A Review Analysis on Using "AIED" to Improve Student Engagement in Hybrid Education

**Sylvester Joseph[1], Amna Tahir[2], Farwa Bibi[3], Khalid Hamid[4], Muhammad Waseem Iqbal[5],
Sadaquat Ali Ruk[6], Saleem Zubair Ahmad[7]**

Abstract
Hybrid learning is a sophisticated blend of in-person and online learning. This concept mixes multimedia assets with traditional classroom activities. Hybrid learning combines virtual and in-person approaches. The goal of the study is to improve student engagement in hybrid learning settings by utilizing artificial intelligence (AI). Maintaining students' interest and motivation is becoming more difficult for educators as online and hybrid learning gain traction. A lot of educational institutions find these models intriguing because they provide peer-to-peer connection, flexibility, and student-teacher involvement. AI can address problems in education by enhancing student collaboration, communication, and real-time feedback. The advantages and disadvantages of hybrid learning are examined in this article, along with the most effective methods for integrating artificial intelligence (AI) into learning settings. AI has the power to revolutionize hybrid learning by fostering a more engaged learning environment and giving teachers and students greater autonomy.
Keywords: Artificial intelligence, interactive learning, hybrid education, online teaching, and student involvement.

1. Introduction

1.1. The examination of the subject area introduction

The growing acceptance of online learning has prompted concerns about its efficacy Despite considering other variables, a systematic study in domestic science has yet to concentrate on preparing students for online learning. The COVID-19 epidemic has expedited the process of digitizing society and education, resulting in the extensive global acceptance of many online learning modes. (Zancajo, A., Verger, A., & Bolea, P. 2022) suggested that fundamental policy adjustments are necessary to address crisis-related difficulties. (Moorhouse, B. L., & Wong, K. M. 2022) suggest a strategy to acknowledge how digital technologies might change academic activity. Some say that using tools like synchronous and asynchronous interaction platforms, Academic norms have changed as a result of learning management systems, online education, and Internet resources. Rather, they advocate for digital learning, especially via the Internet. This tactic encourages teachers to use digital resources to produce innovative lessons and adjust to how technological advancements transform the educational landscape.

1.2. What is the Hybrid Educational Model?

In hybrid courses, synchronous and asynchronous teaching modalities are combined for students who learn online and those who learn offline. With hybrid learning, students can plan and complete their education on their own. With hybrid learning, students can choose their method and style of instruction. Blended learning, another name for hybrid education, blends online and in-person instruction. For optimum effects, it blends online and in-person instruction. Online and in-person instruction are both components of hybrid education. This modifies education to accommodate students' needs and preferences. Students who receive hybrid education have improved technical and digital literacy. Interactive modules, simulations, films, and assessments are all part of online learning platforms. Students can learn and edit on their own with these tools. Student participation and active learning are encouraged by hybrid education. Discussion boards, surveys, and online tests encourage community and student participation. Digital media enables teachers to measure student progress and provide rapid feedback, resulting in individualized teaching and help. Hybrid education can suit more student needs. It helps students with diverse learning styles, skill levels, and physical limitations. Hybrid education enables teachers to adjust lessons, tailor curriculum to student needs, and provide additional assistance (Hamid, K., Iqbal, M. waseem, Muhammad, H., Fuzail, Z., & Nazir, Z. 2022).

For the United Nations' sustainable development objective for 2030, a high-quality education is necessary. It aims to provide inclusive, high-quality education to everyone. This kind of technological development has completely transformed education. They work together to create information, mentor, evaluate, and share expertise. Students' lives have been made easier by educational technology. (Tan, S. 2023) claims that the fast-developing subject of artificial intelligence in education (AIEd) has the potential to drastically change teaching and learning. Even though the "AIEd" has been around for almost thirty years, educators are still unsure of how to make the most of its pedagogical benefits and enhance education. This study means to clear up misguided judgments about man-made reasoning (artificial intelligence), society's belongings, and uses of man-made intelligence in training. Garca-Pealvo claims that F. J., defining AI and distinguishing it from human intelligence is the first step. The open student model by configuration is a system that might be utilized to further develop instruction and get the hang of utilizing simulated intelligence. (See diagram 1) Schooling has seen the critical reception of computerized innovation, bringing about emotional forward leaps. In the 1970s, Dr. Skoll introduced the first intelligent learning system, or computer-aided instruction, into the educational system in the United States. Alan M. Collins and Carbonell, Jaime Artificial intelligence has been utilized in education since. Computer-based projects have the potential to significantly alter the education sector, although we haven't yet seen any humanoid teachers in a classroom. Artificial intelligence (AI) can help education in these ways. Students can experiment with AI without fear of ridicule.

- AI educators' development plans have greater consequences beyond only student learning.
- Students may learn from their mistakes, and so can AI systems.

[1] Department of Computer Science & IT, Superior University, Lahore, 54000, Pakistan, sylvesteryousaf59@gmail.com
[2] Department of Computer Science & IT, Superior University, Lahore, 54000, Pakistan, amna.tahir@superior.edu.pk
[3] Department of Software Engineering, Superior University Lahore-54000, Pakistan, farwabaloch072@gmail.com
[4] Department of Computer Science, Superior University, Lahore, 54000, Pakistan, khalid6140@gmail.com
[5] Corresponding Author, Department of Software Engineering, Superior University Lahore-54000, Pakistan, waseem.iqbal@superior.edu.pk
[6] Shah Abdul Latif University, Ghotki Campus, Pakistan, sadaquat.ali@salu.edu.pk
[7] Department of Software Engineering, Superior University Lahore-54000, Pakistan, saleem.zubair@superior.edu.pk

- AI is a wonderful tool for personalized training.
- Students receive personalized learning plans based on their prior performance and specific needs.

According to (Guerrero-Roldán, A.-E., et al. 2021) artificial intelligence can enhance student-teacher communication. This enables them to get prompt feedback on their tasks and exercises. It is uncomfortable for many pupils to fail or to know the answer ahead of time. Even though learning by doing is a process that requires trial and error. AI offers students a unique way to explore and learn. According to (Krenn, M., et al. 2022) when processing power and AI developments improve, a natural concern arises. The challenge is how sophisticated computer systems, notably artificial intelligence (AI), can contribute to or obtain new scientific knowledge independently (Nazir, Z., Iqbal, M. waseem, Hamid, K., Muhammad, H., Nazir, A., Hussain, N., & ann, Q. 2023).

Figure 1: AI and Sustainable Development Goals (SDGs)

1.3. AIED Inspiration and Hybrid Education

(Zheng, F. 2022) suggests that an adaptable instructional strategy must accommodate varying student readiness, learning styles, and individual interests. The goal of integrating AI into hybrid learning is to produce individualized and adaptable educational opportunities. (Wei, X., Zhang, Y., & Hu, B. 2021) claim that AI technology may be utilized to develop customized online learning resource recommendation systems that would let students access pertinent content while lowering the risks associated with exploration. AI (Hamid, K., Iqbal, M. waseem, Fuzail, Z., Muhammad, H., Basit, M., Nazir, Z., & Ghafoor, Z. 2022) may provide personalized recommendations for learning resources, feedback, and progress tracking based on student requirements and preferences. Integrating AI into hybrid education aims to improve learning efficiency and efficacy.

AI can automate grading and evaluation, allowing educators to focus on personalized and engaging education. According to (Dhara, S., Datta, A., & Pramanik, S. 2022) AI can help analyze student course participation and interests more effectively. This will help the school categorize pupils based on their performance levels, identifying the most gifted and likely to succeed, and those who may struggle. Identifying pupils allows for targeted attention and improved performance. AI can help instructors uncover student data and performance trends, allowing them to act and address issues before they escalate. AI can help overcome educational access gaps by increasing student independence and accessibility. Combining in-person and online learning, hybrid education enables students to study rapidly and autonomously.

AI-powered chatbots and virtual assistants can aid pupils without access to traditional classrooms. AI can expand educational opportunities by improving cross-cultural and cross-linguistic communication. AI-powered translation solutions enable students from diverse linguistic backgrounds to collaborate and study together, reducing obstacles and creating a more inclusive learning environment. (Alharbi, W. 2023) claims that new electronic writing tools have been made possible by recent developments in artificial intelligence (AI). Writing assistance programs provide suggestions for text creation and sentence completion that are human-like, supporting authors and students both during and after the writing process. AI improves student learning by making it more individualized, adaptable, effective, accessible, and inclusive. Teachers may concentrate on engaging instruction by using AI to track student progress, give personalized recommendations, and provide feedback.

AI can assist in removing barriers to education and fostering intercultural and interlingual dialogue (see Figure 2).
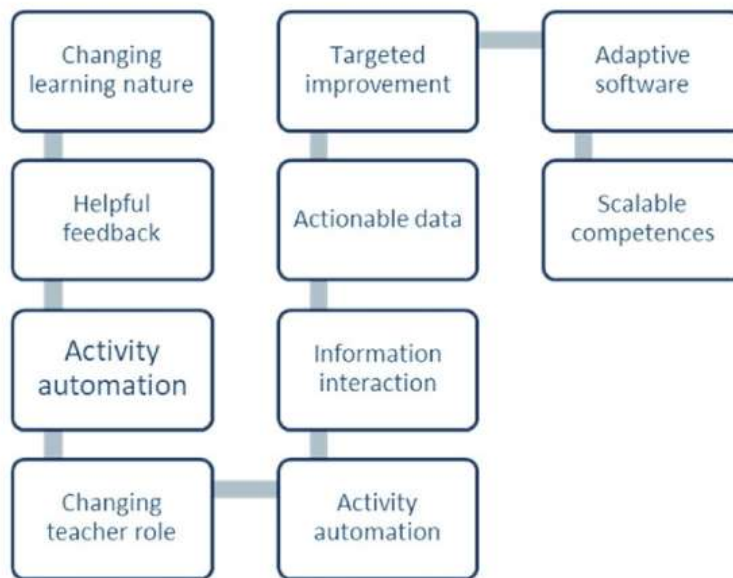
Figure 2: AI's Significant Role in Education

Proponents of Artificial Intelligence in Education (AIEd) point to its efficiency and democratization, while detractors warn of industrialization and alienation in the classroom. (Schiff, D. 2021) thinks that AIEd can upend the current system. Teachers still have a significant impact on schooling, but their roles may change as technology progresses and intelligent computing systems become more prevalent. AI systems might eventually replace teachers for essential course content. These platforms can offer specialized information and serve as a venue for students to ask questions and debate relevant subjects. AI will function as a facilitator, replacing the teaching job. Teachers are essential to the development of human interactions, AI-driven learning, and helping pupils overcome challenges. According to (Ahmad, S. F., Hameed, Z., & Khan, N. A. 2021) artificial intelligence has an impact on a wide range of societal issues, including education.

Technological improvements have led to increased incorporation of technology in education in several countries, like Singapore. AI may help instructors and students create personalized courses and offer feedback on class effectiveness. However, educating students to cooperate with AI is still a tough aim. To improve our understanding of how to create collaborative learning activities in schools using AI technology, more research is required. After conducting in-depth interviews with ten prominent Korean instructors in AI in Education (AIED), (Kim, J., Lee, H., & Cho, Y. H. 2022) discovered that the best learning objectives for teachers were improvement in subject-matter knowledge and capacity. This was discovered while doing a study.

Multidisciplinary education, real problem-solving, innovative tasks, and performance assessments emphasizing process and cooperation can promote active learning. According to (Khan, I., Ali, S., & Khan, W. 2021). teachers confront a significant issue in tracking students' academic progress in each course. Teachers can provide additional help to kids who struggle academically. Today's educational institutions acquire extensive data about pupils from various sources (Muhammad, H., Basit, M., Hamid, K., Iqbal, M. waseem, Shahzad, S., Muneem, F., & Shaheryar, M. 2022). Despite this, institutions are always exploring innovative methods to use data to improve education quality and reputation. AI systems monitor student development and alert teachers to any performance issues. AI systems provide pupils with the help they seek. They help teachers find ways to improve student instruction. According to (Lameras, P., & Arnab, S. 2021), instructors should get a greater grasp of how AI can help them create, visualize, and orchestrate AI-enabled learning. This will encourage the adoption of AI systems that embody pedagogy, domain, and learner models through data-driven inferences.

Beyond the essential elements of education, these programs can improve their ability to develop higher-order thinking abilities and creativity. These objectives might be accomplished by AI-based educators. Science fiction has given way to reality with advanced learning systems thanks to rapid technological breakthroughs.

It might be difficult to grade student assignments and exams. This takes up valuable time that could be used for student interaction, class preparation, or professional development. Even though AI can't completely replace human grading just yet, it is becoming better all the time. With AI, teachers may fill in the blanks and automate grading for every option available. (Neha, K. 2020) claims that artificial intelligence (AI) is almost ready to take the place of human grading. It could be necessary to update automatic grading and fill-in-the-blank tests. Scores for different multiple-choice questions can be adjusted by academics. While function approximation techniques have been tried in traditional classroom settings, research is now being done to determine how virtual learning environments affect engineering students' grades.

2. Literature Review

We gathered a selection of pertinent articles and resources on educational technology to examine current trends in Artificial Intelligence in Education (AIEd). Every article examines how artificial intelligence (AI) and cutting-edge tools like chatbots might improve instructional techniques in hybrid learning environments. The analysis of scholarly papers and important research provided

comprehensive insights. Academic databases such as Scopus, Web of Science, and Google Scholar were thoroughly searched by us. The keywords searched for are "hybrid education," "artificial intelligence in education," "chatbots in education," and "AI-enabled learning," along with "virtual reality in education." To make sure the material was current, the search was limited to items that had been published in the last five years (Hamid, K., Muhammad, H., Iqbal, M. waseem, Nazir, A., shazab, & Moneeza, H. 2023).

The inclusion requirements were satisfied by articles discussing the application of virtual reality, chatbots, or artificial intelligence in hybrid education, as well as how these technologies affect student results and learning approaches. Articles that addressed other topics or did not offer substantial new information about the objectives of the study were not eligible. Every item that was supplied was carefully examined to obtain pertinent data. Using AI for tailored learning, using chatbots as instructional assistants, and using virtual reality in hybrid learning environments are just a few of the subtopics that the research discovered. The conclusions of the review were arranged and presented about these subtopics. A detailed assessment and synthesis of extant studies were conducted to identify patterns, trends, and topics for further exploration.

This paper provides a comprehensive review of AI-enabled learning approaches in hybrid education, highlighting possible benefits and challenges associated with their implementation. The review's shortcomings include depending on past research, which may only cover recent breakthroughs in the subject. The review focused only on academic journal articles, potentially overlooking relevant grey literature and unpublished studies. Despite limitations, this systematic study provides valuable insights into applying AI and new technology in blended learning environments. The results provide new insights into how these technologies might enhance teaching methods and provide directions for future study in this quickly developing sector.

The articles were chosen based on how well they addressed AI in education, hybrid learning, and online learning. Essays on the usage of chatbots and intelligent tutoring systems, the advantages and disadvantages of AI in education, the impact of digital technologies on academic practices, and the incorporation of VR and AR in hybrid education are all covered. Since the articles offered a variety of perspectives, justifications, and suggestions on the matter, a qualitative analysis was conducted on them. The authors of the themes support their claims with their opinions, theories, and empirical evidence. Analyzing the data at hand and the findings of the research may entail doing case studies, reviewing the literature, and drawing conclusions. The essay examines the advantages and drawbacks of online and hybrid learning, as well as the applications of chatbots, AI, VR, and AR in the classroom. The article discusses the most recent findings and how they might affect methods of instruction and learning. The author's views and opinions were probably combined with the facts that were provided to generate the article's conclusions. It's possible that the authors' choices were influenced by the discussion and findings of the piece. They also examined the broader ramifications and opportunities for education research and practice.

3. Responsive Learning Platforms

According to (Costa, R. S., Nogueira, R., & Silva, R. 2021) educational technology can improve several learning processes. The popularity of online learning is rising. Learning analytics profiles learners' performance, styles, and habits in real-time by analyzing online learning videos. For individualized and adaptive learning, the organization supports software development, online learning, and educational research. With the use of adaptive learning, educators and learners can customize instruction to meet each person's needs. These days, adaptive learning frequently refers to flexible Education systems that use real-time technology to give pupils individualized support. Student data served as the basis for the design. ICT use in education, particularly in learning management systems, produces a substantial amount of data about the academic activities of teachers and students, according to (Gómez-Pulido, J. A., Macías, J. A., & López-Gutiérrez, J. 2023). These data are important for more reasons than merely their quantity and variety, but also for their association with the behaviors and results of educational actors. Platforms monitor students' progress and tailor their learning experiences based on their needs by utilizing data analytics and machine learning algorithms.

Depending on each student's learning style and performance level, the system can adjust the course's material, pace, and difficulty level. The automated components span the entire lifecycle to keep course participants interested, we develop instructional materials, plan the learning experience, and employ a sophisticated platform. A smart medium, according to (Finogeev, A., Frengov, I., & Babichev, M. 2018) is a system that provides training materials, controls learning procedures and handles content. It should include standards, an employer-specific analytical system, a web system, a knowledge evaluation system, and a learning activity management system. This entire system assists all the way through. Personalized programs and electronic learning resources are part of lifelong specialized training. One important component of the system is its ability to assess students' prior knowledge and adjust instructional tactics based on their unique needs. Students can improve their knowledge performance by concentrating on important information and processing it correctly inside the assessment system, according to (Alzahrani, F. K., & Alhalafawy, W. S. 2023). To better understand how students modify their approaches to meet the requirements of assessment preparation activities, more study is required. Zhong, Z. asserts that it's critical to mentor students when they use internet resources for self-directed learning and communication. This entails integrating online and offline learning, enhancing learning that occurs during and after class, and encouraging practice, reform, and investigation.

Students' educational experiences are influenced by their present knowledge, motivation, and pace of learning. In adaptive learning, students who regularly demonstrate mastery by completing many tasks without mistakes are presented with more demanding and complicated assignments. However, if the answer might have been better, students would need to repeat their efforts on smaller projects. The adaptation model guides adaptive learning by determining what and how to change for each student. There are two primary sources for this information:

- The investigated issue's themes, projects, and connections are all included in the domain model. You can connect and create a flow between different fields thanks to the technology.
- The learner's prior knowledge, learning style (including making mistakes and finishing assignments quickly), and personal qualities (such as preferences and motivation) are all taken into consideration in the student model.
- Products that adapt can vary classified by Pearson.

3.1. Content

Where does student feedback influence the customization of the material? Errors offer suggestions or breakdown skills. It slows down learning. Contacting the instructor might be suggested by the system. The most difficult adaptation strategy is scaffolding.

3.2. Testing

The subsequent question becomes more difficult if a student correctly answers. It is easy to **Commit Errors**

The researchers at Pearson make a distinction between "practical" and "level" tests, which are given after a particular module or block.

3.3. Material Accommodation Request

It's the most many-sided. While the learner is interacting with the learning material, they record and process data. The system uses data analysis to provide students with relevant content.

4. Changing Learning

4.1. Leveraging AI, AR, and VR to Enhance Learning Methodologies

AIED studies the potential benefits of AI for education and learning. In AIED, teaching and learning have changed recently due to AI models. To identify learning preferences, styles, and individualized lesson plans, AI systems may examine behavior and performance data from students. Learning and student results rise as a result. Another application of AI in education is intelligent tutoring systems. With the help of AI-powered solutions, students may learn complicated ideas at their own pace and receive individualized feedback. These systems enhance learning by employing machine learning algorithms to adapt to student requests. According to (Deeva, G., Pechenizkiy, M., & Trieschnigg, D. 2021) students' learning and development depend heavily on receiving real-time feedback from instructors or supervisors. Unfortunately, providing personalised real-time feedback in real-time is frequently unachievable due to a lack of readily available resources. Recent developments in technology have resulted in the development of computer tutoring systems that can offer students customized feedback in a variety of settings and circumstances. It's interesting how AIED uses AI models to examine big information and improve student learning. The analysis of student behavior, performance, and engagement by AI models can develop novel teaching strategies and resources.

4.1.1. Chatbots and educational activities

Students can get assistance from AI-powered assistants with course-related queries, such as identifying a resource or providing clarification on a subject. The ability of chatbots to comprehend and react to human intent is what makes them fundamentally valuable. A chatbot is a conversational interface that makes it possible for people and businesses to engage in positive ways. A change in knowledge is made possible by computer-aided learning systems, which offer a dynamic classroom environment. Nonetheless, modern students feel at ease in a variety of classroom configurations.

By presenting context, offering templates or detailed instructions, and limiting interactions to reduce issue space, new technological systems can aid in students' learning. These systems may monitor and organize learning processes, providing timely advice and feedback. The chatbot utilizes this recognition to retrieve the desired information. Understanding the user's inquiry is crucial for providing an appropriate response.

Real-time communication between users and services is made possible by chatbots, which can either replace or enhance conventional user interfaces like web pages and applications. Computer programs known as "bots" can understand human language and respond to questions from kids. Questions. There are other ways to respond, like sending in a video, displaying a picture, buying something, or scheduling a meeting. Chatbots have a lot to offer in the educational field. This service is only available at the most expensive schools worldwide. Chatbots can be used to teach beginner courses. The goal is for chatbots to become virtual advisers for students and learn to cater to their needs. Their advice applies to all ability levels. They tailor their study habits to meet their demands. Chatbots are increasingly being used as vertical teachers, engaging with individual students. This allows for face-to-face communication and an improved understanding of the issues at hand. Chatbots are one sort of virtual assistant. Chatbots can provide comments on students' written work, including quizzes and assignments.

4.1.2. ChatBots and Learning

According to (Kuhail, M. A., Al-Zoubi, A. M., & Alsmadi, M. K. 2023) messaging systems enhance learning by enabling students to get responses more quickly. The amount of time teachers can devote to helping with extracurricular activities is restricted. Chatbots save teachers and online course instructors time by providing 24/7 accessibility and ease of usage. Let's look at the advantages of putting an educational chatbot into use. It is essential to have a FAQ section in the chatbot's menu to respond to frequently asked questions from various courses. Students can learn about unplanned webinars, internships, timetable changes, and more from the chatbot. This will let you oversee the learning process, guarantee that students receive the necessary resources on schedule, and offer assistance with any issues that may arise. Students can receive homework and deadline reminders via online chatbots. This keeps them on the go. More study is needed to examine the effectiveness of evidence-based chatbot-learner interaction design tactics used in education.

4.1.3. Chatbots and Interaction

Creating a chatbot can help remove potential students' fears about online universities. Using the bot can help you satisfy students' expectations and increase service quality by responding to all their queries. This will reduce the number of trainees who drop out midway through their program. Emailing academics differ from texting them. Educational bots, as well as interactions with family and friends, may bring people closer together. Maintain contact with students to boost involvement. Chatbots, in the opinion of (Hwang, G.-J., & Chang, C.-Y. 2023) facilitate the collection of student feedback. To improve learning, the program concentrates on answering important issues by obtaining input on the online course platform, lesson grades, and class perceptions. Chatbots increase student engagement by assisting students in better understanding the course material. The chatbot will read the material, provide details on the resources and parts of the system, and assist students in making decisions if they have any questions.

4.2. ChatGPT in the Teaching Environment and Learning Activities

A pre-trained language model called ChatGPT converses with users via dialogue. Open AI created a dialogue-based chatbot for human-to-human communication. Open AI technologies, like chatbots, have the potential to significantly enhance human lives, claims (Rathore, B. 2023). Tasks are automated by chatbots, improving usability, productivity, and communication. OpenAI's Chat Generative Pre-Trained Transformer (ChatGPT) has improved AI-human communication. Natural language processing and automatic text synthesis are made possible by ChatGPT, which may enhance human-machine interactions. Since its launch in November 2022, ChatGPT's user base and popularity have expanded quickly. This network connects millions of libraries, including books, websites, and other resources, to help users with their questions. This tool's popularity stems from its user-friendly interface, interaction, and effectiveness in resolving common issues. According to (Halaweh, M. 2023) educators have expressed concerns about implementing ChatGPT in educational settings since its public release. In summary, it spares students time, effort, and money that they may use for learning, teaching, or research. Users can efficiently read several files for study and teaching with ChatGPT. Users can study, translate documents, ask questions, and work through arithmetic problems on the website. With ChatGPT, candidates for the Certified Public Accountant (CPA) credential may access a wealth of resources and learn at their speed. ChatGPT facilitates the organization of enormous files into coherent paragraphs, enhancing students' comprehension and reading skills. The primary unresolved issue regarding ChatGPT at universities is how it is currently being used. Sooner or later, AI will be taken for granted. Students might therefore run across difficulties that make it difficult for them to apply AI in their solutions. Based on what (Hargreaves, S. 2023) say, ChatGPT is a powerful large-language model that can provide high-quality replies that meet plagiarism detection standards.

Critics argue that online examinations in higher education might lead to increased cheating. (Hargreaves, S. 2023) suggest techniques instructors might use to help students build responsible and ethical technology usage abilities. ChatGPT and other AI technologies are transforming course delivery techniques, making it impossible to ignore their impact. Currently, educational institutions utilize student assessment and grading systems. Students may use AI in academic settings to acquire new abilities and enhance their work. This article focuses on university teachers and administrators who strive to adapt to the changing times.

The GPT-4 algorithm is used by ChatGPT, the most modern version with an intuitive user interface. Large language models (LLM) have shown tremendous potential in processing text data in diverse domains with zero-shot in-context learning, especially for privacy protection, as confirmed by (Liu, Z., Chen, Y., Wang, J., Wang, X., Zhang, H., & Sun, M. 2023) These models include ChatGPT and GPT-4. Though relatively new to the public, some educators and supervisors have been successfully experimenting with this technology for a few years. Rather than making writing easier, the intention is to make it more difficult. We are forced by trials to reevaluate our conception of writing and to stop taking it for granted. Even if it takes more work, students must actively participate in the process even if it takes more work. Over time, technology has had a huge impact on schooling. Technology has improved access to materials for students and educators, but it has also led to more inequities and distractions in the classroom. Technology is a permanent part of learning, and innovations are always being added. ChatGPT can help students improve their editing abilities while studying.

ChatGPT is an application that makes use of artificial intelligence (AI) to generate text based on the needs of the user. Like a writing assistant, this tool can help students create sentences and paragraphs rather than just fixing grammatical and spelling errors. ChatGPT is the best tool for writing essays and other items. Abid Haleem and Mohd Javaid draw attention to the bot's limitations in terms of its capacity to respond to queries in a relevant and convincing manner. The method suggests that the program creates and analyzes text using deep learning. The interpretation of natural language by the model is improved by internet data. The artificial intelligence known as ChatGPT has the power to completely transform education. Although the effects of AI on education are unknown, it is anticipated that the benefits will exceed the drawbacks. Teachers and authorities are concerned that students may use ChatGPT to compose assignments and papers and claim credit for the AI work. This poses ethical and plagiarism concerns, particularly because we still need to establish that the work was completed by the AI rather than the student. ChatGPT may be useful for creating real assessments. However, the teacher should create and conduct a relevant review for their class. The program's functioning relies on deep learning, allowing it to accurately adjust based on previously entered information and mistakes generated by large data to meet criteria.

4.3. Issues and disadvantages associated with using ChatGPT in education

This study emphasizes the necessity for extra human support for students who would rather interact with people and for challenging or private issues. One of the most obvious drawbacks of this research, according to CŇerný, Michal, is the need for extra human assistance, particularly when the chatbot is unable to address complex or private issues or when students would prefer to interact with people. When students engage with non-AI systems, they anticipate similar interactive and psychological responses, deduce characteristics of the program from the interaction, and are taken aback when the chatbot is unable to comprehend their needs or provide sufficient support. Despite these issues, there are limitations and drawbacks to employing software in the classroom, including:

- ChatGPT's cleverness can lead to erroneous output when context is not provided.
- As previously observed, students and lecturers rely heavily on their phones. As technology advances, humans grow more dependent on it.
- ChatGPT's data comes from the Internet. Therefore, accuracy cannot be assured.
- Critical thinking is an essential talent for youngsters to develop. Providing solutions eliminates the need for independent thinking.
- Lack of creativity: ChatGPT can produce whole essays. Using ChatGPT to write a report is considered plagiarism and lacks originality. One major difficulty with ChatGPT is that plagiarism checkers struggle to keep up.
- ChatGPT is trained on data, which might lead to bias.

Concerns regarding the use of chatbots, such as ChatGPT, in educational settings have been brought up by instructors and administrators. Worries about encouraging student participation and creativity as well as potential hazards to current teaching

methods. Instructors and administrators have brought up valid concerns regarding students' use of ChatGPT. One problem is that students could utilize the bot to create speeches or essays by feeding it raw material. More teaching may be necessary for students who primarily rely on the bot for language structure, grammar, and spelling. The main worry is that students might rely too much on the bot for reference, research, and reasoning. To better prepare students for future career opportunities, it's important to consider how ChatGPT might be used to enhance a variety of abilities, rather than only focusing on students' concerns about technology.

4.4. Enhancing Learning Using VR and AR

Liu, Z., Chen, Y., Wang, J., Wang, X., Zhang, H., & Sun, M. (2023) argue that e-learning platforms have made educational resources more accessible, engaging, and relevant to students without geographic or temporal limits. Current e-learning systems have technological and pedagogical challenges as user numbers and data volumes increase. These systems provide students with individualized instruction depending on their performance and chosen manner of learning via AI algorithms. Technology may enhance learning and help students achieve their educational goals. Automatic grading software enables teachers to evaluate homework and exams more efficiently and precisely. Students can also receive feedback on their work from the application, which includes recommendations for improving performance and fixing errors. By using these technologies to interact with virtual environments and objects, students can participate in immersive learning experiences. VR and AR technologies can be used to generate these kinds of experiences. With virtual reality (VR) and augmented reality (AR), students may interact with three-dimensional models, which improves their understanding of difficult subjects like anatomy and engineering. AI in the classroom can increase student engagement, personalize instruction, and provide educators with insightful performance data.

4.5. Virtual Reality in Hybrid Education

According to Lege, R., and Bonner, E., virtual reality (VR) is becoming more and more common in both the consumer and business sectors. Virtual reality (VR) has grown increasingly broadly utilized as technology progresses. Education needs assistance to keep up with new developments, affordances, and pedagogical applications due to the rapid evolution of technology. Technology's rapid development will undoubtedly have an impact on schooling. Virtual reality (VR) technology has lately gained popularity in education, despite its extensive history. VR gadgets for professional and educational purposes have become increasingly cheap in recent years. Daz P. et al. suggest that commercially available VR gadgets can improve learner engagement and outcomes in higher education. Virtual reality education relies on immersive technology, which imitates the actual world and improves students' visual perception. In other words, the user is directly involved in the action. Using an immersive approach offers several advantages.

- **Visibility:** Virtual environments allow for in-depth analysis of a building's plan, structure, and installations, which would be difficult or time-consuming in the real world.
- **Focus:** Digital encounters can make it difficult to truly understand the influence of the actual world. Focused attention can improve knowledge retention.
- **Involvement:** The learning environment may be carefully planned and monitored. Virtual reality allows students to engage in the building process, see exceptional events, and discover innovative solutions to complex difficulties.
- **Safety:** Virtual reality may securely facilitate complicated operations, transportation management, and testing. The learner will not risk herself or others, even if the situation is terrible.
- **Effectiveness:** Research shows that virtual reality (VR) training is at least 10% more effective than traditional teaching methods.

4.6. A drawback of the model

According to Farra, S. L. et al., large upfront expenses and a lack of assurance about expected returns could prevent virtual reality technology from being widely used. Software development for virtual reality can also be expensive. This method takes a great deal of time, effort, and resources to complete. Everybody also receives a special virtual reality experience. After a brief exposure, some people may feel queasy, nauseated, and disoriented. The human body is limited in a few ways. But in the majority of contemporary devices, this problem has virtually been resolved and will soon be defeated. Many individuals think that the average user cannot afford virtual reality. Some people think virtual reality is limited to use in games. Both are incorrect. Radianti, Majchrzak, Fromm, and Wohlgenannt researched the benefits and applications of virtual reality (VR) in diverse situations. Researchers are exploring instructional uses for virtual reality, which has significant promise. This tool enables a 360-degree view of the world's historical buildings. Architectural landmarks such as Egyptian pyramids, medieval towns, and Frank Lloyd Wright's Fallingwater House are now more accessible than ever before.

4.7. Augmented Reality (AR) for Hybrid Education

Augmented reality (AR) has the power to transform the way we teach and learn in educational settings. In hybrid education, Augmented Reality (AR) blends online and traditional classroom instruction to improve learning and provide a link between real and virtual learning environments.

4.7.1. Augmented Reality in the Practical Educational System

Augmented Reality (AR) and artificial intelligence (AI) have the potential to transform education. Jeevan S says that as academia realizes its value, combining augmented reality and artificial intelligence will be a big step forward in the coming years. D. et al. By automating instructor tasks, personalizing student learning, and enabling adaptive evaluation, augmented reality (AR) systems, according to Seo, K., et al., can provide practical AI assistance for hybrid learning and teaching. Contact among understudies and teachers significantly affects their fulfillment and learning results in a mixture of learning. It is essential to have an understanding of how teachers and students perceive the effects of AI systems on their interactions to identify gaps and obstacles that limit their potential and put safety at risk. Augmented reality (AR) offers a more immersive and engaging learning experience than AI, which can personalize classes and analyze students' learning patterns. One way to use AI and augmented reality in education is to develop intelligent AR apps. These programs use AI to recognize things and provide students with data and feedback based on how they act. Yongjun Xu and his colleagues discovered that object detection tasks are well suited for AI systems. The way we interact with one another and conduct business is being transformed by augmented reality technology. Another structure embracing these advances is

expected to improve understudies' opportunities for growth utilizing electrical designing lab gear, especially given the rising notoriety of the web and crossover learning. An app that makes use of augmented reality, for instance, might show the user a virtual heart and give them personalized feedback based on how they interact with the model. Additionally, the application may monitor a student's progress, highlight areas for improvement, and provide feedback.

During the COVID-19 outbreak, AI technology has been rapidly developed and deployed to meet the demands of students in education and language learning. Rapid advancements in artificial intelligence (AI) have made it easier to incorporate augmented reality (AR) in education. The educational 4.0 movement, impacted by automation and digitalization, has an impact on the progress of artificial intelligence (AI) in educational settings. Adaptive learning systems are another technique to combine augmented reality and artificial intelligence (AI) into education. Systems driven by AI personalize learning experiences based on the interests, speed, and learning preferences of students. Students can have immersive, tailored learning experiences thanks to AR technology. Based on the student's preferred method of learning, an augmented reality system may provide information differently. While auditory learners might prefer audio explanations, visual learners might benefit from diagrams and other visual aids. With AR and AI, collaborative learning environments can also be developed.

Students can collaborate virtually on coursework and projects using augmented reality technology. Through the identification of students with comparable talents and interests and the suggestion of groups, AI can promote collaboration. Incorporating Interactive AR into school can enhance collaborative efforts and problem-solving abilities. Education can be revolutionized by combining artificial intelligence (AI) and augmented reality. Using intelligent augmented reality (AR) applications, adaptive learning systems, and collaborative learning environments, we provide each learner with individualized learning experiences. Technological developments in AR and AI could result in more creative educational uses.

Figure 3: Interaction between AI, AR and VR

4.7.2. Interactive promotes teamwork and problem-solving

(Almusaed, A., et al. 2023). recommend that educators use their specific education expertise to address real-world issues more regularly. Theory, observation, teaching, and presentation skills are all encouraged in universities. It is imperative to cultivate instructors who are forward-thinking and have excellent communication skills. Still, there's no denying the usefulness of augmented reality (AR) technology in the classroom. In certain respects, learning activities in hybrid education are advantageous. Although empirical evidence indicates that augmented reality improves learning outcomes for students, its widespread use in the classroom has not yet occurred. Augmented Reality is growing in popularity. It can be used for a variety of purposes, such as training, improved learning, and scenario and product testing. All of this occurs in cyberspace, ensuring efficient resource utilization. Augmented reality is increasingly being used in academic contexts, indicating a widespread adoption of this breakthrough. Implementing increased reality technology at institutions has benefits beyond only engaging students since other possibilities exist (Almusaed, A., & Almssad, A. (Eds.). 2023).

4.7.3. Teachers can expand their available teaching techniques

By making training fun and easy to understand, augmented reality (AR) can improve hybrid and face-to-face learning. According to Cabero-A. et al., the relatively new technology known as augmented reality (AR) has a significant impact on space training. Universal and practical education can be effectively promoted through mobile technologies and augmented reality. Using augmented reality (AR), teachers can show students the inside of a building in a more engaging way. Additionally, abstract ideas can be graphically illustrated with the help of augmented reality (AR). Additionally, (AR) permits students to think critically while studying. Intelligent clarifications permit understudies to find out about how things work freely. This is extremely helpful for comprehending the operation of building components.

4.7.4. Ensure everyone gets access to education

Distance learners can need assistance to complete the learning process with their peers. Augmented reality, or AR, helps students learn well online by addressing these issues. Eldokhny, A. A., and Darwish propose that teachers need to be ready to integrate

augmented reality patterns into traditional online learning to meet the requirements for 21st-century abilities. More study on online distance learning is required to include more examples and information in augmented reality. It is best to employ animated or fixed augmented reality for online distance learning during pandemics. An online learner might utilize the app, for instance, to alter the font size, contrast, and voice comments.

4.7.5. AR may broaden the teaching area to include more pupils

Applications for (AR) can help students get greater access to educational opportunities. Educational programs will be accessible for students who are unable to attend university due to different circumstances. Augmented reality (AR) can partially replace traditional classroom instruction. Augmented reality (AR) technology can improve accessibility in schools. According to Fernández et al. augmented reality (AR) can motivate students, boost their interest in assignments, and help those with educational requirements.

4.8. Increase student engagement and motivation

Motivating pupils to learn is a major challenge in today's environment. There are various reasons for this. External factors such as poor topic description, lack of motivation, and insufficient study time affect students' concentration. Augmented reality (AR) apps provide an alternative solution to these challenges. Learning content for AR is more engaging than traditional schooling. Motivating students to learn is a significant difficulty in today's climate. There are several explanations for this. External variables such as poor topic description, a lack of enthusiasm, and insufficient study time all impact on students' focus. Augmented reality (AR) apps provide an answer to these issues. Learning content for AR is more engaging than traditional education.

4.9. Reducing disruptions

Keeping kids' attention is an ongoing challenge for instructors. Disruption can come from a variety of sources, such as pupils who are disinterested in learning, have erratic attention spans, or lose interest in their studies while advancing academically. Classrooms free from distractions are essential for learning. Regrettably, one of the things that makes it hard to focus is using a smartphone. According to Urbina C. et al., augmented reality and mobile devices have a lot of potential for improving engineering education. In the modern classroom, student engagement and self-learning are prioritized. There is a method, though, to change this using (AR). With the use of augmented reality (AR) technology, smartphones can become helpful teaching aids instead of just diversions. Students' mobile devices with augmented reality apps can help them pay attention and concentrate in class.

4.10. Effective and interesting learning activities

More than just words are required for education. Teaching concepts like chemistry, mathematics, and architectural history just through words is tough. However, employing augmented reality (AR) allows for compelling explanations using digital resources. To facilitate learning, disclose the workings of a process or give pupils direct control over it. AR technology can modernize education by empowering students to explore and learn freely, replacing the traditional teacher-explained approach.

4.11. AI's Advantage for Students and Teachers

Machine learning and artificial intelligence (AI) are powerful drivers of development and success in all industries, including education. According to the eLearning Industry, by 2021, more than half of all LMSs will include AI integration. The EdTech industry has long had access to AI solutions, but adoption has been sluggish. According to Luckin, R., Cukurova, M., Kent, C., and du Boulay, B., knowing about AI is not the same as receiving instruction in AI readiness. AI Ready is aware of the possible effects it could have on a variety of professions, businesses, and sectors. Themes from AI Ready for Teachers and AI Ready for Lawyers might be comparable. Things will, nevertheless, be contextualized differently. Teachers were forced to transition to online instruction as a result of the outbreak, which caused regular schools to close. 86% of educators believe that integrating technology into the classroom is a good idea. Teachers and students can benefit from artificial intelligence (AI) in the classroom. A student's ultimate goal is to obtain certifications that demonstrate their competency. AI can improve learning efficiency. Artificial intelligence (AI) has the potential to significantly impact students' educational experiences by enhancing access to relevant courses, facilitating interactions with teachers, and freeing up time for other activities.

4.12. AI's Benefits to Students

Students want a degree to demonstrate their expertise. Students can benefit from AI's ability to simplify learning and help them achieve this goal. Munir, Vogel, and Jacobsson say that AI can help students get a better education by giving them access to relevant courses, making it easier for them to interact with teachers, and giving them more time to do other things. Personalization is a significant development in education. AI allows students to tailor learning programs to their experiences and preferences. By adapting to students' knowledge, speed, and objectives, AI can improve learning. Systems powered by AI can look at how students have learned in the past, figure out where they can do better, and offer personalized learning options. In tutoring, students frequently require additional assistance outside of the classroom, and teachers frequently lack time. In these situations, AI, chatbots, and educators are suitable options. Through personalized instruction, instructor activities, and adaptive assessment, artificial intelligence (AI) systems can effectively improve online education and learning, according to Sage K. et al. The effect of man-made consciousness (artificial intelligence) on understudy-educator relations stays obscure, regardless of its potential allure. Besides, (artificial intelligence) advances can help understudies in creating abilities beyond the study hall. Instructors and professors receive a constant stream of repetitive questions. Mechanized help and conversational knowledge answer understudies' often-asked requests rapidly. Students can identify answers more quickly and this saves teachers time. Students can study and explore around the clock using AI-powered technologies without having to wait for an educator. Exchange students can get an excellent education without having to pay for housing or travel.

4.13. AI's Benefits to Teachers

Numerous educators battle to deal with their time due to their broad daily agendas. Teachers can save time by automating tasks, analyzing student performance, and bridging educational gaps with AI. AI, according to Celik, Dindar, Muukkonen, and others, can assist educators in improving class planning, execution, and assessment. AI can help teachers learn more about their students' needs. Academics play a variety of roles in advancing AI technology, as we discovered. Teachers can address common knowledge gaps and problem areas thanks to AI's ability to personalize learning courses for both instructors and students. Tapalova and Zhiyenbayeva

define artificial intelligence (AI) as the capacity to adapt to students' requirements and preferences. The study investigates the use of Artificial Intelligence in Education (AIEd) to provide students with individualized instruction. Without requiring academic input, AI-powered chatbots addressed generic and recurring student inquiries. Regular tasks like document grading, pattern detection, and general questions can be automated by AI.

4.14. Improving the Engagement of Students in Hybrid Education through the Impact of AI

According to Singh, J., Steele, K., and Singh, L., the COVID-19 pandemic of 2019 has altered the educational system. The global health crisis has compelled universities all across the world to reevaluate their approaches to teaching, including blended, online, and hybrid formats. The use of hybrid curricula, which blend in-person and virtual instruction, is growing in popularity. It can take some time to get children's attention in this situation, particularly when there are digital elements involved. In hybrid classes, artificial intelligence (AI) has the potential to greatly increase student involvement. The use of AI in this setting is examined in the review paper "Enhancing Student Engagement: Leveraging AI's Potential in Hybrid Education". This research investigates how AI could improve hybrid classes through personalized lectures, quick feedback, and collaboration. AI's ability to customize teaching for each learner is a huge benefit in various circumstances. According to Aditi Bhutoria, big data analysis and artificial intelligence (AI) will drive significant advancements in education.

AI algorithms can analyze student data and customize education strategies to meet individual requirements, interests, and learning styles. Allowing students to establish their own learning goals and pace can boost engagement and motivation. When combined with personalized instruction, artificial intelligence (AI) will provide pupils with relevant feedback.

AI-powered assessment systems can instantly assess student responses and provide constructive feedback, facilitating error correction and deeper comprehension. Additionally, providing feedback to struggling students might help teachers modify their efforts to meet their specific needs. According to Shubham Joshi and colleagues, AI will create new teaching and learning solutions that will be tested in various scenarios. Educational technology can improve students' ability to achieve and manage academic goals. AI technology can improve student engagement by providing timely support. AI-powered chatbots can provide immediate solutions to student inquiries, thereby reducing irritation and returning students to work faster. According to (Lee, Y.-F., Hwang, G.-J., & Chen, P.-Y. 2022) chatbots enable students to learn anytime and from any location. Chatbots promote self-directed learning by reducing anxiety and increasing retention among students. Additionally, users may submit real-time comments and receive personalized information during the learning process. Chatbots can help students navigate complicated materials and activities with ease.

5. Conclusions

Multidisciplinary strategies are required to reach a larger number of AIEd users, as most AI studies have focused on STEM fields. In hybrid education, AI technology can increase student engagement and educational quality. As innovation propels, using Man-made consciousness (simulated intelligence) in the homeroom will probably develop. There is no correlation between theoretical frameworks or effective teaching practices and the use of AI in classrooms, particularly at the university level. The essay discusses the need to prepare students for the rising demand for online courses. This article introduces hybrid education, which combines in-person and online teaching methods, as well as AI's potential to enhance education. A comprehensive overview of AI applications in the classroom, including chatbots and virtual reality, can be found in this book. Students who are self-driven and intelligent benefit from artificial intelligence (AI). Man-made intelligence-fueled advances, including chatbots, mentoring frameworks, and customized learning stages, can support understudy inspiration and commitment to studies. Teachers play a crucial role When it comes to using AI for learning in the classroom. These resources might also be useful to teachers. Effective education and human interaction must be combined with AI technology to achieve its full potential. Keen PCs impersonate human communication by finishing undertakings like voice acknowledgment and dissecting a few ways to accomplish wanted results. The educational application of AI's scientific foundation aims to communicate previously obscure ideas through computation. Educators should consider moral troubles including information security and forestalling algorithmic predisposition. The advantages and disadvantages of using AI, chatbots, virtual reality, and augmented reality in hybrid classes are emphasized here. This article looks at how computer-based intelligence, AR, and VR have upset informative strategies. The paper emphasizes the necessity of adaptive learning platforms and learning analytics for individualized instruction. The main point of contention is whether chatbots can improve student engagement and reaction time as teaching aids. The book also includes ChatGPT, an AI-powered chatbot that increases user engagement and conversation. The essay discusses the potential drawbacks of using ChatGPT in the classroom, such as bias, reliance on technology, misinterpretation of the context, and a lack of inventiveness and critical thinking. Additionally, it emphasizes its benefits. To provide a foundation for pertinent organizational aspects, the legal frameworks of data privacy and antidiscrimination are combined with the ethical frameworks of fairness and social justice. Consequently, these frameworks' components serve as the foundation for significant structures. The Sustainable Development Agenda aims to promote lifelong learning and ensure that everyone has access to high-quality education. Man-made consciousness (computer-based intelligence) can address significant training difficulties, improve education and learning rehearses, and speed up progress towards this objective. With appropriate preparation and execution, it is feasible to influence understudies' instructive support fundamentally. Quick innovation leap forwards present dangers and worries that legislative and administrative frameworks still can't seem to address. This article emphasizes the potential of AI, chatbots, virtual reality, and augmented reality to enhance learning methods and promotes further research in these areas. While acknowledging the hazards and limits of new technology, it emphasizes the need to explore their potential to improve skills for the future labor market.

References

Ahmad, S. F., Hameed, Z., & Khan, N. A. (2021). Artificial intelligence and its role in education. *Sustainability, 13*(22), 12902.

Alharbi, W. (2023). AI in the foreign language classroom: A pedagogical overview of automated writing assistance tools. *Education Research International, 2023*(1), 4253331.

Almusaed, A., & Almssad, A. (Eds.). (2023). *Sustainable Smart Cities: A Vision for Tomorrow*. BoD–Books on Demand.

Almusaed, A., Almssad, A., & Rico Cortez, M. (2023). Critical interpretation of a non-creative supervision practice for Ph.D. students. *Journal of Higher Education Research, 15*(1), 26-46.

Almusaed, A., Almssad, A., & Rico-Cortez, M. (2022). CDIO Initiative on Student Engagement by Effective Syncretic (Lectures--Seminars). In *Proceedings of the International Society for Technology, Education, and Science* (pp. xx-xx). ISTES Organization.

Almusaed, A., et al. (2023). Enhancing student engagement: Harnessing "AIED"'s power in hybrid education—A review analysis. *Education Sciences, 13*(7), 632.

Alzahrani, F. K., & Alhalafawy, W. S. (2023). Gamification for learning sustainability in the blackboard system: Motivators and obstacles from faculty members' perspectives. *Sustainability, 15*(5), 4613.

Costa, R. S., Nogueira, R., & Silva, R. (2021). Personalized and adaptive learning: Educational practice and technological impact. *Texto Livre, 14*(3), e33445.

Deeva, G., Pechenizkiy, M., & Trieschnigg, D. (2021). A review of automated feedback systems for learners: Classification framework, challenges and opportunities. *Computers & Education, 162*, 104094.

Dhara, S., Datta, A., & Pramanik, S. (2022). Artificial Intelligence in Assessment of Students' Performance. In A. I. Rehman (Ed.), *Artificial Intelligence in Higher Education* (pp. 153-167). CRC Press.

Finogeev, A., Frengov, I., & Babichev, M. (2018). Life-cycle management of educational programs and resources in a smart learning environment. *Smart Learning Environments, 5*, 1-14.

Gómez-Pulido, J. A., Macías, J. A., & López-Gutiérrez, J. (2023). Data analytics and machine learning in education. *Applied Sciences, 13*(3), 1418.

Guerrero-Roldán, A.-E., et al. (2021). Experiences in the use of an adaptive intelligent system to enhance online learners' performance: A case study in Economics and Business courses. *International Journal of Educational Technology in Higher Education, 18*, 1-27.

Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation. *Contemporary Educational Technology, 15*(2), ep421.

Hamid, K., Iqbal, M. waseem, Fuzail, Z., Muhammad, H., Basit, M., Nazir, Z., & Ghafoor, Z. (2022). Detection of Brain Tumor from Brain MRI Images with the Help of Machine Learning & Deep Learning.

Hamid, K., Iqbal, M. waseem, Fuzail, Z., Muhammad, H., Basit, M., Nazir, Z., & Ghafoor, Z. (2022). Detection of Brain Tumor from Brain MRI Images with the Help of Machine Learning & Deep Learning.

Hamid, K., Iqbal, M. waseem, Muhammad, H., Fuzail, Z., & Nazir, Z. (2022). ANOVA Based Usability Evaluation Of Kid's Mobile Apps Empowered Learning Process. *Qingdao Daxue Xuebao(Gongcheng Jishuban)/Journal of Qingdao University (Engineering and Technology Edition), 41*, 142–169.

Hamid, K., Muhammad, H., Iqbal, M. waseem, Nazir, A., shazab, & Moneeza, H. (2023). ML-Based Meta Model Evaluation Of Mobile Apps Empowered Usability Of Disables. *Tianjin Daxue Xuebao (Ziran Kexue Yu Gongcheng Jishu Ban)/Journal of Tianjin University Science and Technology*, 56, 50–68.

Hargreaves, S. (2023). 'Words Are Flowing out Like Endless Rain into a Paper Cup': ChatGPT & Law School Assessments. *Legal Education Review, 33*, 69.

Hwang, G.-J., & Chang, C.-Y. (2023). A review of opportunities and challenges of chatbots in education. *Interactive Learning Environments, 31*(7), 4099-4112.

Khan, I., Ali, S., & Khan, W. (2021). An artificial intelligence approach to monitor student performance and devise preventive measures. *Smart Learning Environments, 8*, 1-18.

Kim, J., Lee, H., & Cho, Y. H. (2022). Learning design to support student-AI collaboration: Perspectives of leading teachers for AI in education. *Education and Information Technologies, 27*(5), 6069-6104.

Krenn, M., et al. (2022). On scientific understanding with artificial intelligence. *Nature Reviews Physics, 4*(12), 761-769.

Kuhail, M. A., Al-Zoubi, A. M., & Alsmadi, M. K. (2023). Interacting with educational chatbots: A systematic review. *Education and Information Technologies, 28*(1), 973-1018.

Lameras, P., & Arnab, S. (2021). Power to the teachers: An exploratory review on artificial intelligence in education. *Information, 13*(1), 14.

Lee, Y.-F., Hwang, G.-J., & Chen, P.-Y. (2022). Impacts of an AI-based chatbot on college students' after-class review, academic performance, self-efficacy, learning attitude, and motivation. *Educational Technology Research and Development, 70*(5), 1843-1865.

Liu, Z., Chen, Y., Wang, J., Wang, X., Zhang, H., & Sun, M. (2023). Deid-gpt: Zero-shot medical text de-identification by GPT-4. *arXiv preprint arXiv*, 2303.11032.

Manzali, Y., et al. (2024). Prediction of Student Performance Using Random Forest Combined With Naïve Bayes. *The Computer Journal*. Advance online publication.

Moorhouse, B. L., & Wong, K. M. (2022). Blending asynchronous and synchronous digital technologies and instructional approaches to facilitate remote learning. *Journal of Computers in Education, 9*(1), 51-70.

Muhammad, H., Basit, M., Hamid, K., Iqbal, M. waseem, Shahzad, S., Muneem, F., & Shaheryar, M. (2022). Usability Impact of Adaptive Culture in Smart Phones.

Neha, K. (2020). Role of Artificial Intelligence in Education. *Alochana Chakra Journal, 9*(IX), 305-309.

Rathore, B. (2023). Future of AI & generation alpha: ChatGPT beyond boundaries. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal, 12*(1), 63-68.

Schiff, D. (2021). Out of the laboratory and into the classroom: The future of artificial intelligence in education. *AI & Society, 36*(1), 331-348.

Tan, S. (2023). Harnessing Artificial Intelligence for innovation in education. In S. Tan (Ed.), *Learning intelligence: Innovative and digital transformative learning strategies: Cultural and social engineering perspectives* (pp. 335-363). Springer Nature Singapore.

Wei, X., Zhang, Y., & Hu, B. (2021). Personalized online learning resource recommendation based on artificial intelligence and educational psychology. *Frontiers in Psychology, 12*, 767837.

Zancajo, A., Verger, A., & Bolea, P. (2022). Digitalization and beyond: The effects of Covid-19 on post-pandemic educational policy and delivery in Europe. *Policy and Society, 41*(1), 111-128.

Zheng, F. (2022). [Retracted] Personalized Education Based on Hybrid Intelligent Recommendation System. *Journal of Mathematics, 2022*(1), 1313711.