IC-024
AI-Enabled Personalized Learning and Adaptive Assessment for in Higher Education: Sustainable Development Framework Conceptual Framework

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ABSTRACT

This study aims to examine the ethical and social consequences of using AI in these areas and the different applications of AI in higher education related to adaptive assessment and personalized learning. A quantitative method will be used, employing surveys to collect data from individuals in diverse roles, including users, educators, and the IT team. The group consists of higher education institutions that intend to use artificial intelligence for personalized learning and adaptive assessment. The future study will encompass several areas, such as proctoring tests, inclusive learning, gamification, learning retention, and real-time knowledge. This research contributes to the advancement of AI in education by deepening our comprehension of the effective and ethical use of AI in personalized learning and adaptive assessment, hence promoting innovation in educational technology. The overarching goal is to meet the needs of a wide range of learners by devising approaches to ensure that artificial intelligence (AI) is used in a manner that is representative of all backgrounds and learning preferences. In the realm of higher education, integrating AI-enabled personalized learning and adaptive assessment systems offers a promising avenue for advancing sustainable development objectives. Furthermore, incorporating sustainable development practices into higher education curriculum ensures that future generations are equipped with the knowledge and skills needed to address pressing environmental and societal challenges. This abstract underscores the importance of integrating AI-driven educational approaches with sustainable development principles to empower learners and advance towards a more sustainable future.

Keywords : Artificial Intelligence, Learning Management Systems, LMS, Higher Education, Personalized Learning, Assessment Strategies

Introduction

Artificial intelligence is developing faster, and acceptance and adoption are not linear (Pisica et al., 2023). AI's primary advantage over other human technologies lies in its unmatched speed, accuracy, and consistency. (Zhang, 2023). AI technology has been used and studied with algorithms to enhance technologies such as machine learning, biometric recognition, and virtual reality. This has resulted in substantial changes in educational content, managerial strategies, theoretical framework, teaching methods, and learning approaches in higher education (Zhang, 2023). This proposal is a draft sharing the background, problem statement, research questions, theoretical framework, hypotheses, and method. "Artificial Intelligence: The term "Artificial Intelligence" yields more than 580 million results on Google in less than 0.30 seconds and over 4.5 million results in 0.15 seconds on Google Scholar" (Pisica et al., 2023). Personalized learning approach's focus is to adapt and adjust the learning experience to each learner's style and preferences (Anuyahong et al., 2023), Dynamic Evaluation adapts the type and quantity of assessment according to the learner's progress. This study uses quantitative methodology to analyze the impact on AI on personalized learning and Dynamic Evaluations to WEF (2022) recommendations on "Formative assessments". The study asserts that the use of artificial intelligence (AI) in customized or tailored learning and Dynamic Evaluation holds the ability to enhance learning effectiveness of learners, amplify learning experience, and alleviate the burden on facilitators on routine tasks like grading and other administrative work (Hannan et al;., 2023; Lazányi, 2023; Popenici et al., 2017; Fahd et al., 2023; Khosrawi et al., 2023; Yang et al., 2023; Babu et al., 2023; Gupta et al., 2022; Sugumar et al., 2021; Babić, 2017; Fardinpour et al., 2018).

Purposes

Artificial intelligence is developing faster, and acceptance and adoption are not linear (Pisica et al., 2023). AI's primary advantage over other human technologies lies in its unmatched speed, accuracy, and consistency. (Zhang, 2023). AI technology has been used and studied with algorithms to enhance technologies such as machine learning, biometric recognition, and virtual reality. This has resulted in substantial changes in educational content, managerial strategies, theoretical framework, teaching methods, and learning approaches in higher education (Zhang, 2023). This proposal is a draft sharing the background, problem statement, research questions, theoretical framework, hypotheses, and method. "Artificial Intelligence: The term "Artificial Intelligence" yields more than 580 million results on Google in less than 0.30 seconds and over 4.5 million results in 0.15 seconds on Google Scholar" (Pisica et al., 2023). Personalized learning approach's focus is to adapt and adjust the learning experience to each learner's style and preferences (Anuyahong et al., 2023), Dynamic Evaluation adapts the type and quantity of assessment according to the learner's progress. This study uses quantitative methodology to analyze the impact on AI on personalized learning and Dynamic Evaluations to WEF (2022) recommendations on "Formative assessments". The study asserts that the use of artificial intelligence (AI) in customized or tailored learning and Dynamic Evaluation holds the ability to enhance learning effectiveness of learners, amplify learning experience, and alleviate the burden on facilitators on routine tasks like grading and other administrative work (Hannan et al;., 2023; Lazányi, 2023; Popenici et al., 2017; Fahd et al., 2023; Khosrawi et al., 2023; Yang et al., 2023; Babu et al., 2023; Gupta et al., 2022; Sugumar et al., 2021; Babić, 2017; Fardinpour et al., 2018).

Research Gaps

Out of the 44 "academic journals" assessed in this proposal, 97% are qualitative. Sufficient qualitative analysis is present, with limited quantitative analysis. To validate the theory and practice regarding the impact of artificial intelligence on tailored learning and dynamic evaluation, with a particular emphasis on higher education and use cases involving learning management systems, it is critical that my research employs a quantitative methods approach as opposed to a mixed method one. The literature analysis highlights various areas of research that have not been adequately addressed in Tailored Learning, Dynamic Evaluation, and Learning Management Systems (LMS). The needs of diverse learners must be met, adoption of AI in higher education must be overcome, ethical and privacy issues must be addressed, AI must be integrated across disciplines, accountability must be established, pedagogical methods and ethics must be addressed, user experience and human emotions must be understood, and dynamic assessments and formative feedback must be used. Although AI has the potential to improve Tailored Learning experiences, there is a lack of research on how these systems may effectively meet the needs of diverse learners, address student concerns about data privacy, and provide rules for fair AI implementation. By filling these gaps, we may improve learning outcomes and experiences in corporate and higher education environments by advancing AI-driven instructional technology, tailored learning, and dynamic evaluation.

Theoretical Framework

The literature study of numerous papers mostly focuses on utilizing a qualitative method. According to the "Unified Theory of Acceptance and Use of Technology" (UTAUT) (Venkatesh et al., 2003) and the "Technological Pedagogical Content Knowledge" (TPACK) framework, O'dea et al., (2023) suggested that Artificial Intelligence (AI) technologies do not offer significant new improvements for pedagogy in higher education currently. Crompton et al., (2023) employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology in their investigation. In their study, Anuyahong et al. (2023) utilized a mixed-methods approach to investigate the impact of artificial intelligence on adaptive learning and assessment in higher education. The study encompassed both the institutions that use AI in these systems and the individuals who use them to gain insight into their own experiences and emotions.

The researchers have utilized Human-Centered Artificial Intelligence (HCAI) as a means to examine the importance of AI in the field of education (Shneiderman, 2020). HCAI enhances human performance, safety, and trust by fostering self-assurance, creativity, clear accountability, and social interaction, so guaranteeing the dependability, safety, and credibility of systems (Bingley et al., 2023). The study conducted by Arantes (2022) indicates that the SAMR theoretical framework (Puentedura, 2006) enables the smooth incorporation of teaching and research methods when utilizing WhatsApp for instant messaging. The SAMR paradigm involves comprehending the substitution (S) of technology as a direct replacement without any functional alteration, and the augmentation (A) which utilizes technology substitution with certain functional enhancements. The Modification (M) stage emphasizes the restructuring of technology, while the Redefinition stage enables the

development of new activities that were previously considered unimaginable (Puentedura, 2012). Mesquita et al. (2022) emphasized the need to examine the SAMR model in the context of higher education's future, which will entail integration of technology, more participatory classes, and the adoption of diverse technological approaches. This will facilitate the development of educational settings connected to authentic professional situations. The SAMR framework can be examined through the use of an illustrative example (Credit: Puentedura, 2012).

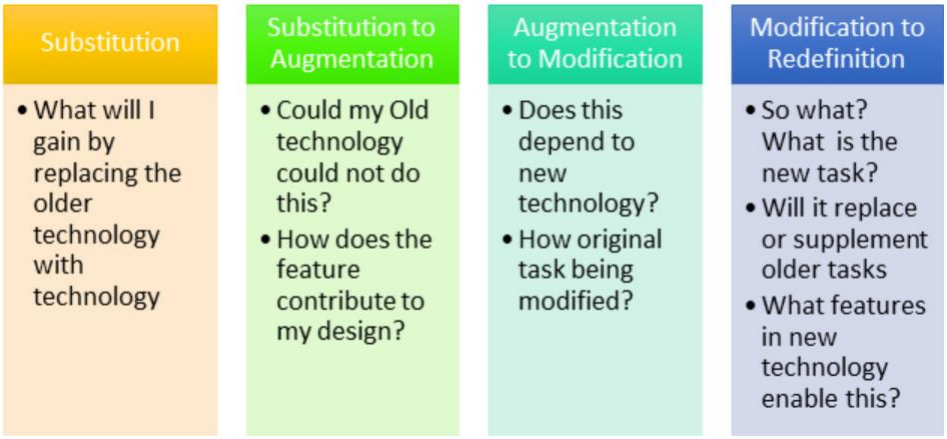

Figure 1 - SAMR model as proposed by Puentedura, 2012

This framework is designed to examine how the use of AI in conjunction with an LMS could make it possible to implement the necessary interventions for tailored learning and dynamic evaluation. The Tran et al. (2016) study introduced the "E-USABLE" conceptual framework, which integrates User-Centered Design, andragogy theory, and Bloom's Revised Taxonomy. This framework provides guidance for designing and evaluating e-learning systems. E-USABLE is a framework that provides guidance for the design and assessment of e-learning systems, with a specific emphasis on their usability and effectiveness in educational settings. In business research contexts, it is advantageous to collect, and analyses needs from stakeholders, users, and specialists to develop tailored programs that align with specific corporate objectives. Researchers can better understand user demands, increase system usability, and improve learning outcomes by utilizing the framework's pedagogy, change management, and user-centered design concepts. The requirements elicitation framework, comprising five aspects, can be tailored for AI-powered Learning Management Systems (LMS) to guarantee they fulfil user requirements, correspond with educational objectives, and deliver a seamless learning experience. The E-USABLE framework is essential for building surveys to collect requirements and assess e-learning systems. Analysing the effectiveness, utility, security, auditability, feedback, learnability, and efficiency of Tailored Learning functionalities, the E-USABLE framework may be applied to individualized learning in e-learning systems. It is particularly useful for investigating the impact of AI on LMS, as AI technologies are increasingly being integrated to improve Tailored Learning experiences, automate administrative tasks, provide adaptive feedback, and assess learning data. The E-USABLE methodology enables the evaluation of the influence of AI on LMS functionality and user experience across four dimensions: efficacy, usefulness, safety, auditability, feedback, learnability, and efficiency. This study has the potential to result in more effective and captivating learning experiences for both students and educators. The E-USABLE framework is a technology used to create and assess Tailored Learning and Dynamic Evaluation systems. It highlights how crucial it is to modify instruction to fit the needs, aptitudes, and learning preferences of each learner; measure knowledge and skills precisely; make the interface user-friendly and intuitive; and make sure that learner data is securely stored and protected. The system should exhibit consistent behavior, following established design patterns and meeting user expectations. The system should possess the qualities of learnability, comprehensibility, and enjoyment, facilitated by explicit instructions, tutorials, and documentation. The total user experience should be captivating and favorable, promoting motivation and contentment. Educators, learners, and other stakeholders are encouraged to participate in the design and evaluation process, provide input, and make iterative improvements based on the principles outlined in the E-USABLE framework. The conceptual framework for the study can be illustrated as:

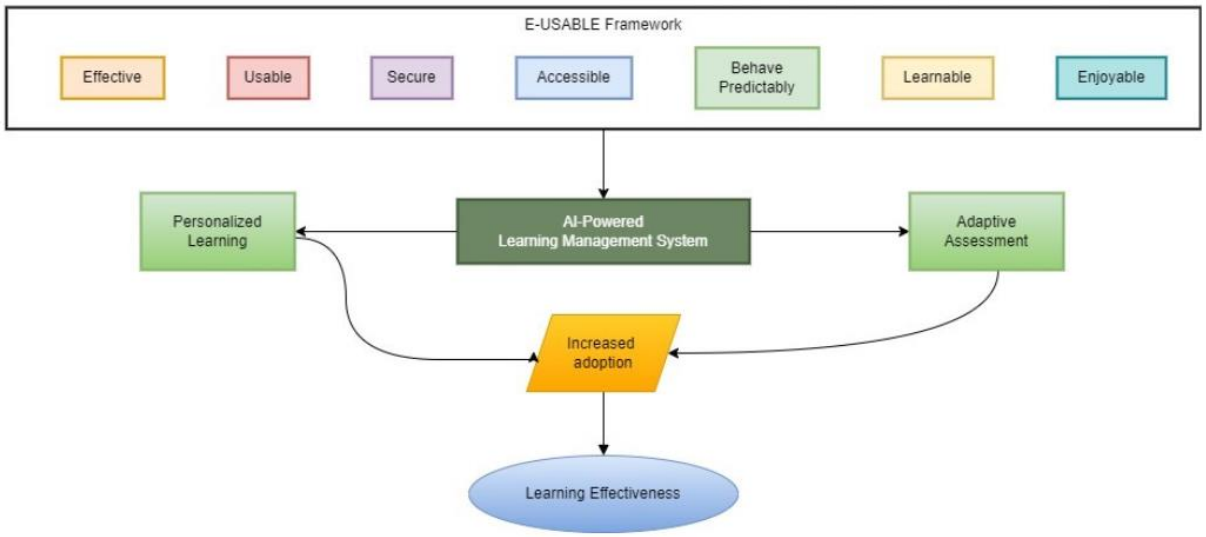

Figure 2 - Proposed Theoretical framework for this study

Research Methodology

Pisica et al., (2023) recommend using exploratory, qualitative research to investigate. Sample size 18 academics from social sciences and humanities (Convenience sampling). Their semi-structured interviews included 2 questions

- What are the advantages and opportunities of implementing AI in Higher Education?
- What are, in your opinion, the disadvantages and threats of implementing AI in Higher Education?

Anuyahong et al., (2023) in their research used Purposive sampling. Quantitative analysis included regression and ANOVA, and the qualitative analysis used focused group discussions using thematic analysis. The mixed-method approach in research analysis combines qualitative and quantitative data to offer a thorough understanding of research topics, allowing researchers to cross-verify findings, adapt methods to complex questions, improve the validity and reliability of outcomes, and explore research phenomena in detail. Most of the researchers studied used qualitative approaches. Mesquita et al., (2022) used quantitative analysis to study the future of higher education on technology and pedagogical practices. This study will employ a quantitative research design, primarily utilizing experimental and quasi-experimental methods. The experimental studies will investigate the impact of AI integration in Learning Management Systems (LMS) on Tailored Learning experiences (Hypothesis 1) and the effectiveness of AI-powered Dynamic Evaluations (Hypothesis 2). The quasi-experimental studies will examine the ability of AI-powered LMS to address diverse learning needs (Hypothesis 3) and the utilization of AI-driven predictive analytics for student retention and success (Hypothesis 4).

Conclusions

Pisica et al., (2023) suggest that decision-makers in higher education should prioritize policies related to educating, recruiting, and implementing ethical guidelines (code of conduct) for all parties involved. It is crucial for individuals to comprehend the limitations of technology and acknowledge that artificial intelligence is currently incapable and will not be able to replace instructors, both now and in the future. AI can only present chances to raise educational standards (Zhang, 2023). O'dea et al., (2023) suggested that further research should be conducted to explore the educational benefits of AI tools in improving learning and teaching in social science and science disciplines such as business management, psychology, biology, and mathematics. Analyzing the viewpoints of academic tutors and students about the integration of AI in higher education is of utmost importance. Anuyahong et al., (2023) emphasize that the most effective integration of AI and human assistance in education should be customized to meet the specific needs and preferences of individual students, while also considering ethical and regulatory considerations. Ongoing study and evaluation are essential to ensure the responsible and effective utilization of AI-driven technology in education. This study involves an assessment of use cases for Tailored Learning and Dynamic Evaluation in a Learning Management System (LMS) that utilizes Artificial Intelligence (AI). Future study should prioritize investigating additional dimensions of LMS, such as learning and

the influence of AI on these dimensions. Future scholars can use the HCAI framework to examine the ethical considerations surrounding the application of AI in education. This research enhances the progress of AI in education by enhancing our understanding of the efficient and ethical utilization of AI in personalized learning and Dynamic Evaluation, therefore fostering innovation in educational technology.

Recommendations

A Learning Management System (LMS) that utilizes artificial intelligence (AI) is essential for implementing customized learning experiences in both corporate and higher education settings. AI-powered LMS solutions offer real-time feedback and recommendations, which improves learning outcomes (Koedinger and Aleven, 2007). Predictive analytics aid in the identification of students who are at risk, allowing for focused assistance and enhancing rates of student retention (Arnold & Pistilli, 2012). AI systems customize learning paths by considering each learner's progress, thereby providing them with suitable challenges (Brusilovsky, 2001). AI automation enhances operational efficiency and diminishes expenses for educational institutions (Baker, Corbett, & Koedinger, 2004). Nadimpalli et al. (2023) highlights the significance of comprehending the learner attributes, structuring the learning material, and creating appropriate learning maps to individualize and streamline the learning process. A Learning Management System (LMS) that utilizes artificial intelligence (AI) is essential for implementing customized learning experiences in both corporate and higher education settings. AI-powered LMS solutions offer real-time feedback and recommendations, which improves learning outcomes (Koedinger and Aleven, 2007). Predictive analytics aid in the identification of students who are at risk, allowing for focused assistance and enhancing rates of student retention (Arnold & Pistilli, 2012). AI systems customize learning paths by considering each learner's progress, thereby providing them with suitable challenges (Brusilovsky, 2001). AI automation enhances operational efficiency and diminishes expenses for educational institutions (Baker, Corbett, & Koedinger, 2004). Nadimpalli et al. (2023) highlights the significance of comprehending the learner attributes, structuring the learning material, and creating appropriate learning maps to individualize and streamline the learning process.

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