements covered usability, performance stability, data security, and reliability. Requirements were elicited through stakeholder consultations with students and academic staff and were informed by relevant educational platform design literature. The system design specified the architecture, interaction flow, and database structures supporting collaborative resource sharing. A layered architecture separated the presentation layer, application logic, and database layer to improve modularity, scalability, and maintainability (Mohan, 2022; Pinciroli et al., 2022).

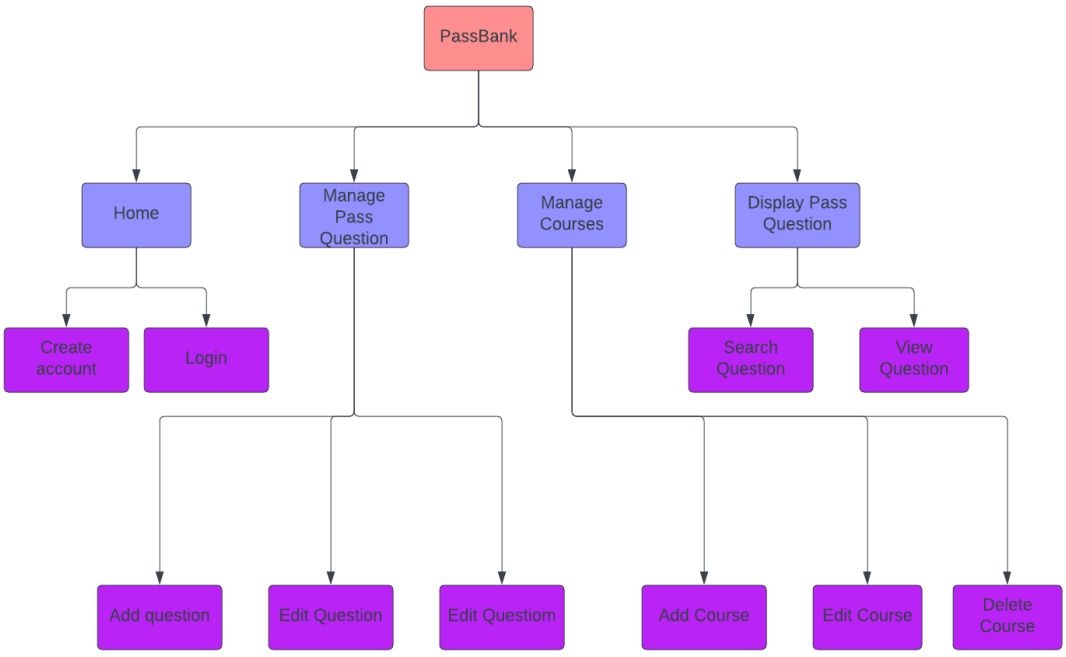


Figure 1. Structural design of the system

System behavior and user interactions were modeled using a use case diagram describing administrator and user roles across authentication, content submission, search, moderation, and access control.



Figure 2. Physical design of the system

The physical design diagram represented deployment and component allocation to clarify hosting and runtime interactions between the application server and database services.

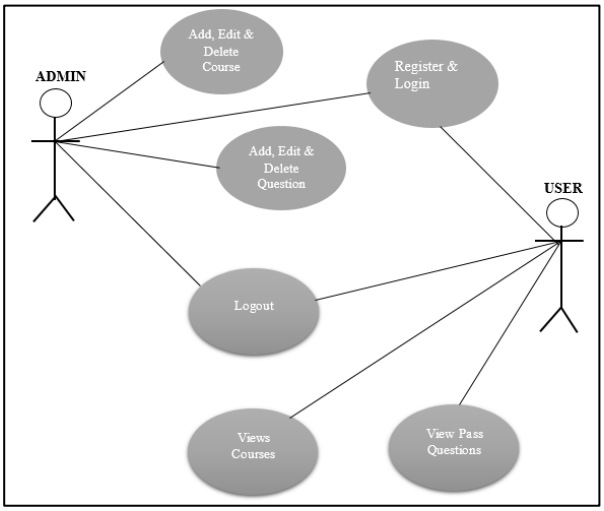


Figure 3. Use case diagram of the system

The database schema was formalized using an entity relationship (ER) model describing core entities: users, examination questions, courses, and access records, and their relationships to support structured content management and controlled access.

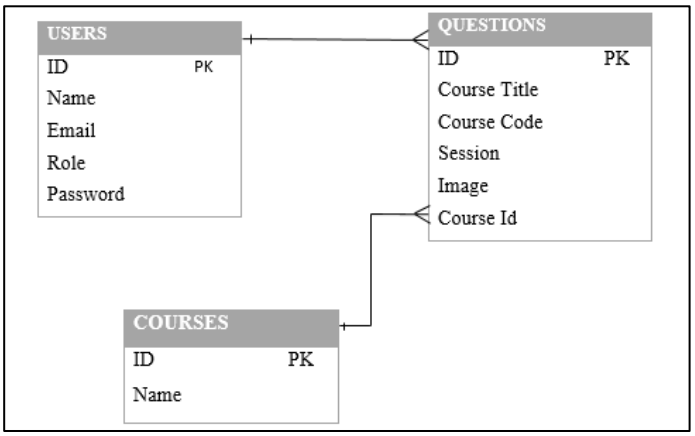


Figure 4. Entity relationship diagram of the system

Implementation used HTML/CSS with Bootstrap for the responsive interface, PHP for server-side logic and authentication workflows, and MySQL for persistent storage of credentials, examination content, metadata, and logs. The platform was deployed on an Apache web server. Evaluation after implementation included (i) functional testing against predefined requirements, (ii) usability assessment using task completion and satisfaction indicators among representative users, and (iii) security inspection targeting common web vulnerabilities in authentication and input handling.

Results and Discussion

Results

The implementation produced a functional web-based platform that supports structured academic resource management and controlled user interaction. Core modules authentication, question management, and content retrieval operated as expected, enabling administrative governance and user access to shared materials. Functional testing verified compliance with predefined requirements. Administrative test cases (Table 1) covered adding, editing, and deleting questions and courses, as well as login/logout operations; all executed successfully, indicating reliable support for content governance and platform management.

Table 1. Admin requirement testing

Test Id	Function	Description	Expected Result	Actual Result	Status
1	Add a new question	Admin tries to add a new question to the system	A new question has been added to the system	A new question was added to the system	Successful
2	Edit question	Admin tries to edit a question in the system	Question edited in the system	The question was edited in the system	Successful
3	Delete question	Admin tried to delete a question in the system	Question deleted in the system	The question was deleted in the system	Successful
4	Add a new course	Admin tries to add a new course to the system	New course added to the system	A new course was added to the system	Successful
5	Edit course	Admin tries to edit a course in the system	Question: Course edited in the system	The course was edited in the system	Successful
6	Delete course	Admin tries to delete a course in the system	Course in the system	The course was deleted from the system	Successful
12	Login	Admin tries to log in to the system	Admin logs in to the system	Admin was logged in to the system	Successful
13	Logout	Admin tries to log out of the system	Admin logs out of the system	Admin was logged out of the system	Successful

User-level functional testing addressed essential interactions: account creation, authentication, question search, and viewing, and all test cases succeeded (Table 2), suggesting stable support for routine academic use.

Table 2. User requirement testing

Test Id	Function	Description	Expected Result	Actual Result	Status
1	Create account	The user tries to create an account in the system	A new user created an account in the system	A new account was created in the system	Successful
2	Login	The user tries to log in to the system	The user logs in to the system	The user was logged in to the system	Successful
3	Logout	The user tries to log out of the system	User logs out of the system	The user logged out of the system	Successful
4	Search a question	The user tries to search for a question in the system	The user searches for a question in the system	The question was searched in the system	Successful
5	View a question	The user tries to view a question in the system	Users view a question in the system	The question was viewed in the system	Successful

Usability assessment indicated that representative users could navigate the interface and locate resources efficiently, consistent with the platform's intended information organization. Security inspection focused on input handling and access control. The team implemented input validation and sanitization to reduce risks such as SQL injection and unauthorized request manipulation.



```php
if (isset($_POST["register"])) {
    $name = $_POST["name"];
    $email = $_POST["email"];
    $password = $_POST["password"];

    // Input Validation/Sanitization
    $name = sanitizeInput($name);
    $email = sanitizeInput($email);

    // Check if user exists
    if (userExists($email)) {
        $error = "User already exists";
    } else {
        // Hash the password
        $encrypt_password = md5($password);

        // Insert into DB
        if (insertUser($name, $email, $encrypt_password)) {
            $success = "Registration successful";
        } else {
            $error = "Registration failed";
        }
    }
}
```

```php
// Function to sanitize input to prevent SQL injection and XSS
function sanitizeInput($input) {
    // Implement your input sanitization logic here
    // For example, use mysqli_real_escape_string() for SQL injection prevention
    // Use htmlspecialchars() for XSS prevention
    return $input;
}

// Function to check if a user exists in the database
function userExists($email) {
    global $connection;

    $email = mysqli_real_escape_string($connection, $email);
    $sql_check = "SELECT * FROM users WHERE email = '$email'";
    $query_check = mysqli_query($connection, $sql_check);

    return mysqli_fetch_assoc($query_check);
}

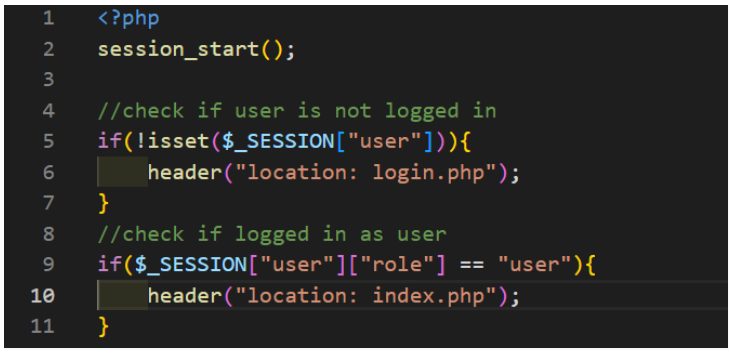
// Function to insert a new user into the database
function insertUser($name, $email, $password) {
    global $connection;

    $name = mysqli_real_escape_string($connection, $name);
    $email = mysqli_real_escape_string($connection, $email);
    $password = mysqli_real_escape_string($connection, $password);

    $sql = "INSERT INTO users(name,email,password) VALUES('$name','$email','$password')";
    $query = mysqli_query($connection, $sql);
```

Figure 5. Vulnerability testing

Access restriction checks confirmed that protected pages could not be reached without authorization, supporting baseline confidentiality expectations for user accounts and stored resources.



```php
<?php
session_start();

//check if user is not logged in
if(!isset($_SESSION["user"])){
    header("location: login.php");
}
//check if logged in as user
if($_SESSION["user"]["role"] == "user"){
    header("location: index.php");
}
```

Figure 6. Checking unauthorized access to other pages

The interface provided entry points for registration and login and supported administrative moderation and user content submission through dedicated pages.

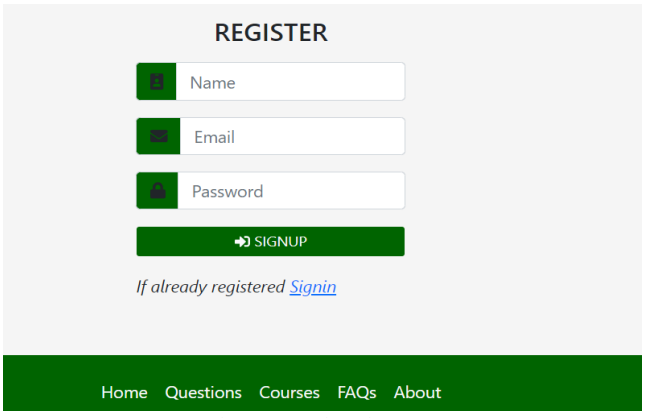


Figure 7. Registration page

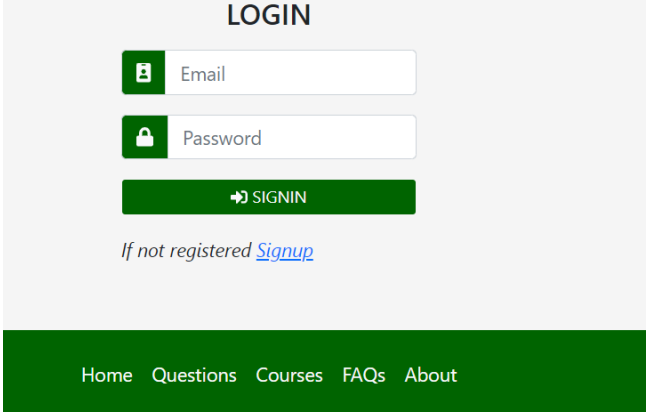


Figure 8. Login page

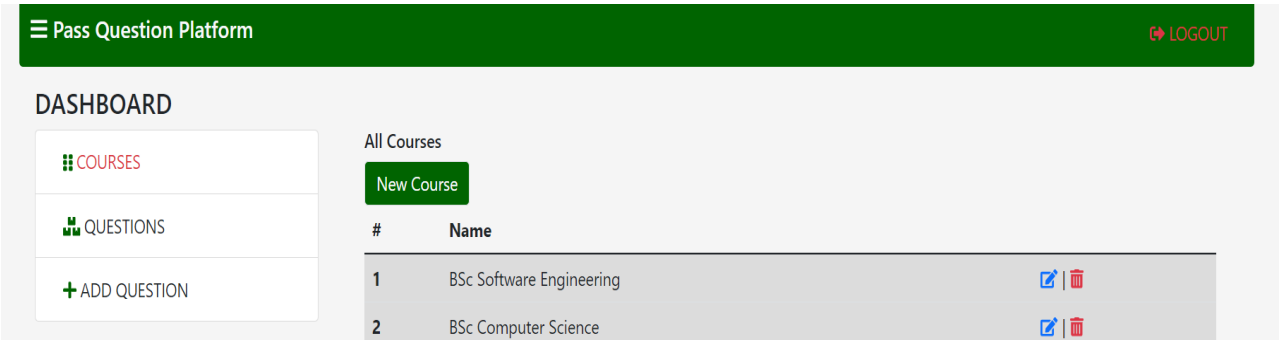


Figure 9. Admin dashboard

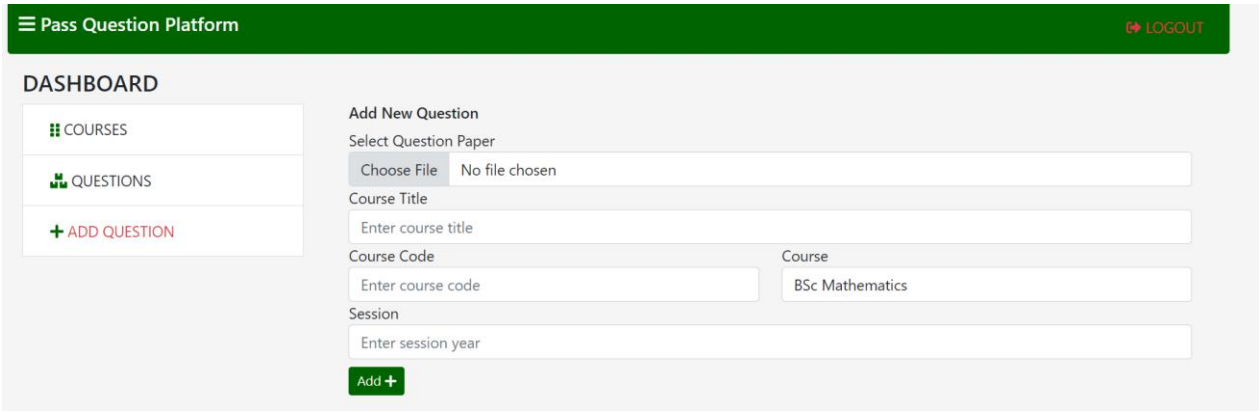


Figure 10. Question upload form

Iterative evaluation sessions with students, educators, and administrative users generated refinement actions, including adjustments to interface aesthetics for readability and revisions to access policies intended to balance content security with collaborative engagement. The team implemented these updates before final validation.

Discussion

The findings indicate that the platform met its technical objective of providing a stable and structured environment for sharing examination-related academic resources. Successful execution of functional test cases suggests that the architecture supported governance and user interaction in ways consistent with expectations for educational platforms that prioritize reliability and structured access (Zhou et al., 2024).

Usability outcomes align with instructional design arguments emphasizing the pedagogical value of clarity, predictable navigation, and well-structured information organization to reduce extraneous cognitive load (Ally, 2004). In line with Hennings and Nilsson (2023), the design implication is that usability enables learning: by reducing navigational friction, users can allocate more attention to interpreting resources and preparing for learning rather than managing the interface.

From a collaborative learning perspective, the platform operationalized peer-assisted knowledge sharing through regulated contribution and retrieval mechanisms. This aligns with evidence that digital collaboration becomes more educationally productive when interaction is structured and aligned with explicit learning objectives rather than left entirely unmoderated (Fasola & Abimbola, 2023; Qureshi et al., 2023). The implemented moderation and role-based controls therefore function not only as security features but also as pedagogical boundary conditions that can shape how resources are used.

The design choices also respond directly to concerns that past-exam repositories may encourage surface learning when access is unrestricted (Marachi & Quill, 2020). Role-based permissions, moderated submission, and restricted access to protected resources represent a governance-aware approach intended to mitigate rote reproduction and support more responsible engagement with assessment-oriented materials. This supports broader arguments that educational technologies contribute to learning outcomes when grounded in pedagogical intent and institutional safeguards (Khan & Khan, 2019; Lamanauskas & Makarskaitė-Petkevičienė, 2023). The system's modular architecture further suggests potential adaptability across contexts, although transferability still requires validation through multi-institutional evaluation.

Conclusions and Suggestions

Conclusions

This study shows that a governance-aware question-sharing platform can do more than serve as a passive repository by integrating usability, access control, and moderation into a socio-technical infrastructure that supports exam preparation and collaborative study. Functional testing confirmed that core administrative and user workflows were executed reliably, while usability assessment indicated that users could complete representative tasks with minimal navigational friction. Baseline security inspection further documented the implementation of input handling and access restrictions appropriate for platforms managing user accounts and academically sensitive resources.

The work contributes conceptually by positioning pass question sharing as an infrastructure problem in which educational value depends on how architecture, governance mechanisms, and interaction design are coupled. Practically, it offers an implementation pattern: a layered architecture with role-based permissions and moderated content workflows that institutions can adapt to expand access to examination resources without compromising assessment integrity.

Suggestions

Future work should extend evaluation beyond functional compliance toward outcome-oriented assessment, including longitudinal analysis of how platform use relates to learning strategies, assessment literacy, and academic performance. Integrating learning analytics and recommendation mechanisms may help explain which interaction patterns support productive preparation behaviors and which patterns correlate with surface learning. Multi-institutional studies are also needed to test scalability, interoperability with learning management systems, and alignment of data governance with institutional policies. Finally, broader stakeholder inclusion, lecturers, curriculum designers, and academic quality units, would strengthen conclusions about organizational feasibility and ethical boundaries for assessment material sharing.

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Author Contributions

Barira Hamisu formulated the research objectives, designed the study, and drafted the manuscript. Raji Abdullahi Egigogo designed the system architecture and implemented the authentication and role-based access controls. Mardiya Bagiwa designed the database and developed the modules for organizing, searching, and retrieving past examination questions. Ismail Jugulde Babaji coordinated the platform evaluation, documented the functional and preliminary security checks, and summarized the test results. All authors reviewed and approved the final manuscript.

Research Ethics and Informed Consent

The authors obtained institutional permission to conduct the study. The relevant institutional authority determined that formal ethics approval was not required.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Tables 1 and 2 report the functional test cases and their outcomes. Respondent-level data from the platform evaluation are not included in the article.

Declaration of Generative AI Use

Gemini AI was used solely for language editing to improve the manuscript's clarity and readability. The authors take full responsibility for the manuscript's accuracy, originality, validity, confidentiality, and integrity.

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