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KEYWORDS	ABSTRACT
Artificial Intelligence, Adaptive Learning, Higher Education, Personalized Education, Educational Technology	This study focuses on the ability of Artificial Intelligence (AI) to redesign learning experience of higher education by making learning adaptable by the year 2030. Machine learning and natural language processing afford the possibility of developing adaptive learning environment for students. The research also focuses on AI's present and future uses in the learning & issues of realizing those uses. The purposive sampling technique selected 5 faculty members from different universities. A semi-structured interview guide was developed to get data from the participants. Data was analyzed thematically by facilitation of NVivo 14. The potential of AI for enhancing personalized tasks, automated tasks related to administration, and creating interactive learning experiences. The concerns of data confidentiality and ethical considerations were also addressed. By analyzing the improvement of adaptive learning technologies, the study presents views of how AI can improve educational outcomes. Therefore, the findings also emphasize the diverse implications of equalizing technological innovation with keeping important human fundamentals in education while highlighting the justice and inclusivity.
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INTRODUCTION

The higher education is at the edge of transitional phase due to emergence of artificial intelligence technologies (Giovanni, Luciano, Bosso & Manuri, 2024). The educational AI solutions involve the technologies used to augment learning, boost effectiveness and efficiency and optimize educational management (Mellul, 2018). Machine learning, natural language processing, and data analytics are enabling technologies leveraging this revolution. These technologies make it possible to build new

smart systems whose task is to analyze the needs of particular student and respond to these needs in a way that was impossible before, as these technologies have changed learning behaviour (Kinshuk, Cheng & Chew, 2016). In the concept of learning environments, AI-based technologies can adapt to student learning speed, approach, and preferences and allow for personalized learning at scale, impacting students' learning (Robert, Potter & Frank, 2023). It is not just a change in 'level,' which pertains to the alteration of the difficulty of the content matter; it also entails changing the delivery of information, the sort of assessments utilized, and even the age and time at which instructions to support students are introduced. Moreover, the COVID-19 pandemic has caused the increased use of technology in learning.

It has shown how beneficial and risky the online and blended learning approach impacts the higher education sector (Saleh, Khan, Banerjee & Safi, 2023). As various universities in the world reflect on the degree of abilities resulting from the change, it is vital to consider the ways accompanied by AI that construct and sustain the strong and resilient learning environment. Thus, today's learning management systems, such as Coursera, edX, etc., also employ the recommendation system based on students' performance and choices. E-learning has completely changed how learning is instructed to students (Kulkarni, Rai & Kale, 2020). The AI-driven adaptive learning systems can personalize educational experiences by analyzing students' learning behaviors, preferences, and performance data to tailor content and resources accordingly. In this connection, the computer programs such as natural language processing and speech recognition programs make it easier for hearing-impaired students to access content by developing transcripts and captions. Therefore, machine translation is opening opportunities for the unilingual teaching, satisfying the clients' demand for more language choices. Thus, looking ahead to 2030, we can anticipate several key developments in the AI-driven adaptive learning:

1. Augmented and Virtual Reality (AR/VR) integration: It is a form of gamification where the virtual environment replicates real life, and students work through real-life problems as they channel into a 3D environment.
2. Advanced Natural Language Processing: Much more enlarged types of dialog interfaces that can interact with the students, explain something, or answer questions in a more detailed natural language method.
3. Predictive Analytics: Smart systems that alert the tutors early enough so that students with diverse challenges may help before they produce such behaviour enhancing engagement, & improving academic outcomes.
4. Emotion Recognition: AI that can determine the learners' mood and redesign their education process to maximize engagement and facilitate collaborative learning through intelligent tutoring effective systems.
5. Personalized Curriculum Design: The intelligent tutoring systems capable of generating and adapting full curriculum to the students' requirements and learning progress rates in diverse situations and contexts.

However, the use of AI in higher education institutions comes with some problems and issues that might be of concern with the collection and analysis of a large amount of information from learners,

including privacy and ethical issues. Governments need to make the necessary high costs to provide the infrastructure that facilitates the AI technologies and the costs incurred to train individuals to use technologies. In addition, educators would have to gain new skills and techniques and employ new methods to enhance the application of AI tools in learning. While definite worries are being generated about overuse of technology, they have reduced important facets of learning, including socialization and critical thinking skills. Rather, different twenty-first-century skills are focused like critical thinking skills have been focus of diverse recent studies in education policy documents (Jamil, Aslam & Ali, 2024; Jamil, Hafeez & Muhammad, 2024; Jamil, Muhammad & Aslam, 2024), the social, and science textbooks (Jamil, Mehmood, & Noorani, 2024; Jamil, Mehmood, & Saleem, 2024; Jamil, Mehmood, & Shah, 2024; Naseer, Muhammad & Jamil, 2022), teachers' perspectives (Jamil, Anwar & Ali, 2024; Jamil, Muhammad & Qureshi, 2021a) and teachers' practices (Jamil & Muhammad, 2019).

Life skills integration has also been the focus of different textbooks in recent studies (Jamil, Arif, & Shahzadi, 2024; Jamil, Chohan & Tabassum, 2024; Jamil, Hassan & Godil, 2024; Jamil, Jabeen & Moin, 2024; Jamil, Ain, & Chohan, 2024). The significance of this research is informed by the shift in the teachers' and learners' demography as world becomes more interconnected and technology-intensive. The integration of AI in higher education is transforming the traditional learning model into more flexible, efficient, and student-centered approach. Still, it is undeniable that machines can never save students. AI can also assist in identifying students at risk of falling behind, providing timely interventions, and supporting educators in designing more effective learning strategies. The probably one of most important questions that must be resolved is safeguarding such information and getting permission to process it properly (Jamil, Muhammad & Qureshi, 2021b). Therefore, this study aims to explore the future of the higher education by identifying how AI can enhance the development of personalized learning spaces. In the current study, we thus aim to present a general outlook on how and to which extent AI may support the individual learning process and enrich the educational attainment in the university by discussing current use cases, future developments, and potential issues.

Objective of Study

- ✓ To explore the role of artificial intelligence in creating adaptive learning environments by 2030.

LITERATURE REVIEW

Recently, the usage of artificial intelligence has been studied. Modern trends emphasize its usage for individualized learning based on the needs of the learners. In the educational settings, different educational techniques are used to improve learning. In the systematic review of 146 publications, Zawacki, Marín, Bond and Gouverneur (2019) revealed that the functions of AI in higher learning are divided into describing and projection, evaluation, with personalization and adaptable systems. Their studies show how AI has previously made modifications in education, and, at the same time, they express concern about the deficiency of greater ethical reflections concerning the use of AI in the learning setting. Another area in which applying AI in education provides great potential is an adaptive learning situation. In this linking, such systems employ AI algorithms to deliver learning

content that suits a particular student. A study by [Kabudi, Pappas and Olsen \(2021\)](#) conducted a systematic mapping of AI-enabled adaptive learning systems using 147 studies published between 2014 and 2020 and found adaptive learning systems, intelligent mechanisms, and adaptive learning platforms were the most proposed strategy for addressing the challenges faced by the students and teachers concerned.

The effectiveness of adaptive learning systems was explored regarding students' learning processes & performance ([Igor, Marija, Tijana, Vilmoš & Momčilo, 2023](#)). Neoclassical technology is applied to deploy AI technologies to automate assessment process. [Luckin \(2017\)](#) intends AI's advantages in delivering feedback: when AI is used in proctoring and avatar platforms, it can offer feedback to a student more often, in detail, and according to his or her needs. Some of them state that automated writing evaluation tools relieve teachers of many burdens so that they devote their time to more valuable processes linked with students. Some empirical research has been undertaken to explain the problems faced in the practice when deploying AI-based adaptive learning systems in tertiary education ([Kabudi et al., 2021](#)). AI-driven adaptive learning systems can personalize educational experiences by analyzing students' learning behaviors, preferences, and performance data to tailor content and resources. This study's literature was based on the adaptive learning systems, and 147 studies were conducted between 2014 and 2020. The study's findings identified types of AI-enabled learning interventions. In another study by ([Ezzaim, Dahbi, Agqal & Haidine, 2024](#)), the automatic learning style detection in different educational aspects was explored by approaches, techniques, models, and application.

This can be especially problematic for institutions in the developing countries or those with fewer resources. AI-integrated adaptive learning systems present the prospects of an effective enhanced system that is more learner-engaging, efficient, and effectively developed to equip learners for the dynamic world of the twenty-first century. In the modern world, conventional models for delivering education no longer hold students in good stead for the future jobs market. Data-driven approaches were found to be positive for enhancement of learning adaptation. The AI-based technologies can adapt to student learning speed, approach, and preferences and allow for personalized learning at scale, impacting students' learning. Towards the vision of 2030, some researchers have tried to map the future of AI in educational sector. [Tuomi \(2022\)](#), artificial intelligence has been discussed as a twenty-first-century ability & socio-emotional learning in education. Robotic services application and implications were discovered by [Tuomi, Tussyadiah and Stienmetz \(2021\)](#). According to [Luan, Geczy, Lai, Gobert, Yang, , Baltes, Guerra, Li and Tsai \(2020\)](#), there are diverse challenges & future directions about big data and AI in educational context. Big data explosion and AI revolution were described as challenges.

According to [Tuomi, Tussyadiah and Stienmetz \(2021\)](#), many scenarios regarding the application of AI in education are possible, which triggers the necessity of developing intelligent learning systems that would cover the most demands of competencies required in the modern labour market. In the Pakistani context, different studies have been conducted regarding the topic. [Ullaha, Haydar, and Arslan \(2024\)](#) conducted a study in the Pakistani educational system for the artificial intelligence applications in teaching-learning process, exploring the theory to practice. Artificial intelligence

was explored regarding electroencephalogram (EEG) waveforms for prediction failure in early-grade children of rural areas (Rasheed, Chand, Ahmed, Sharif, Hoodbhoy, Siddiqui & Hasan, 2021). Ahmad (2021) explored the role of AI in education. Technology and artificial intelligence should be used in educational system. In the same way, AI-based student assessment and recommendations were explored for the e-learning in big data by as recommended by Bagunaid, Chilamkurti and Veeraraghavan (2022).

RESEARCH METHODOLOGY

The current study is qualitative phenomenological to establish faculty members' perception and experience of AI in establishing an adaptive learning environment by 2030. Phenomenology suits this research because it enables the analysis of the participants' experiences and perceptions of the phenomena that involve higher education. Based on the purposive sampling, five faculty members from different public universities in Pakistan were included in the study. This approach could allow expanding the topics focused on by the participants and, at the same time, give a broad structure for the subjects and feelings of participants. In this research, data collection technique used was semi-structured interviews. A purposive sampling was used to increase chances of getting participants with experience & sympathetic in mixing the education technology. The selection criteria included: Holding PhD degree, having taught for more than 10 years at university level and, Familiar with educational technology.

The participants under study were five, and sample size is consistent with Creswell (2013) sampling of participants in phenomenological research, which recommends a sample size of between 5- 25. Using this number made it possible to focus on cases without losing opportunity to see the general trends. The study employed semi-structured interviews, that interview guide was formulated based on research objectives and conducted literature review. The interviews were done over WhatsApp, and the participants' consent was sought to record the interviews; all interviews were recorded, and the participants' responses were transcribed into text form for analysis. All the interviews were held for 60-90 minutes. Thematic analysis was led as per to Braun and Clarke (2006) to analyze data and report patterns within data. This method offered flexibility and provided a detailed and complex data picture. The study used qualitative data analysis software as NVivo 14 to help organize, code, and visualize data.

FINDINGS OF STUDY

The following themes arose from thematic analysis of responses about using AI & creating adaptive learning environment to cater to educational needs by 2030. These findings are organized into the following categories:

Personalization & Adaptive Learning

In this case, all participants pointed to the fact that AI has the potential to greatly improve the level of personalization in higher learning. They anticipated that by 2030, AI-driven systems would be capable of delivering the content and sequences of courses, taking student needs and learning into consideration, giving feedback and tips to learners, giving specific sources for materials on a real-time basis, and altering how assessment is done to suit a student would better enable that particular

person to perform. One of participants defines it like this: This AI could significantly help teachers to individualize learning for students, something which is currently unachievable by teachers alone. (Participant B).

Administrative Efficiency & Support

Most participants appreciated use of AI in critical tasks that could arguably take up much of the contact hours, thus creating arguably more student-teacher interactions. Furthermore, they focused on diverse key areas like mechanized rubrics for elaborative valuations, robotic resource matching like course timetables, resource assignments, and uses of predictive analytics to identify learners who are at risk, examine methods that can be adopted to help them. One faculty member said, “The changes that I envision in AI by year 2030 are routine clerical work, much of which will be handled automatically, and we will concentrate more on coaching & innovative task solving with students.” (Participant A).

Enhanced Accessibility & Inclusivity

AI's potential for increasing the accessibility of educational processes has been mentioned several times. The participants envisioned the use of the AI translation in reducing language barriers in the internationalization of education, the role and function of adaptable interfaces and approaches for learners with disabilities, and constant tutor aid through AI chatbots in form of 24/7, always online teaching assistants. An interviewee said this is true, “AI has potential of increasing reach of higher education by addressing the diverse requirements that learners have never been addressed before.” (Participant E).

Challenges & Ethical Considerations

While participants were usually optimistic about AI's potential, they identified several challenges and ethical concerns: While participants were generally optimistic about AI's potential, they also known several challenges and ethical concerns like that have to do with using and analyzing data about students and their learning, concerns with AI use in education can be overt reliance on it and subsequent loss of what is deemed vital in learning, fears that AI is going to reinforce, even amplify existing bias into education, and requirement of large amounts of investment in physical & human infrastructure. One participant was of view the following words: “We should be careful with ethical issues of AI in learning systems. Education should keep on approaching the subject with honest and sincere intention & we shouldn't let artificial intelligence systems deepen pre-existing inequalities.” (Participant D).

Integration and Implementation Strategies

The participants made suggestions on following to respond to how to incorporate the application of AI in higher learning by 2030. It is recommended to gradually introduce the ideas and methods of lean management and start with pilot projects and, then expand programs following certain results; teachers, AI scientists, and policymakers collectively to ensure that AI systems are very relevant to the education systems, professional development of faculty to teach the use of AI tools, and training of AI competencies for learners to learn about AI and be in a position to analyze and evaluate AI tools. Another participant talked about this as follows: “The integration of AI should, therefore, be a

collective endeavor so that teachers are always involved in the design and deployment processes.” (Participant C)

DISCUSSION

The conclusion drawn from this research makes it considerable to understand the importance of AI in designing future learning environments in higher education by 2030, as envisaged by the faculty of Pakistani public universities. This strong focus upon the capability of providing an individualized learning approach coincides with current practices and works done at present. The faculty members expect AI systems to address the learning content, delivery speed, and assessment methodologies adapted to individual student requirements. This also supports work of [White \(2020\)](#), who noted that adaptive learning systems positively affect student outcomes. This potential for personalization addresses a long-standing educational challenge: the chances of delivering the knowledge within a standardized system while aiming at individual learning needs. This indicates that by 2030, people expect their artificial intelligence to give them instant feedback as well as recommendations. In this regard, This goes with the study of [Luckin \(2017\)](#), who pointed out that AI provides more feedback to the students than a human instructor would due to its capability to provide required feedback as often as needed.

Using the developed systems could further improve the learning process because the students could immediately get coaching relevant to their progress. The results of this research tally with the study by [Zawacki et al. \(2019\)](#), who averred that profiling, prediction, and assessment are the major cases of AI in higher education. AI might indeed be capable of taking up most of the bureaucratic and time-consuming work and, in turn, help educators identify more with nurturing and possibly come up with better solutions regarding the student problems, hence improving the quality of education. However, it is also great to remember the possible negative effects of the higher automation levels. Some may consider it as causing job insecurity or a reduction of the value of some administrative positions. However, such applications hold the risk of the reached decision being wholly or partially wrong since their decision-making process relies on the incorporation of algorithms that may yield disparate results when not correctly designed and managed. Future implementation plans should contain these aspects and use them to ensure that AI will not somehow exclude human discretion in education administration.

One of the most interesting implications of the paper is that AI might increase access to education and its inclusiveness. In translating services, providing timely advice on how interfaces should look in future, and having twenty-four-seven AI tutors available, faculty members uphold the emerging call for enhancements of the learning environment's accessibility for more populace learners. This potential application of AI might also respond to some of the enduring questions about diversifying access to post-secondary education. Further, these results call for attractive ethical foundations and policies that will adjust and ease the use of AI in learning. With adoption of these systems ongoing in learning institutions, it will only be vital to implement transparent, liable, and fair systems when in operation. It is needed to gather educators, AI developers, and policymakers to collaboratively design AI tools, that combine with proposals to address faculty concerns [Luan et al. \(2020\)](#). Perhaps this approach could be useful in creating concerned that AI systems being settled are developed to

fulfill the actual education-related requirements and that they are consistent with the permissible standards of pedagogy.

CONCLUSION

This research aims to identify the possibility of using artificial intelligence to develop a learning environment in higher education by 2030 from faculty of Pakistani public universities. The research findings provide a complex and mixed picture of the role of AI in the future of education, as well as the strengths and weaknesses that need to be believed to apply from different perspectives to cater to the situations. The study reveals that the use of AI in learning is predicted to positively impact the ability to deliver unique teaching tools that will teach the students, as well as their learning styles and speed. Learner-centered education manifests in choice of the content, mode of tests and quizzes, and ways of providing the feedback, and it may become the new frontier of the delivery of education. Third, there are expectations of the significant enhancements in terms of administrative effectiveness that would release educators from operational work and ensure they spend more time with students.

In terms of accessibility and inclusiveness in learning, there are possibilities where AI is used, which was underscored with such features as real-time translation and intelligent interfaces that make learning easier for various subgroups of learners. However, the present work revealed key ethical implications and operationalization concerns. Data privacy, risk bias in AI systems, personalization, and some elements of human touch in the learning were perceived as key concerns. It is crucial to develop a rational approach and consider the need to include such ethical issues as applying an effective approach in learning management while sparing the human aspects of communication. When envisioning the future of AI in higher education until 2030, the conclusion can be drawn that promoting the integration of AI into educational process will require combined work of educators, technology experts, and policymakers. The next steps will be the gradualistic strategy, continuous professional development of the faculty, and the creation of the programs that would help students become AI literate.

Recommendations

1. It is crucial, then, to set up the robust ethical standards and frameworks for managing AI in higher learning in order to meet the required standards for attaining the desired and leading diverse outcomes.
2. Continued professional development programs should be executed so that faculty members who will be required to incorporate AI into their teaching and training practice are well-trained on how to do it.
3. To implement artificial intelligence technologies gradually to increase the acceptance and gauge the response through pilot implementation in certain courses or departments towards the desired outcomes.
4. Collaborations between teachers, engineers working on AI technologies, policymakers, and educational professionals should be developed to ensure that the developed AI systems are pedagogically required.
5. Make sure that all the applications and platforms created and improved with the help of the

artificial intelligence technologies are accessible to students with special needs in order to meet the standards.

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