

Artificial Intelligence for improving e-learning: Opportunities, limits, and design principles

Radiant Journal of Business & Sustainability

ISSN (Print),

ISSN (Online)

Volume 1, Issue 1, February 2026

DOI:

www.radiantpublisher.com

Abrar Salim AlKathiri^{1*}, Maryam Saif AlHarrasi¹, Thuraya Nasser AlMaskr¹, & Husna Nasser Almaskari¹, Yasir Mohamed Abdulgadir², Akbar Khanan², & Mohamed Ezzeldin A. Bashir²

Abstract

Artificial intelligence is changing how students learn online. Evidence from classrooms remains limited and sometimes inconsistent. This study tests AI support within real e-learning courses. We used a quasi-experimental design across two undergraduate courses. One section received AI tools embedded in the LMS. Another section used standard materials without AI features. The Courses were Management Information Systems at a public university. Students accessed materials using laptops and mobile phones. The chatbot explained concepts and answered questions. Adaptive quizzes adjusted difficulty using aligned item banks. Recommendations surfaced videos and readings from the course. Control sections received identical content without automation. We balanced instructors, topics, and assessments across sections. The intervention lasted eight teaching weeks. Intervention fidelity was monitored through weekly instructor checklists. We measured learning gains with aligned pretests and posttests. Engagement came from system logs of sessions and interactions. A validated survey captured satisfaction and perceived usefulness. All students provided consent under approved ethics procedures. We examined outcomes using mixed-effects models controlling for relevant variables. AI sections outperformed controls in posttests after controlling for baseline. More sessions and faster feedback cycles resulted in higher engagement. Students reported higher satisfaction and greater sense of supervision. Instructors reported reduced grading load for routine tasks. We observed no clear rise in integrity violations. Adoption required onboarding time and careful data governance. The Short duration and single institution limit generalizability. AI can augment teaching when aligned with course pedagogy. Future work should test longer deployments across diverse contexts. We provide practical guidelines for responsible classroom adoption.

Keywords: Artificial intelligence, E-learning, Smart education, AI applications, Modern technology teaching, Adaptive Learning.

INTRODUCTION

Artificial intelligence has modernized education, developed new teaching and learned methods. It has also broadened the horizons of scientific and intellectual research and discovery through e-learning environments. Artificial intelligence is defined as the human capacity to understand information, process complex operations, and solve problems, thus contributing to the development of advanced learning environments capable of effectively identifying and supporting learners' needs (Wang, Wang, Zhu, Wang, Tran, & Du, 2024).

¹ Management Information System College of Business Administration, Oman

² Department of Information Systems and Business Analytics, College of Business Administration, Sharqiyah University Ibra, Oman

* Corresponding Author Email: 2213725@asu.edu.om

Recent studies have employed how to deal with artificial intelligence in the field of education, especially the emergence of artificial intelligence systems such as chatGPT and deepseek (Ilgaz & Celik, 2023).

One of the problems we face today is that some students have difficulty understanding certain professors due to differences in their abilities and teaching styles. Traditional teaching methods cannot meet the needs of all students, leading to a decline in academic performance and an inability to grasp course material. For this reason, smart programs have been developed to facilitate self-learning. Artificial intelligence plays a crucial role in creating these systems by improving student performance.

Artificial intelligence can present some challenges when used, such as sporadic errors or difficult-to-understand results due to insufficient data. Slow performance or irresponsiveness can also result from a weak internet connection. Other common problems include errors in analyzing texts in multiple languages and over-reliance on AI instead of its own analysis. Concerns about data security and privacy can also arise, especially when sensitive information is disclosed. Furthermore, beginners may find it challenging to understand some system settings or user interfaces for certain applications (Chiu et al. 2023)

To solve these problems, it is necessary to use artificial intelligence methods, develop students' skills, and increase their mental abilities using modern technologies effectively.

In summary, this research includes a review of studies related to artificial intelligence in education, the problems that led to the use of artificial intelligence, and how artificial intelligence solved these problems.

Research Objectives

- 1)Creating educational artificial intelligence applications.
- 2)Raising the standard of instruction Assisting students in their studies.
- 3)Examining contemporary teaching techniques and using artificial intelligence them into Importance.
- 4)examines how artificial intelligence platforms assist learning processes.

Related Work

1)Tamkeen Education

This is an initiative in Oman, a private educational institution offering modern educational programs and creating a smart learning environment using online devices and software. However, registration fees are required for this initiative, while our program is free (MyTamkeen).

2)INZINT LLC

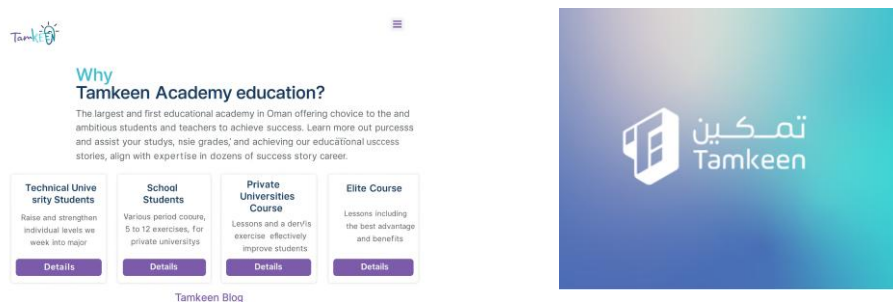


Figure 1: Tamkeen

INZINT provides AI-driven learning solutions in Oman, such as customized learning routes, chat apps for help, and learning analytics.

This company's use of AI in education makes it stand out in the Smart Learning Programs area.

This demonstrates the effective use of AI in education—not just as a tool, but AI-driven learning approach. (12)



Figure 2: Inzint

3) Onsor Technologies

This Omani company developed a 3D teaching tool called the "AMAD Device" that enables students to interact with 3D content without the need for specialised eyewear.

- Maadh bin Ahmed al Hinai, the CEO and founder, claims that technology aims to improve knowledge of complicated topics that are hard to see and comprehend.
- Why is this a good example? Because it shows how Oman's educational technology (EdTech) is growing both domestically and internationally (Onsor)

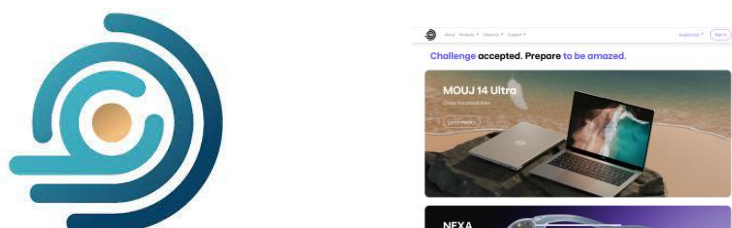


Figure 3:

Artificial intelligence (AI) is a branch of computer science that aims to enable computers or software to think and learn like humans. While these programs and technologies exist, AI is fundamentally used to develop modern educational technologies.

What distinguishes our program from other programs is that it is fast, easy to use, and a platform that students can benefit from in their studies.

Significances of the Study

The study emphasizes how crucial it is to evaluate these tools' capacity to help students by coming up with solutions, posing queries, and demystifying difficult ideas, making them useful extra learning resources that may be used outside of the classroom. Additionally, the research highlights the enormous potential of these technologies to improve the learning process, while cautioning about the possibility that they may occasionally provide incorrect information. The study's results are a crucial step in improving our understanding of how to integrate artificial intelligence into medical education in an efficient and secure manner. Additionally, they pave the way for further research that will aid in the creation of novel instructional strategies.

LITERATURE REVIEW

Artificial intelligence (AI) is a subfield of computer science concerned with understanding human thought processes and reproducing their effects through information systems. The primary goal of AI is to create intelligent systems (i.e., computer programs or machines) capable of intelligent behaviors to enhance education, including learning, reasoning, problem-solving, perception, and creativity. Expert systems and neural networks (including machine learning and deep learning techniques) are common examples of AI technologies.

Strong and weak AI are frequently distinguished by scientists (Wells, 2023). Strong AI, sometimes referred to as artificial general intelligence (AGI), can multitask and has a wide range of human abilities, such as communication, logic, and emotional reactions. On the other hand, weak AI, also referred to as narrow AI, can employ algorithms to solve issues or carry out jobs, like playing chess and detecting fraud, but it lacks the complete range of human talents. Weak AI refers to AI applications that have been created and are presently being used for business purposes.

Since the advent of AI in the mid-1950 s, AI technologies have been increasingly applied to facilitate education and training in various subjects, including language, STEM, and medicine (Perrotta & Selwyn, 2020). To date, AIED applications are developed to support teaching and learning activities such as content preparation and dissemination, interactions and collaboration, and performance assessment (Wang et al., 2024)

Platform	Gaps	How Our Platform Improves These Gaps
Tamkeen Education	Tamkeen Education restricts access for households who cannot afford private educational services by requiring pupils to pay registration fees. Although the program offers cutting-edge digital resources, its learning system is not completely customised, so students might not receive assistance that meets their unique learning requirements. Because of this, the platform provides little flexibility for students who require reasonably priced, personalised educational options.	All students, regardless of their financial situation, can use our platform because it is totally free. It offers individualised, readiness-based instruction that adjusts to the developmental stage of each kid, guaranteeing that each learner advances at a rate appropriate to their skills. Additionally, the platform offers straightforward, user-friendly features that make early learning interesting, doable, and successful for both parents and kids—all without the expense or technical complexity.
INZINT LLC	Although INZINT uses very sophisticated artificial intelligence, its tools are mostly intended for adult learners rather than young children. The platform's analytics, data tracking, and personalised learning paths are useful for older children, but they don't directly promote parent-child engagement or early reading readiness.	Our platform was designed specifically to provide young pupils, ages three to six, with a developmentally appropriate learning environment that fosters early reading skills. It seeks to build strong literacy foundations by stimulating the brain's natural reading mechanisms through age-appropriate activities, incremental skill development, and readiness-based learning. Additionally, the program provides gamified and interactive experiences that keep kids interested while they learn, making reading enjoyable and stress-free. Additionally, the platform promotes parental involvement by providing activities and resources that parents may do at home to assist their child's educational path.
Onsor Technologies (AMAD Device)	The AMAD Device from Onsor Technologies has several drawbacks that limit its usability and instructional potential. First, many schools and families cannot afford the system since it requires specialised 3D technology, which is very expensive. Its wider adoption is hampered by this cost. Furthermore, the technology does not promote early reading development or offer AI-based personalised learning that adjusts to each learner's needs because its primary purpose is 3D	By operating seamlessly on common smartphones and tablets, our platform provides a more inclusive and accessible solution by doing away with the need for any specialised or costly equipment. Our platform employs artificial intelligence to enhance early reading development through individualised, readiness-based learning experiences, in contrast to tools that just concentrate on visual engagement. Additionally, it is made to be used at home and at school, so kids may learn anywhere

visualisation. The gadget's restricted applicability at home due to its equipment requirements makes it less useful for ongoing education outside of the classroom.

and at any time. This flexibility guarantees that every child may benefit from high-quality, AI-enhanced learning without facing financial or technological obstacles, promotes accessibility, and supports educators and parents.

METHODOLOGY

Paragraph on Suggested Methodology

To investigate empirical studies on the application of artificial intelligence in online learning and remote education, a systematic review technique was used in this work. Using predetermined inclusion criteria, including research kind, publication year, and educational environment, pertinent studies were gathered from many scientific databases. After that, the chosen studies were vetted, classified, and examined to determine the main advantages—such as better academic performance, tailored learning as well as the main drawbacks, such as privacy and data security risks. Because of their systematic approach, the researchers were able to provide informed recommendations for the future use of AI in educational contexts.

Artificial intelligence in e-learning targets a few groups, the most significant of which are adult learners who wish to learn new (Goru-Dogan, Dogan, Bozkurt, 2023)

Target Market

Artificial intelligence in e-learning targets a number of groups, most notably adult learners who want to learn new skills through flexible, AI-enhanced learning platforms, companies that use smart training platforms to develop their employees' skills, teachers who are looking for tools to help them prepare lessons and monitor student progress, and school and university students who need personalized learning and additional support.

Functional Requirements

Artificial intelligence systems must be able to process and analyze data to discover patterns. They must also be capable of continuous learning to improve over time. To communicate with users, they must be able to understand natural language, make predictions, and make judgments based on available information. Furthermore, they must be able to interact with other systems to maintain data security and privacy, tailor themselves to each user's needs, and perform tasks automatically with minimal human intervention.

Non-Functional Requirements

AI systems in e-learning offer unique performance characteristics, including rapid response, accurate results, and high reliability to ensure business continuity. Furthermore, they must feature a user-friendly design that encourages interaction and be scalable to handle large numbers of students without compromising quality. Adherence to ethical standards in information processing and decision-making is paramount, and security and data protection are essential to safeguarding learner privacy.

System Analysis and Design (Entity Relationship Diagram)

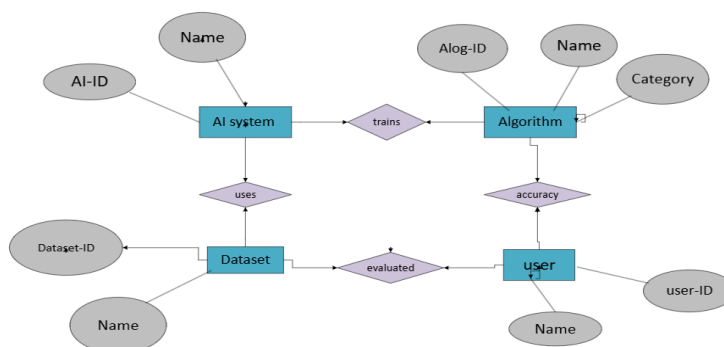


Figure 4: Entity Relationship Diagram

This diagram illustrates the relationships within the system. The AI system uses a database, trains an algorithm, and the algorithm is measured based on user interaction. The user then evaluates the database.

Artificial Intelligence Interface

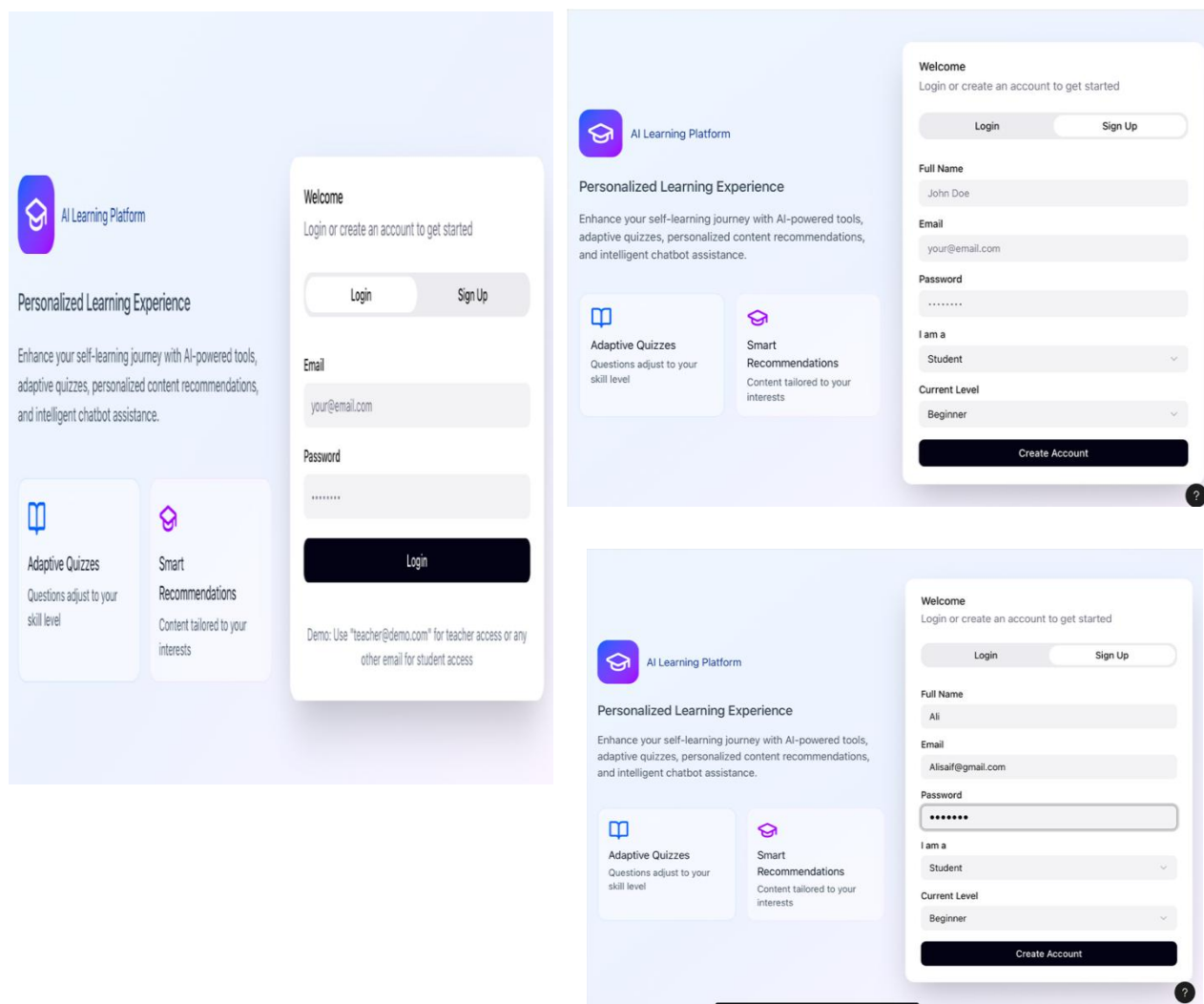


Figure 5: AI Learning Platform – Login and Sign-Up Interface

The AI learning platform's login interface for both teachers and students is made to be easy to use. It offers two primary choices: Sign Up for new users and Login for current users. Users choose between being a teacher or a student after entering their full name, email address, and password during registration. To provide tailored recommendations and adaptive quizzes, students also indicate their current learning level (e.g., Beginner, Intermediate, Advanced). This simplified procedure guarantees safe access while enabling the platform to customize the learning process according to user type and proficiency.

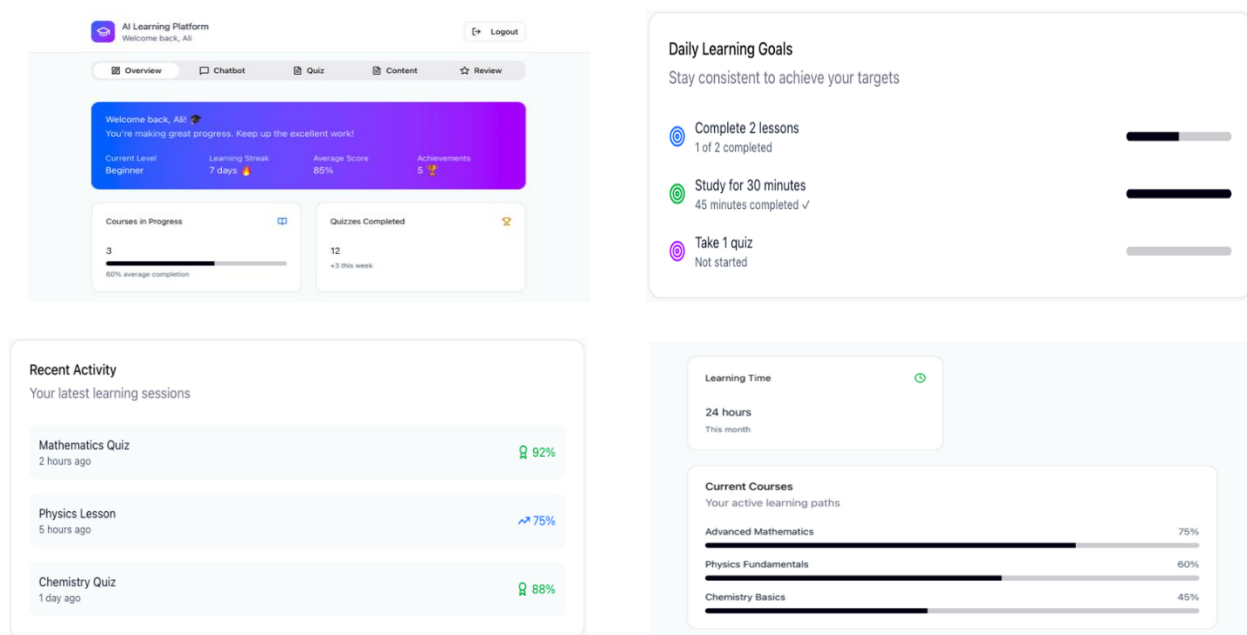


Figure 6: Student Dashboard on the AI Learning Platform

The AI learning platform's student dashboard, which is intended to offer a customized learning experience, is seen on the second page. At the top are the user's accomplishments, average score, learning streak, and current level. The progress in ongoing courses, the number of quizzes finished, and the overall amount of time spent learning each month are displayed below. Along with progress indicators, daily learning objectives including finishing classes, studying for a predetermined amount of time, and taking quizzes are displayed on the right. To assist students, monitor their progress and maintain motivation, the page also features a recent activity area that highlights the most recent quizzes and classes finished along with performance percentages.

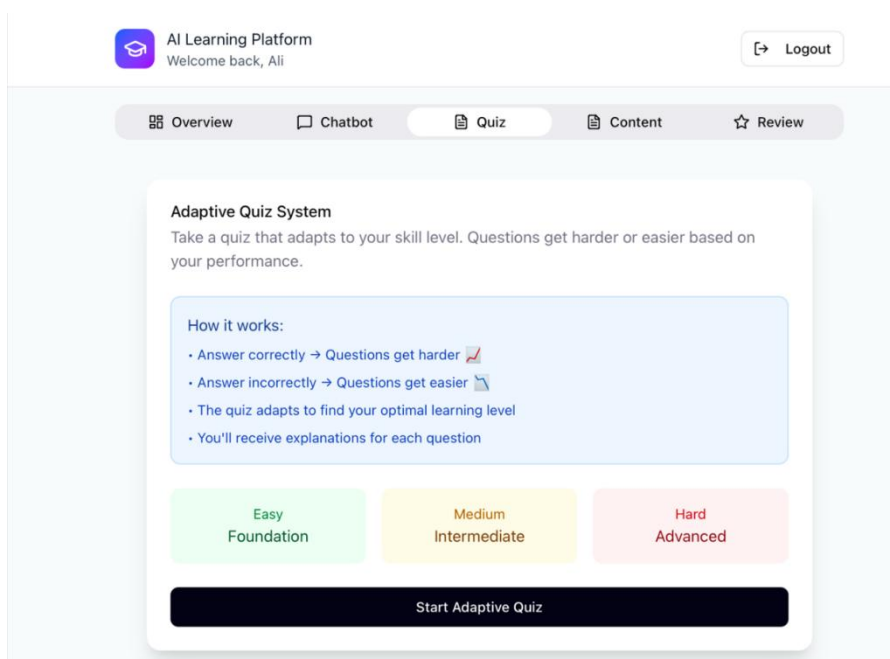


Figure 7: Adaptive Quiz Page on the AI Learning Platform

Adaptive Quiz Page on the AI Learning Platform

The Adaptive Quiz interface, located on the third page, enables students to take tests that dynamically adapt to their level of proficiency. To provide a customised learning experience, the system increases question difficulty when answers are correct and decreases difficulty when responses are incorrect. It seeks to determine the learner's ideal level and offers explanations for every question. Before selecting the Start Adaptive Quiz button to get started, users can select from three starting levels at the bottom: Easy (Foundation), Medium (Intermediate), or Hard (Advanced). This feature keeps students engaged and challenged while allowing them to advance at their own speed.

Figure 8: AI Learning Platform Customized Content Page

AI Learning Platform: Customised Content Page the Personalised Content Recommendations interface, located on the fourth page, offers students customised study materials according to their interests, learning history, and current level. It emphasises at the top that content ratings, level matching, and progress monitoring are used to generate recommendations. Users can select from tabs like Recommended for You, All Content, or In Progress below, as well as filter disciplines like Biology, Chemistry, Physics, and Mathematics. The topic title, difficulty level (beginner, intermediate, and advanced), expected time, rating, enrolment numbers, and choices to Start Learning, Continue, or see Details are all displayed on each suggested course card. To assist their individualised learning path, this website makes sure that students receive the most pertinent and interesting content.

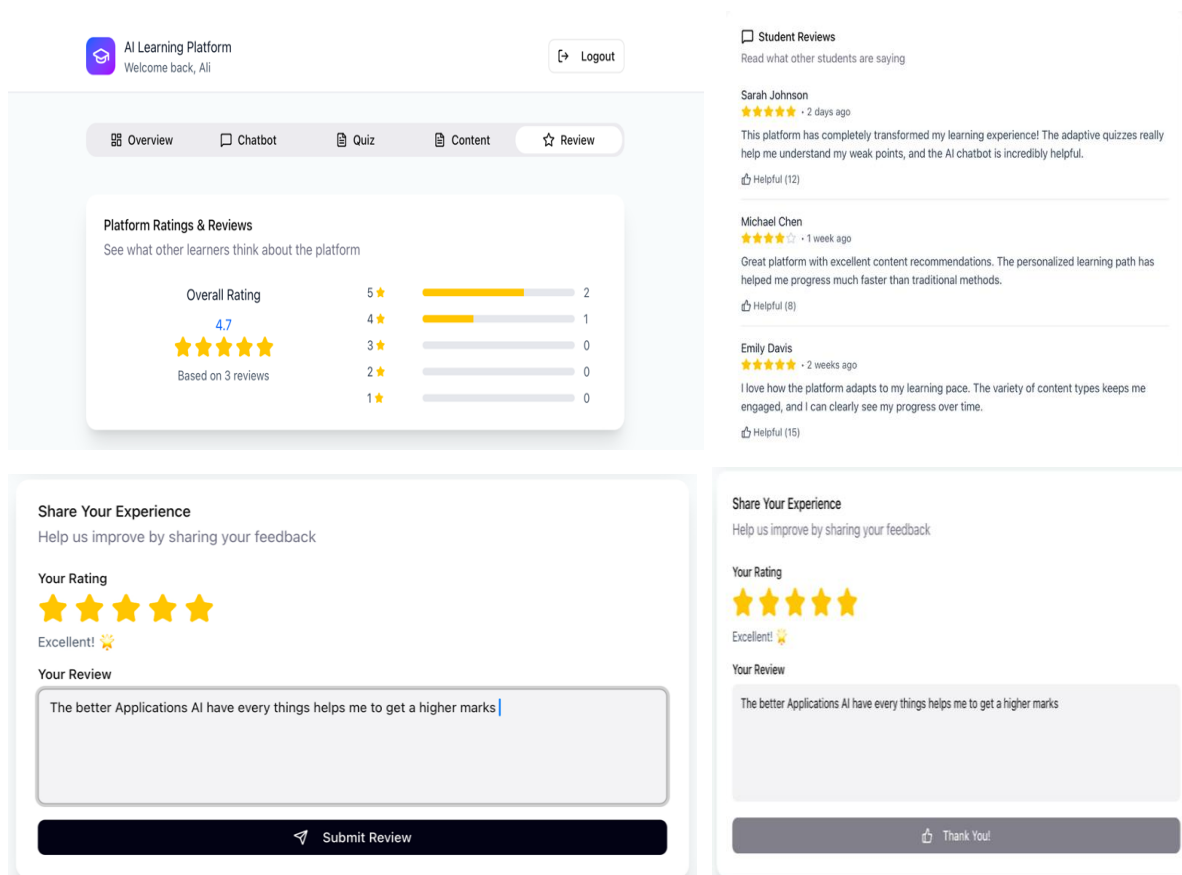


Figure 9: Ratings and Reviews Page for the AI Learning Platform

Ratings and Reviews Page for the AI Learning Platform the Ratings and Reviews feature, located on the fifth page, allows students to share their personal platform experiences and read user reviews. It shows a breakdown of ratings from 1 to 5 stars at the top, along with the overall rating (4.7 stars) based on several reviews. Learners' thorough comments about their experiences using AI chatbot support, tailored content, and adaptive tests are displayed in the Student Reviews section below. Lastly, users can rate and evaluate the platform using the Share Your Experience form, which helps to improve it and aid future learners. By displaying actual user input, this page promotes openness and community involvement.

RESULTS AND DISCUSSION

This section presents the review's findings, focusing on the study's contribution to the development of artificial intelligence in education. It provides a comprehensive and clear overview of the numerous applications of AI, highlighting its advantages and the challenges that must be addressed for its successful adoption (Garzon, Patino, & Marulanda, 2025) The study also considers how AI is used differently in different nations, academic fields, educational levels, types of AI, scientific developments, and journal publication rates. This method makes it possible to pinpoint the most important areas for further educational advancement. A thorough list of the assessed studies, all computer-generated, is included in the review along with a wide range of analysed findings (Bond, Bedenlier, & Handel, 2024).

Recommendations

The role of the teacher in the classroom is changing significantly because of the growing reliance on AI technology, according to reports from the U.S. Department of Education on artificial intelligence and the future of education. The role of the teacher is shifting away from only imparting knowledge and towards helping students develop their analytical and

critical thinking abilities. The findings also highlight how intelligent systems are useful instruments for raising the calibre of education because they have sophisticated features including precisely monitoring student progress, customising information to their skills, and giving prompt feedback.

Along with the necessity of integrating artificial intelligence into education in a student-centered manner that promotes student interaction and participation without undermining the importance of the teacher's human role, the recommendations also call for enhancing collaboration between the education and technology sectors to create creative and secure educational solutions (U.S. Department of Education, 2023).

CONCLUSION

Artificial intelligence, to put it briefly, is a paradigm change in education, changing the educational process from a uniform traditional model to a flexible dynamic learning system that is central on the learner as an individual with his own specific requirements and abilities. Artificial Intelligence is now a strategic collaborator in creating the future of education, not only auxiliary technology. According to recent studies, the effective use of AI in education depends on its ethical and responsible deployment, with explicit policies in place to safeguard data and guarantee digital equity for all students. Therefore, ensuring that education benefits effectively and sustainably from modern technologies requires finding a balance between technological capabilities and maintaining humanistic educational principles (Bond, Bedenlier, & Handel, 2024).

Reference

- Bond, M., Bedenlier, S., & Händel, M. (2024). A meta-systematic review of artificial intelligence in higher education: Trends, issues, and opportunities. *International Journal of Educational Technology in Higher Education*.
- Chiu, T. K. F., Xia, Q., Zhou, X., Chai, C. S., & Cheng, M. (2023). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Educational Technology & Society*.
- Garzón, J., Patiño, E., & Marulanda, C. (2025). Systematic review of artificial intelligence in education: Trends, benefits, and challenges. *Multimodal Technologies and Interaction*.
- González-Pérez, L. I., & Ramírez-Montoya, M. S. (2022). Components of Education 4.0 in 21st century skills frameworks: A systematic review. *Sustainability*, 14, Article 1493. <https://doi.org/10.3390/su14031493>
- Goru Dogan, T., Dogan, M. E., & Bozkurt, A. (2023). A systematic review of empirical research on artificial intelligence (AI) in online and distance education processes. *Applied Sciences*, 13(5), Article 3056. <https://doi.org/10.3390/app13053056>
- Ilgaz, H. B., & Çelik, Z. (2023). The significance of artificial intelligence platforms in anatomy education: An experience with ChatGPT and Google Bard. *Cureus*, 15(9). <https://doi.org/10.7759/cureus>.
- Inzint. (n.d.). *Inzint*. <https://inzint.om/>
- Luukkonen, S., van den Maagdenberg, H. W., Emmerich, M. T., & van Westen, G. J. (2023). Artificial intelligence in multi-goal drug design. *Current Opinion in Structural Biology*, 79, Article 102537.
- MyTamkeen. (n.d.). *MyTamkeen*. <https://mytamkeen.com/>
- Onsor. (n.d.). *Onsor*. <https://onsor.om/>
- Strielkowski, W., Grebennikova, V., Lisovskiy, A., Rakhimova, G., & Vasileva, T. (2024). AI-driven adaptive learning for sustainable educational transformation. *Sustainable Development*.

- U.S. Department of Education. (2023). *Artificial intelligence and the future of teaching and learning: Insights and recommendations*. Office of Educational Technology.
- Wang, S., Wang, F., Zhu, Z., Wang, J., Tran, T., & Du, Z. (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems with Applications*, 252, Article 124167.

Author Contributions:

All authors contributed equally

Conflict of Interest:

The authors declare no competing interests.

Ethical Approval:

No ethical approval required.

Funding:

The authors received no specific funding for this work.

Declaration:

We confirm that the manuscript is original, has not been published previously, and is not under consideration elsewhere.

Licensing Details:

This work is licensed under a Creative Commons Attribution–NonCommercial 4.0 International License (CC BY-NC 4.0)