

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

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## Abstract

The increasing reliance on digital learning environments in higher education has not eliminated students' difficulty in obtaining examination resources that are both academically credible and systematically organized, particularly for peer-assisted study. A web-based question-sharing platform was therefore designed and implemented to provide structured access to past examination materials within a governed collaborative environment. The platform was built using HTML, Bootstrap, PHP, and MySQL and incorporated secure authentication, role-based content management, and controlled resource sharing. System evaluation was carried out through functional testing, usability assessment, and security inspection involving undergraduate students and academic administrators; usability was captured using task completion rates and user satisfaction indicators. The evaluation documented stable system operation across core modules, high task success rates, and baseline protection against common web vulnerabilities through input validation and access restrictions. The platform also supported more consistent access to examination resources and fostered collaborative preparation practices by enabling regulated contribution and retrieval of materials. This work contributes design-oriented evidence to educational technology research by demonstrating how governance-aware architecture and usability-driven implementation can strengthen collaborative learning support without weakening assessment integrity in higher education contexts.

*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 availability of resources has not consistently translated into access to academically credible, well-structured materials, especially for examination preparation and assessment literacy (Zhou et al., 2024).

Within 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

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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 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, offering limited insight into how design choices shape accessibility, collaborative engagement, and examination preparedness in higher education contexts.

To address this gap, the present work designs and implements a web-based question-sharing platform integrating 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. System design specified 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).

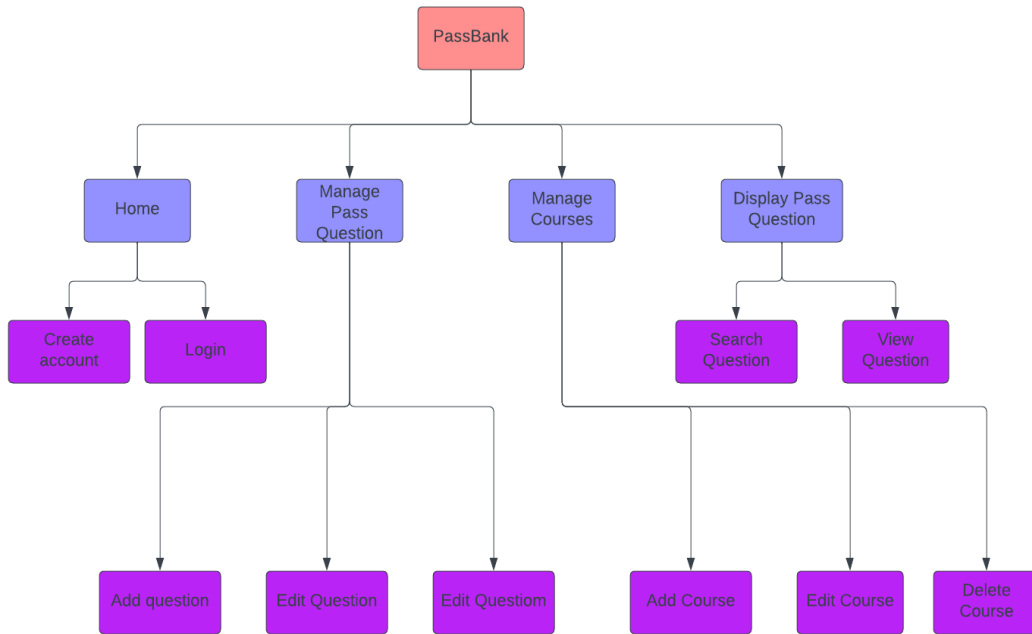


Figure 1. Structural design of the system

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

Physical deployment and component allocation were represented in the physical design diagram to clarify hosting and runtime interactions among the application server and database services.

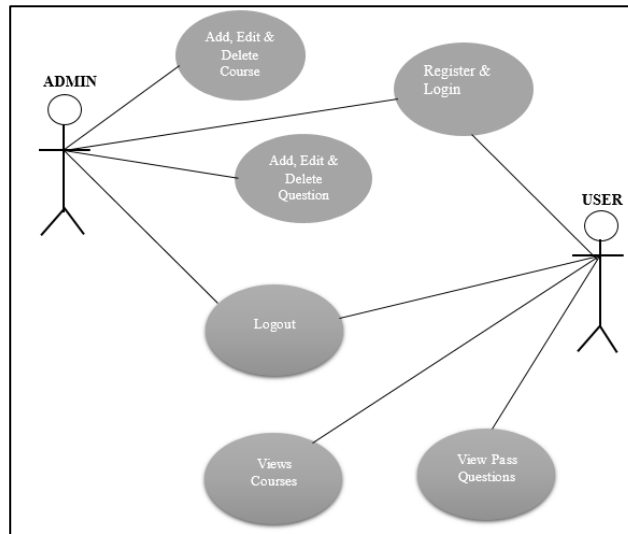


Figure 3. Use case diagram of the system

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.

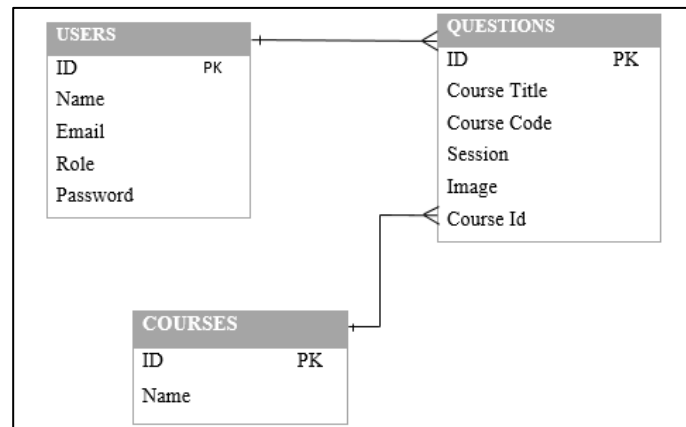


Figure 4. Entity relationship diagram of the system

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

### Result

Implementation produced a functional web-based platform supporting 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 tries 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 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 tried 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 into 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 into 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. Input validation and sanitization were implemented to reduce risks such as SQL injection and unauthorized manipulation of requests.

```

54  if (isset($_POST["register"])) {
55      $name = $_POST["name"];
56      $email = $_POST["email"];
57      $password = $_POST["password"];
58
59      // Input Validation/Sanitization
60      $name = sanitizeInput($name);
61      $email = sanitizeInput($email);
62
63      // Check if user exists
64      if (userExists($email)) {
65          $error = "User already exists";
66      } else {
67          // Hash the password
68          $encrypt_password = md5($password);
69
70          // Insert into DB
71          if (insertUser($name, $email, $encrypt_password)) {
72              $success = "Registration successful";
73          } else {
74              $error = "Registration failed";
75          }
76      }
77  }
78
79  // Function to sanitize input to prevent SQL injection and XSS
80  function sanitizeInput($input) {
81      // Implement your input sanitization logic here
82      // For example, use mysqli_real_escape_string() for SQL injection prevention
83      // Use htmlspecialchars() for XSS prevention
84      return $input;
85  }
86
87  // Function to check if a user exists in the database
88  function userExists($email) {
89      global $connection;
90
91      $email = mysqli_real_escape_string($connection, $email);
92      $sql_check = "SELECT * FROM users WHERE email = '$email'";
93      $query_check = mysqli_query($connection, $sql_check);
94
95      return mysqli_fetch_assoc($query_check);
96  }
97
98  // Function to insert a new user into the database
99  function insertUser($name, $email, $password) {
100     global $connection;
101
102     $name = mysqli_real_escape_string($connection, $name);
103     $email = mysqli_real_escape_string($connection, $email);
104     $password = mysqli_real_escape_string($connection, $password);
105
106     $sql = "INSERT INTO users(name,email,password) VALUES('$name','$email','$password')";
107     $query = mysqli_query($connection, $sql);
108 }

```

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.

```

1  <?php
2  session_start();
3
4  //check if user is not logged in
5  if(!isset($_SESSION["user"])){
6      header("location: login.php");
7  }
8  //check if logged in as user
9  if($_SESSION["user"]["role"] == "user"){
10     header("location: index.php");
11 }

```

Figure 6. Checking unauthorised access to other pages

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

Signin'. At the bottom of the page, there is a green navigation bar with white text: 'Home Questions Courses FAQs About'."/>

Figure 7. Registration page

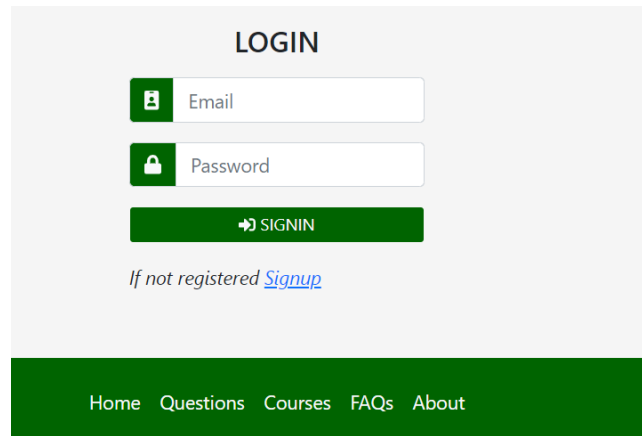


Figure 8. Login page

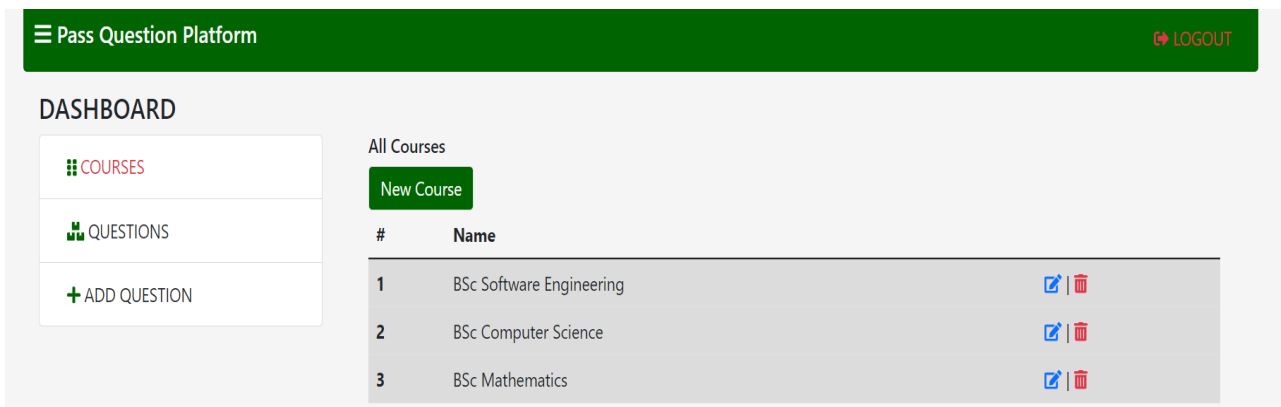


Figure 9. Admin dashboard

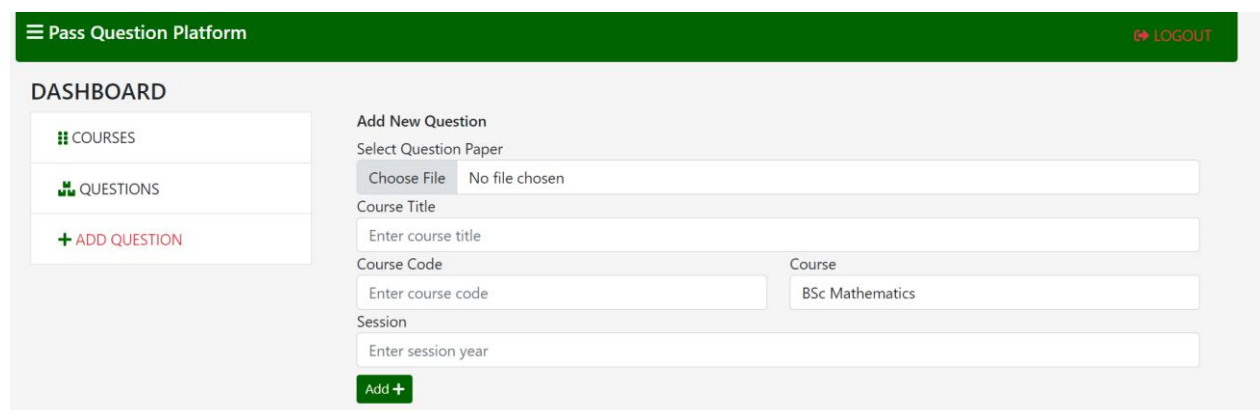


Figure 10. Question upload form

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. These updates were implemented 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 are consistent with instructional design arguments that emphasize the pedagogical relevance of clarity, predictable navigation, and well-structured information organization for reducing extraneous cognitive load (Ally, 2004). In line with Hennings and Nilsson (2023), the design implication is that usability functions as a learning enabler: by reducing navigational friction, more attention can be allocated to resource interpretation and preparation activities rather than interface management.

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; Lamanuskas & 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 demonstrates that a governance-aware question-sharing platform can function as more than a passive repository by integrating usability, access control, and moderation into a socio-technical infrastructure that supports examination 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 of a layered architecture with role-based permissions and moderated content workflows that institutions can adapt when seeking 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 data governance alignment 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.

### **References**

- Adeshina, A. E. (2024). The transformative role of digital resources in teaching and learning. *Open Journal of Educational Development*, 5(1), 1–9. <https://doi.org/10.52417/ojed.v5i1.520>
- Aithal, P. S., & Maiya, A. K. (2023). Innovations in higher education industry—Shaping the future. *International*

- Journal of Case Studies in Business, IT, and Education (IJCSBE), 7(4), 283–311. <https://doi.org/10.47992/IJCSBE.2581.6942.0321>
- Ally, M. (2004). Foundations of educational theory for online learning. In *Theory and practice of online learning* (2nd ed., pp. 15–44). Athabasca University Press. <https://doi.org/10.15215/aupress/9781897425084.003>
- Alshamrani, A., & Bahattab, A. (2015). A comparison between three SDLC models: Waterfall model, spiral model, and incremental/iterative model. *International Journal of Computer Science Issues (IJCSI)*, 12(1), 106–111.
- Ebbini, E. (2023). Enhancing collaborative and self-paced learning in traditional and distance education settings. In *Higher education in the Arab world: E-learning and distance education* (pp. 223–245). Springer. [https://doi.org/10.1007/978-3-031-33568-6\\_12](https://doi.org/10.1007/978-3-031-33568-6_12)
- Elkhatat, A. M. (2022). Practical randomly selected question exam design to address replicated and sequential questions in online examinations. *International Journal for Educational Integrity*, 18(1), Article 8. <https://doi.org/10.1007/s40979-022-00103-2>
- Fasola, O. S., & Abimbola, M. O. (2023). Collaborative technology for information sharing, knowledge creation and management in libraries. *Gateway Information Journal*, 24(1–2), 33–46.
- Hassan, G. (2023). Technology and the transformation of educational practices: A future perspective. *International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBA)*, 3(1), 1596–1603. <https://doi.org/10.54443/ijebas.v3i1.1136>
- Hennings, M., & Nilsson, E. (2023). Implementation and evaluation of a web-based learning management system. (Manuscript or technical report).
- Hossain, M. (2018). Motivations, challenges, and opportunities of successful solvers on an innovation intermediary platform. *Technological Forecasting and Social Change*, 128, 67–73. <https://doi.org/10.1016/j.techfore.2017.10.018>
- Kaur, H. (2024). Online education: Trends and its importance. (Manuscript).
- Kauschinger, M., Krcmar, H., Schrieck, M., & Boehm, M. (2021). Knowledge sharing in digital platform ecosystems: A textual analysis of SAP’s developer community. In *Innovation through information systems: Volume II* (pp. 21–39). Springer. [https://doi.org/10.1007/978-3-030-86797-3\\_2](https://doi.org/10.1007/978-3-030-86797-3_2)
- Khan, S., & Khan, R. A. (2019). Online assessments: Exploring perspectives of university students. *Education and Information Technologies*, 24(1), 661–677. <https://doi.org/10.1007/s10639-018-9797-0>
- Kircz, J. (2005). Institutional repositories, a new platform in higher education and research. (White paper).
- Krisbiantoro, B., & Pujiani, T. (2023). Examining the utility and performance of online scoring rubrics in the context of educational assessment. In *Conference on English Language Teaching* (pp. 313–329).
- Lamauskas, V., & Makarskaitė-Petkevičienė, R. (2023). Distance education quality: First-cycle university students’ position. *Contemporary Educational Technology*, 15(3), 1–14. <https://doi.org/10.30935/cedtech/13243>
- Liu, P. (2024). Optimizing self-paced learning in machine learning education for working professionals: Strategies, trends, and insights. In *International conference on human-computer interaction* (pp. 120–136). Springer. [https://doi.org/10.1007/978-3-031-76815-6\\_10](https://doi.org/10.1007/978-3-031-76815-6_10)
- Liu, Y., & Wu, L. (2021). Personalized learning in online education: A review and meta-analysis. *Computers & Education*, 166, 104142.
- Malpartida, W. M. F. (2023). University students’ perspectives of face-to-face and online education: A language learning comparison prior and during COVID-19. *International Journal of Instruction*, 16(4), 707–724. <https://doi.org/10.29333/iji.2023.16440a>
- Marachi, R., & Quill, L. (2020). The case of Canvas: Longitudinal datafication through learning management systems. *Teaching in Higher Education*, 25(4), 418–434. <https://doi.org/10.1080/13562517.2020.1739641>
- Mohan, V. (2022). System development life cycle. In *Clinical informatics study guide: Text and review* (pp. 177–183). Springer. [https://doi.org/10.1007/978-3-030-93765-2\\_12](https://doi.org/10.1007/978-3-030-93765-2_12)
- Pincioli, F., Justo, J. L. B., & Forradellas, R. (2022). Systematic mapping study: On the coverage of aspect-oriented methodologies for the early phases of the software development life cycle. *Journal of King Saud University–Computer and Information Sciences*, 34(6), 2883–2896. <https://doi.org/10.1016/j.jksuci.2020.10.029>
- Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2023). Factors affecting students’ learning performance through collaborative learning and engagement. *Interactive Learning Environments*, 31(4), 2371–2391. <https://doi.org/10.1080/10494820.2021.1884886>
- Salunke, V. M., & More, S. (2025). Design and development of a digital platform for peer-to-peer book exchange.

- International Journal of Advanced Research in Science, Communication and Technology, 31–37. <https://doi.org/10.48175/IJAR SCT-23205>
- Smarandache, A., & Popescu, E. (2024). Designing a collaborative learning platform based on learnersourcing and gamification. *Interaction Design and Architecture(s)*, 62, 41–53. <https://doi.org/10.55612/s-5002-062-003>
- Zhou, L., Gong, Z., & Xiang, P. (2024). Distributed computing and inference for big data. *Annual Review of Statistics and Its Application*, 11. <https://doi.org/10.1146/annurev-statistics-040522-021241>
- Zibani, P., Rajkoomar, M., & Naicker, N. (2022). A systematic review of faculty research repositories at higher education institutions. *Digital Library Perspectives*, 38(2), 237–248. <https://doi.org/10.1108/DLP-04-2021-0035>