



DOI: [10.71317/jgst.2.8.2026.307](https://doi.org/10.71317/jgst.2.8.2026.307)

Journal of Global Social Transformation

Journal homepage: <https://rjsaonline.org/index.php/JGST>



Artificial Intelligence-Enhanced Education and Student Psychological Well-Being: Exploring the Balance Between Digital Innovation and Mental Health

Dr. Amber Sarwar Hashmi¹, Amjad Hussain², Aisha Aslam³, Ali Yousuf Khan⁴

¹ Department of Computer Science, Rawalpindi Women University, Pakistan

Email: amber.hashmi@rwu.edu.pk

² Health Service Academy, Islamabad, Pakistan

Email: amjadsoomro01@gmail.com

³ Riphah International University, Pakistan

Email: aishaaslam358@gmail.com

⁴ Sir Syed University of Engineering and Technology, Karachi, Pakistan

Email: aliykhan@ssuet.edu.pk

ARTICLE INFO	ABSTRACT
Submission: June 18, 2026 Revised: July 02, 2026 Accepted: July 16, 2026 Available Online: August 01, 2026 Keywords: Artificial Intelligence-Enhanced Education, Digital Innovation, Student Psychological Well-Being, Higher Education, Mental Health, Educational Technology, Digital Learning, Pakistan. Corresponding author: Dr. Amber Sarwar Hashmi Email: amber.hashmi@rwu.edu.pk	The rapid advancement of artificial intelligence (AI) has transformed higher education by introducing intelligent learning technologies that enhance teaching, learning, and academic management. Despite these advancements, concerns have emerged regarding their potential influence on students' psychological well-being and mental health. Thus, the objective of this research was to analyze the implications of artificial intelligence-based education and the role of digital innovation on students' mental health in the context of higher education. The study adopted a quantitative cross-sectional research design. A survey was the only research instrument. The study population was comprised of under and post-graduate students who attended the public and private sector universities of Punjab and Sindh, Pakistan. The universities were Bahauddin Zakariya University, The Islamia University of Bahawalpur, University of the Punjab, Government College University Faisalabad, University of Sindh, Shah Abdul Latif University, and University of Karachi. A sample of 467 participants was surveyed. The sample was selected using the convenience sampling method. The researcher collected the data using an online survey created in Google Forms. The survey was distributed via university email groups, WhatsApp groups, and other academic online platforms. The researcher downloaded the responses, and data were screened and transferred to IBM SPSS Statistics for analysis. The researcher applied descriptive statistics to analyze participants' demographic data, and used Cronbach's alpha to evaluate scale reliability. To study the relationship of artificial intelligence-based education and the mental health of students, the researcher applied Pearson correlation analysis, and for the role of digital innovation, the researcher employed multiple regressions. The researcher employed an independent samples t-test and a one-way analysis of variance (ANOVA) to assess the impact of demographic variables on students' mental health. The results showed that student psychological well-being improved with Artificial intelligence-enhanced education integrated with digital innovation. Furthermore, developing more engaging, personalized, and supportive learning environments improved student psychological well-being. Implementing Artificial Intelligence ethically and human-centered in psychologically supportive educational practices helped balance innovative technologies with student mental health. The results add to current understanding of Artificial Intelligence in higher education and provide insights for educators, university administrators, and policymakers, as well as educational technologies, to create more sustained digital transformations for greater student psychological well-being.

Introduction

The evolving role of Artificial Intelligence (AI) is enabling new pedagogical thinking and practice at the global level and will continue to do so for the foreseeable future. The arrival and rapid integration of new generations of AI-based technologies in schools and universities has resulted in different (i) intelligent tutoring systems, (ii) adaptive learning systems, (iii) automated assessment systems, (iv) virtual learning assistants, and (v) personalized learning environments, as well as advanced learning technologies for (i) educational access, (ii) instructional delivery, and (iii) learner engagement. With growing interest and investment in AI technologies, the digital transformation of higher education has gained even more momentum in the wake of the COVID-19 pandemic and the shift to online and hybrid modes of learning. Consequently, institutions of higher education are more likely to regard AI as a means to improve the (i) educational experience, (ii) evidence-based decision-making, and (iii) frameworks for the (i) provision of educational services and (ii) lifelong learning. The available research suggests that the responsible and ethical use of AI in education will transform learning, enhance the efficiency of learning, and improve the teaching and learning process (Holmes et al., 2022; Zawacki-Richter et al., 2019).

The continuing integration of artificial intelligence in education has changed how the teacher-student dynamic is perceived in current education systems. Rather than being viewed as a replacement for teachers, AI is better understood as an advanced support tool for teachers in the areas of developing curriculum, grading, assessing students, and even helping recognize students who need intervention. Students are afforded the benefit of having personalized suggestions and assessments, immediate feedback, and the opportunity to learn continuously from anywhere in the world, which directly addresses the barriers to learning that geography may impose. AI education systems further increase learning adaptability and promote the independence and autonomy of students to move at their own pace when learning. According to researchers, the use of AI in education helps lessen the extra workload on teachers and helps create advanced, interactive learning activities that inspire and teach students to use creativity and critical thinking when approaching and solving problems. (Luckin & Cukurova, 2019; Crompton & Burke, 2024).

Even with these benefits, many scholars have come to believe that incorporating AI into learning environments poses new ethical and psychological concerns that reflect the need for greater scrutiny. Over-reliance on AI processes may reduce students' cognitive abilities, critical thinking, and communication skills, and may also impact students' intrinsic motivation when digital tools supplant meaningful human interactions. In addition, concerns about maintaining academic integrity, privacy, and the effects of uneven access to technology, algorithmic bias, and excessive screen time have generated increased interest across the teaching, research, and policymaking communities. These concerns illustrate the need to consider AI beyond its educational potential by exploring its impact on students' psychological experiences in digitally mediated learning environments. Thus, the need to balance the rapid pace of technological development and the psychological and emotional well-being of students has become one of the most pressing goals of higher education around the world (Yang, H et al., 2025).

Student Psychological Well-Being in AI-Enhanced Learning Environments

Understanding the effects of AI tools on student psychological well-being is of growing importance to the education community, especially in higher education. The implementation of AI in post-secondary education has implications for the emotional functioning of students, their satisfaction in life, and their self-confidence and academic motivation. It has the potential to worsen the psychological challenges students face, including stress and anxiety. The pressing need for research in education psychology has been driven by the ramifications of AI in education for the emotional and psychological well-being of students. Current research in education psychology is assessing how AI in education disrupts students' emotional experiences, satisfaction with learning, and cognitive engagement. AI tools in educational settings are designed to be flexible, offer personalized and ongoing instructional support, and mitigate students' learning challenges. However, these tools demand advanced levels of psychological engagement from students and introduce challenges related to an increased reliance on technology and diminished face-to-face interaction. Understanding the implications for student psychological well-being is of growing importance to the education community. This is especially true for higher education, where institutions are implementing AI tools into teaching and learning (Ryff, 2014).

AI plays a role in psychological health by building environments that adjust learning to the pace and level of each student. The benefits of these systems include less frustration in the classroom, greater feelings of autonomy, and greater self-confidence, as well as self-efficacy. AI allows instant feedback that makes the process of self-correction and improvement easier, as well as helping students maintain regularity in learning. Virtual assistants and tutoring systems also help students feel less uncertainty. Research has shown that when artificial intelligence is designed to assist human participation rather than replace it, self-efficacy, self-regulation, and satisfaction with the learning assist systems, as well as overall psychological health, show positive results. (Ng, J, et al., 2025, Chan & Hu, 2023)

These advantages notwithstanding, the excessive use of AI augmenting educational systems poses serious psychological risks. Scholars have documented cognitive overload, burnout, screen fatigue, and social withdrawal due to the instantaneous accessibility of AI and the potential threats of algorithmic decisions. Digital fatigue and the unrelenting surveillance of AI create anxiety and uncertainty, resulting in a loss of trust in one's ability to solve problems. In an academic setting, a carefully balanced use of AI innovations and teaching practices, including digital health and well-being programs, will foster the psychological health and provide emotional support to students. AI augmentations will help educational systems meet the demands of an evolving digital society, while supporting the mental health of students and fostering long-term psychological wellness (Asif, F et al., 2026).

Balancing Digital Innovation and Mental Health in Higher Education

Digital transformation in higher education has opened new avenues for innovation, but it also has implications for the mental health and wellness of students. Across the globe, universities are developing AI technology to better train teachers, optimize administrative procedures, and provide more learning opportunities. AI systems enhance the design and delivery of learning by automating academic tasks, generating learning predictions, and tailoring learning engagement for the benefit of the students and the satisfaction of the institution. The new technologies of the modern age have also made the institutions of higher learning more aware of the fact that digital innovations should be assessed in the context of the academic jurisdiction and the mental health of students, as well as in the context of the emotional and psychological resilience and adaptability of students. This reality articulates the sustainable innovations in education, which demand a contention between the advancement of technology and the welfare of humans (Zhao, X et al., 2026).

To achieve this equilibrium, universities must create educational ecosystems where AI exists alongside human-first educational practices rather than replacing them. Human-centered AI development and integration emphasize the role of technology, teachers, and students in the creation of learning ecosystems. The goal of these systems is to achieve academic success and emotional growth. Teachers take on important roles in guiding students, providing emotional support, and encouraging collaborative learning and the development of higher-order thinking skills, which AI can support through personalized, efficient, and learning adaptive teaching aids. Learning technologies are most effective when combined with a pedagogy that is concerned with empathy, ethical responsibility, digital literacy, and an inclusive approach to learning. This approach balances the use of AI in a way that expands educational opportunities while managing the emotional consequences of a societal reliance on digital technology (Kulesa, A, et al., 2024; Raza, S, et al., 2025).

The advancement of AI-augmented education relies on the formulation of regulations and frameworks that both allow for the evolution of technology and safeguard the psychological health of students. Digital wellness, ethical AI governance, mental health supports, and technology use policy frameworks that support responsible use of AI-enabled education platforms are becoming part of the university landscape. Responsible use of technology recognizes that the continued evolution of technology should not stress, worry, or emotionally drain students. Future education models will likely consider the balance of psychological well-being with academic performance to ensure that the use of AI in education will support the all-around development of the student as opposed to optimizing the system of education. As AI will be one of the disruptive technologies in the global system of higher education, the balance of digital technology and mental health will be among the most critical and priority concerns of educational researchers and policymakers as well as the leaders of educational institutions (Al Muoaeweed, 2025; Sabapathi, S et al., 2025).

Research Objectives

- To examine the influence of artificial intelligence-enhanced education on students' psychological well-being in higher education institutions.
- To evaluate the relationship between digital innovation in educational environments and students' mental health outcomes.
- To explore the balance between artificial intelligence adoption and the promotion of student psychological well-being in higher education.

Research Questions

- How does artificial intelligence-enhanced education influence students' psychological well-being in higher education?
- What is the relationship between digital innovation in educational environments and students' mental health outcomes?
- How can higher education institutions balance artificial intelligence adoption with the promotion of students' psychological well-being?

Problem Statement

Artificial Intelligence's rapid employment in higher education has created a shift in personalization, accessibility, and efficiency in teaching and learning. These tech tools have made learning easier, but they come with strong apprehensions about students and their mental health. Relying too heavily on learning systems run by AI, increased screen time, a decrease in real world interactions, digital fatigue, a lack of concern for privacy, and academic pressure can all affect students emotional and mental health. Most of the previous studies have examined the educational utility of AI technologies, but very little research has been conducted to examine how AI enhanced learning impacts students mental health. This is especially true in terms of balancing digital technologies with mental health in the context of higher education. This gap has the potential for systematic research to help answer the question of whether the benefits of employing AI can be realized without adversely affecting students mental health. This research will also help educators, higher education institutions and policy makers with the implementation of AI technologies in learning environments that are human and health centered.

Significance of the Study

This research is relevant as it focuses on a novel area of study. Most studies on the incorporation of AI in the educational sector document the challenges posed to the mental health and psychological wellness of learners. This research aims to propose ways to implement AI in the educational sector to maximize learning outcomes while considering the emotional and psychological wellness of learners. This research will also provide frameworks to policymakers and educational technology designers on how to use AI in the educational sector. This research will also aid the development of educational policies centered on the digital wellness of learners and the ethical use of AI. This research will also close the existing knowledge gap by providing insights on the impact of AI on educational digital services and the consequences to the mental health of learners. The findings will also guide researchers who are interested in the development of AI-based educational services that are sustainable and psychologically safe for learners.

Literature Review

Artificial intelligence (AI) has had a tremendous impact on multiple facets of higher education. Teaching, learning, assessment, and even the administration of higher education have all been significantly altered by the introduction of AI. In their work, Wayne Siraj, J et al. (2025) explain that AI in the education sector refers to technologies that, in an intelligent manner, provide support to learning in the form of adaptive learning, personalized feedback, automated assessments, and even learning analytics. In an attempt to augment the education offered to learners and the efficiency of institutions, many universities around the world have implemented AI-based learning management systems, intelligent tutoring systems, virtual teaching assistants, automated grading systems, and recommendation systems. By way of learning behavior analysis, identification of knowledge gaps, and the recommendation of learning resources, instructional systems can provide personalized learning to meet the diverse learning needs of students. In the opinion of Rose Panayotova, G (2025), AI helps to improve and augment learning, therefore, it should be regarded as an aid to educators that helps ease the burden on teachers and allows them to focus more on mentoring and developing critical thinking and engagement in learners. The growing application of AI in higher education is in line with the digital transformation of higher education, albeit the focus on AI in higher education is to facilitate improved access to learning and enhance the level of performance of learners in learning, and to establish learning systems that are more adaptable in meeting the needs of learners (Özüdoğru, G et al., 2025).

The impact of AI on teaching practices, in particular the AI's ability to support learning that is both personalized and centered on the learner, is profound. Helen Crompton and Burke (2023) describe that in contrast to traditional education solutions, AI adaptive learning systems routinely gauge the progress of each learner and adjust the available learning resources. Students engage with learning resources that are tailored to the students preferred learning style. Furthermore, students are able to learn at their own pace and receive feedback that reinforces learning. The students' academic confidence is improved. Moreover, knowledge retention is enhanced. The ability of intelligent tutoring systems to deliver personalized instructional support improves the quality of learning that students are able to achieve. Intelligent systems encourage students to actively control their learning, to monitor their learning progress, and to set academic targets. In addition, AI systems support the automation of the grading process, attendance tracking, plagiarism detection, and the monitoring of students. These systems allow educators to engage in teaching and learning activities. AI is able to improve educational systems as a result of the automation of repetitive educational tasks.

Artificial Intelligence has played a prominent role in the facilitation of data-centric decision making in higher educational institutions. As per the OECD (2021), Learning analytics via AI assist higher educational institutions in recognizing students who may be likely to fail, and also in tracking the progression of students in addition to aiding in the provision of delays in adaptive learning support. AI's predictive algorithms allow institutions to recognize behavioral indicators such as poor and diminishing academic performance, absenteeism, declining participation and engagement and to intervene with timely academic and supportive psychological assistance.

In a similar line of thought, Ahmad, A (2024) has expressed the opinion that AI fosters positive Institutional effectiveness in higher educational institutions through advances in Curriculum design and positive resource and support optimization. Nonetheless, the authors have highlighted that the positive impacts of AI on higher educational institutions are also contingent upon the quality of educational data, transparency of algorithms, and the ethical and responsible application of AI. In the absence of oversight, cross institutional digital inequalities, the presence of algorithm biases and poor prediction outcomes are likely to challenge the fulfilment of the aims and objectives of AI in education. (Liu, R et al., 2025; Kashive, N, et al., 2025)

Artificial Intelligence and Student Psychological Well-Being

The rapid development of AI technologies and their impact on the teaching and learning environments of the university have made the psychological well-being of students a pressing concern for the university. Psychological well-being is described as the student's ability to maintain positive emotional balance, academic motivation, and resiliency, as well as self-confidence and satisfaction with life, while also successfully coping with the challenges that the educational process brings. As noted by Carol D. Ali, K et al., (2024), the psychological well-being of students includes self-acceptance, personal growth, autonomy, positive relationships with others, control of the surrounding world, and having a purpose in life. In AI-assisted educational environments, intelligent learning systems that personalize the educational process and provide ongoing educational assistance and support influence these dimensions of psychological well-being. Likewise, according to Wayne Omar, G et al. (2024), AI can offer students the support they need to thrive in the classroom because it can identify students' academic needs, create optimal learning pathways, and provide positive and constructive feedback to help minimize academic anxiety and build self-confidence. The growing use of AI educational technologies in universities has made it essential for researchers to assess how these technologies affect students' psychological well-being in addition to their academic outcomes.

Supporting students' psychological well-being is one of the many benefits of artificial intelligence. It is the result of developing personalized learning that takes into account each individual's learning style, needs, and preferences. Adaptive learning systems continually analyze individual students and create personalized content that matches instructional needs and pace. The reduction of personalized, academic, and procedural pressure creates a greater sense of self-efficacy, autonomy, and confidence. AI-systems create intelligent tutoring systems capable of providing instant feedback to students and help close learning gaps. Virtual learning assistants help students after school hours and offer support during times of learning distress. Intelligent, educational technology systems help support students' psychological well-being.

Although there are benefits to AI-supported learning, the literature notes a few psychological concerns of students that stem from the over-dependence of AI-supported learning. As indicated by Hamilton, A (2024), the development of digital learning has meant that university students spend more and more time in front of the computer, and as a result, have less and less time engaging in social activities. This may result in digital fatigue, emotional exhaustion, and feelings of isolation. In a similar study of automated learning systems, the Organisation for Economic Co-operation and Development (Ouanes, K, 2024) argued that the use of automated learning systems may work against students' interests and create psychological stress and anxiety due to concerns of privacy, surveillance, and data security. In addition to the above, Holmes et al. (2022) argued that the overreliance of the AI systems of students may contribute to a lack of creative thinking and a lack of confidence of students in their ability to solve problems that are beyond the level of thinking of the AI systems. The above may suggest that although the integration of AI in learning creates efficiencies, due to the unintended psychological effects on students, AI in learning should be implemented with caution.

Digital Innovation and Students' Mental Health Outcomes

Digital innovation is changing the landscape of higher education. Digital innovations are changing how students learn, communicate, and collaborate. Digital innovations are also changing how students access resources. This is the case of the inclusion of virtually all learning aids and platforms from AI to cloud computing, virtual classrooms, learning management systems, educational analytics, and mobile learning applications. The integration of the innovations mentioned increases educational access and flexibility. The (United Nations Educational, Scientific and Cultural Organization (2023)) recognizes the value of digital innovations to educational institutions in that they allow learning to be flexible, personalized, and learning technology aids to be present while encouraging engagement, and positively contributing to the effectiveness of the institution. Education technology aids and platforms create more opportunities for learning environments that encourage interaction, learning, and collaboration regardless of the physical distance between the learners and the facilitators. (Wayne Mennella, C. et al. (2024)) state that digital innovations have permanently altered learning and teaching methodologies and their component frameworks and strategies through learning that is adaptive, assessments that are intelligent, and teaching that is supported through the use of technology and data with a focus on learning outcomes. The continuous changes that digital technology is causing in higher education is causing researchers to pay attention to the changes and their impact on the psychological and mental health of students.

Digital innovations have the potential to improve mental health by lessening academic stressors and creating supportive learning environments. Rose Ali Khan et al. (2024) note that smart educational technologies construct flexible learning pathways and help students cope with academic stress. As a result, students experience higher levels of efficacy and self-confidence. The digital medium supports ongoing communication between the student and the teacher, and can assist with real-time guidance, reducing learning anxiety. Responding to this learning process, most artificial intelligence-based learning environments promote feelings of success and encourage motivation, which translate to improved emotional welfare and mental resilience. According to Smith (2022), using technology in learning environments results in a higher level of engagement, cooperation, and independence among learners. This contributes to a better learning experience and improved satisfaction in the learning process. Improved digital technologies can promote mental health in the learning context if the technology resources are integrated to augment learning activities while preserving the value of educational engagement.

Even with these benefits, researchers have found that increasing reliance on technology impacts users' mental health. The Organization for Economic Co-operation and Development (2021) reported that students who are digitally overloaded by persistent online learning and teaching, may suffer from mental problems, including more stress, and cognitive and technological anxiety. Rachmad, Y (2024) observed that students may experience feelings of social isolation and digital fatigue when they suffer from mental health problems because of their excessive digital screen usage coupled with the persistent online learning. Kumar, R et al. (2025) noted that the persistent use of digital surveillance and intelligent technologies may increase students' psychological problems because of digital fatigue, privacy and infection-related concerns. The problems highlighted above suggest that digital innovations to learning and teaching have the ability to increase the efficiency of learning and teaching and improve students' mental health. However, the innovations also introduce new mental health challenges that must be addressed by using support systems and practicing more responsible use of digital technologies.

Balancing Artificial Intelligence Adoption and Psychological Well-Being in Higher Education

The integration of AI into higher education brings the opportunity to develop the quality of education and the concern about the impact on the psychological well-being of students. Adaptive learning, AI-based intelligent tutoring, learning analytics, automated assessments, and virtual learning assistants are among the systems that institutions have been adopting to realize improvements in teaching and learning (Wayne Najm, A et al., 2025). It is argued that AI will enable the personalization of learning within higher education and the enhancement of the learning, teaching, and support processes offered by education institutions. Researchers have claimed that the positive and negative impact of technology on students' emotional and psychological well-being, mental resilience, and overall health must be assessed in addition to the impact on the outcomes of students' learning and the efficiency of the learning environment. As AI systems become more embedded in educational systems, the challenge for the higher education sector will be to ensure that the incorporation of technology does not adversely impact students' mental health and learning experiences (FR Oswald AJ Mascarenhas, 2018).

A balanced approach to AI adoption combines advanced technologies and human-centric education. Rose Khan, M (2024), argues that AI does not need to take the place of teaching's human elements. AI, as an intelligent partner, needs to complement the teaching elements that involve care, guidance, cooperation, and emotional support. While AI systems bolster learning through custom feedback and progress tracking and show students who need help, teachers build rapport and foster critical thinking and social skills. Tributing to the balanced approach, Helen Farid, F (2023), proposes that advanced technologies combined with teaching methodologies cultivating motivation and collaboration of students endorse effective AI use. The sustained approach to the teaching and learning system empowers universities to enjoy the numerous benefits of AI, while caring for the emotional and social needs of the students.

Even with AI's many advantages, the academic literature identifies many risks from the unrestrained or widespread use of more technologies in higher education. The Organisation for Economic Co-operation and Development (2021) believed that depending too much on AI-supported learning environments causes digital tiredness and cognitive overload, and it increases stress, reduces social communication, and raises privacy, data, and security worries, as well as the transparency of algorithms. Dąbrowska, A et al. (2025) believed that the continuous use of digital technologies causes emotional exhaustion and increases students' feelings of isolation, especially if educational institutions do not provide opportunities for real-life interactions. Holmes et al. (2022) noted that too much trust in AI recommendations reduces students' self-confidences and the ability to think and create without support. This shows AI technologies should be used more carefully to avoid educational innovations that worsen students' psychological well-being.

Research Gap

Much research has looked into the educational advantages of artificial intelligence (AI), such as personalized learning, adaptive instruction, and improved academic performance. However, there has not been much research on the impact of AI on students' psychological well-being and mental health, particularly in the context of higher education. Most research has looked at the technological efficiency and instructional capabilities of AI. Very little research has looked at the impact of AI on students' emotional resilience, stress, anxiety, and psychological well-being. Also, there has been little research on how higher education institutions can balance AI use with the preservation of students' mental well-being through non-AI teaching practices. Lastly, there is a lack of research on the integration of AI education, digital innovation, and the psychological well-being of students, especially in quickly changing online education. This study attempts to fill this gap by looking at the connection between AI education and students' psychological well-being, and how digital innovation can be used to promote educational improvement and well-being in the higher education context.

Research Hypotheses

H1: There is a significant relationship between artificial intelligence-enhanced education and students' psychological well-being.

H2: Artificial intelligence-enhanced education and digital innovation significantly predict students' psychological well-being.

H3: There is a significant difference in students' psychological well-being based on gender.

H4: There is a significant difference in students' psychological well-being across different academic year levels.

Conceptual Framework

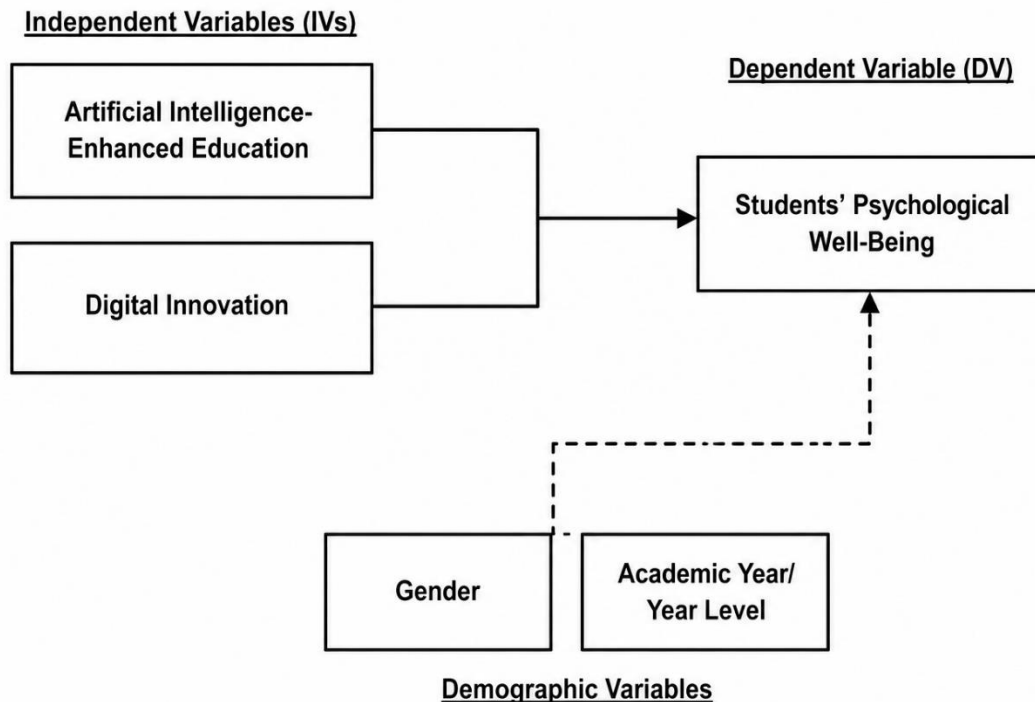


Figure 1: Conceptual Framework

Methodology

Research Design

In this study, we utilized a quantitative methodology incorporating a cross-sectional survey research design. This approach helped illuminate artificial intelligence-based education, digital innovation, and psychological well-being as pertaining to students enrolled in higher education. A survey was the primary means of data collection, and the need for standardized data collection from large numbers of respondents in a short time was met. The quantitative approach was appropriate to analyze relationships, the predictive power of the variables, and between-group differences. The cross-sectional design was justifiable, as data were collected from respondents at one specific point in time. This provided the researcher with a detailed, comprehensive understanding of university students' current perceptions and experiences regarding AI-based education and psychological well-being.

Population

The study comprised the undergraduate and postgraduate populations of publicly and privately funded higher education in the provinces of Punjab and Sindh, Pakistan. The study surveyed several universities, including Bahauddin Zakariya University, The Islamia University of Bahawalpur, University of the Punjab, Government College University Faisalabad, University of Sindh, Shah Abdul Latif University, and University of Karachi. These universities employ teaching and learning digital technologies and AI-integrated educational platforms. Hence, they are suitable for investigating the nexus between AI-integrated education and psychological well-being in students.

Target Audience

Targeted respondents were undergraduate and postgraduate students who were familiar with at least some applications of AI and digital learning technologies. It was important that students came from the diverse fields of social sciences, management sciences, computer science, engineering, education, health sciences, and information technology. Respondents were expected to have considerable exposure to educational AI tools such as ChatGPT, intelligent tutoring systems, adaptive learning systems, virtual learning assistants, and learning management systems. Students who had no exposure to AI educational technologies were excluded from the study.

Sampling Technique

The study employed a convenience sampling technique to identify respondents. This type of non-probability sampling method was employed to provide the researcher access to the students as facilitated by various university networks and online academic communities. Convenience sampling was justified by the considerable distance of participants across Punjab and Sindh, and the online distribution of the study's questionnaire. The technique also provided the researcher an easy and effective means of collecting data from participants who readily agreed to take part in the study.

Sample Size

The study analyzed a sample of 467 respondents. The number of participants was sufficient to perform the planned analyses involving a correlation, an array of regression analyses (multiple linear regression), an independent samples t-test, as well as a one-way analysis of variance (ANOVA). Participants were sufficient to provide the study with the statistical power to analyze the constructs of the study for their relationships, as well as their predictive power and their group distinctions.

Data Collection

Data were collected using a structured questionnaire based on previously validated studies. The questionnaire was divided into four sections. The first section captured demographic data: gender, age, academic year, and university. The second section addressed Artificial Intelligence-Enhanced Education. This section was based on the Artificial Intelligence in Education Scale by Holmes et al. (2022). The subsequent section addressed Digital Innovation. The items in this section were based on the Digital Innovation Capability Scale by Nambisan et al. (2019). The final section addressed Student Psychological Well-Being. The items in this section were based on the Psychological Well-Being Scale by Ryff (1989). All items were assessed using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

A Google Form was used to develop the questionnaire. The survey link was distributed electronically via university email, WhatsApp, Facebook groups, and other online student networks in selected universities, Punjab and Sindh. The survey was completed online, and

responses were recorded automatically. Subsequently, the responses were exported from Google Forms to Microsoft Excel for data screening, coding, and cleaning, then exported to IBM SPSS Statistics for analysis.

Ethical Considerations

Ethics were in full effect during the duration of this project. Study participants were selected completely on a voluntary basis. Respondents had the option to read about the purpose of the study before answering the research questions. Informed consent was gained electronically via the introductory section of the online survey. Study participants were to be assured of the confidentiality and the anonymous nature of their responses. The responses would be for the sole purpose of the study. Consideration for the participant's privacy and right to withdraw was made by the assurance of the lack of personally identifiable information. Participants were informed of their freedom to withdraw from the study at any time and for any reason. The researcher was the only individual with access to the secure data.

Data Analysis

The plain form data was downloaded from the Google survey and imported into Microsoft Excel. Responses were coded and checked for completeness, missing values, and duplicate entries. In Excel, the responses were scanned for accuracy. The prepared data were imported into the IBM SPSS Statistics software package for analysis.

The demographic data of respondents and variables were analyzed using descriptive statistics (i.e., means, frequencies, standard deviations, and percentages). Reliability of the measurement scales was evaluated using Cronbach's Alpha, and relationships were evaluated using Pearson's correlation. To determine the predictive influence on students' psychological well-being, multiple linear regression was used for artificial intelligence-enhanced education and digital innovation. A t-test was used to evaluate the difference of students' psychological well-being based on gender. A one-way analysis of variance examined psychological well-being of different academic year levels. Findings were interpreted at a confidence level of 95 %, and a significance level of $p < 0.5$.

Table 1: Demographic Characteristics of the Respondents (N = 467)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	229	49.0
	Female	238	51.0
	Total	467	100.0
Age (Years)	18–20	103	22.1
	21–23	174	37.3
	24–26	126	27.0
	Above 26	64	13.7
	Total	467	100.0
Academic Level	Undergraduate	268	57.4
	Postgraduate	199	42.6
	Total	467	100.0
Academic Year	First Year	82	17.6
	Second Year	114	24.4
	Third Year	123	26.3
	Fourth Year	91	19.5
	Postgraduate	57	12.2
	Total	467	100.0
Province	Punjab	289	61.9
	Sindh	178	38.1
	Total	467	100.0
Type of Institution	Public University	281	60.2
	Private University	186	39.8

Variable	Category	Frequency (n)	Percentage (%)
Experience Using AI Educational Tools	Total	467	100.0
	Less than 1 Year	116	24.8
	1–2 Years	173	37.0
	3–4 Years	121	25.9
	More than 4 Years	57	12.2
	Total	467	100.0

Over 467 respondents from public and private higher education across Punjab and Sindh, Pakistan, were included in the demographic study. The respondents showed a balanced gender distribution with 51.0% (n = 238) female and 49.0% (n = 229) male. The majority of participants were within the age group of 21 to 23 years (n = 174, 37.3%). This was followed by the age group of 24 to 26 years (n = 126, 27.0%), the age group of 18 to 20 years (n = 103, 22.1%), and those above the age of 26 years (n = 64, 13.7%). The majority of respondents were at the undergraduate level (n = 268, 57.4%). The remaining respondents were at the postgraduate level (n = 199, 42.6%). In terms of academic year, the largest respondents were in the third year (n = 123, 26.3%), followed by second year (n = 114, 24.4%), fourth year (n = 91, 19.5%), first year (n = 82, 17.6%), and postgraduate level (n = 57, 12.2%). Moreover, 61.9% (n = 289) of respondents were in universities in Punjab, and 38.1% (n = 178) were in Sindh. The results additionally showed that the majority of respondents were in public universities (n = 281, 60.2%) whereas 39.8% (n = 186) were in private universities. Most of the participants (37.0%, n = 173) had 1–2 years of experience with AI educational technologies. Other experiences reported include: 3–4 years (25.9%, n = 121), less than 1 year (24.8%, n = 116), and more than 4 years (12.2%, n = 57). The experience levels indicate that the participants had enough experience with AI educational technologies to answer the survey questions meaningfully.

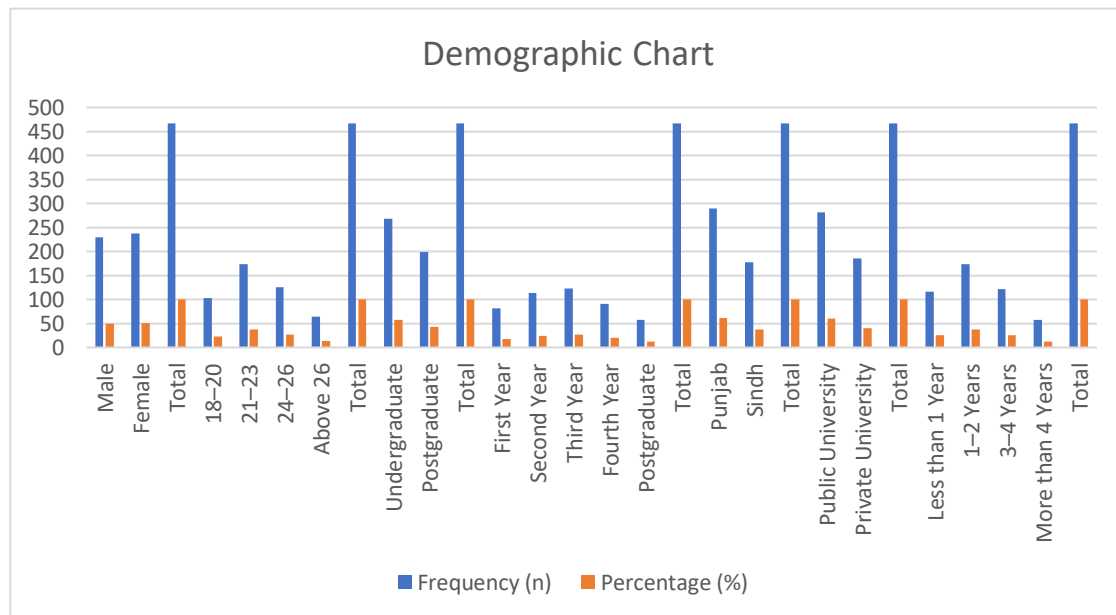


Figure 2: Demographic Chart

Table 2: Pearson Correlation Analysis between Artificial Intelligence-Enhanced Education and Student Psychological Well-Being (N = 467)

Variables	1	2
1. Artificial Intelligence-Enhanced Education	1	.681**
2. Student Psychological Well-Being	.681**	1
Pearson Correlation (r)	.681	
Sig. (2-tailed)	.000	
N	467	

A Pearson correlation analysis examined the integration of AI in education and its impacts on the psychological well-being of students of 467 participants. The study found that AI-enhanced education and students' psychological well-being had a strong positive correlation ($r = .681$, $p < .001$). The results implied that AI educational practices had a positive impact on students' psychological well-being and the emotional integration in the learning process. The AI Technologies that were most likely to impact positively on students' emotional well-being and academic experience were the personalized Learning and Intelligent tutoring systems, as well as the Adaptive Learning Technologies. The positive correlation, especially with the significance of less than .05, indicated that the participants of the study had a positive integration of AI in education practices and psychological well-being.

Table 3: Multiple Linear Regression Analysis of Artificial Intelligence-Enhanced Education and Digital Innovation Predicting Student Psychological Well-Being (N = 467)

Predictor Variables	B	Std. Error	Beta (β)	t	Sig.
(Constant)	0.842	0.231	—	3.645	.000
Artificial Intelligence-Enhanced Education	0.481	0.047	0.492	10.234	.000
Digital Innovation	0.356	0.044	0.389	8.091	.000

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.792	.627	.625	0.412

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	132.864	2	66.432	390.918	.000
Residual	78.848	464	0.170		
Total	211.712	466			

The study surveyed 467 participants to explore the predictive relationship between education augmented by artificial intelligence, digital innovation, and psychological well-being using multiple linear regression. The model was able to predict participants' psychological well-being to a high degree ($R = .792$) and accounted for 62.7 percent of the variance ($R^2 = .627$, Adjusted $R^2 = .625$). According to the ANOVA results, the regression model was significant, and the predictor variables accounted for large amounts of variance of psychological well-being ($F = 390.918$, $p < .001$). From the regression coefficients of the predictor variables, artificial intelligence-enhanced education ($\beta = .492$, $t = 10.234$, $p < .001$) and digital innovation ($\beta = .389$, $t = 8.091$, $p < .001$) both significantly and positively impacted student psychological well-being. The results imply that students' psychological well-being improved with the advancements of both AI-enhanced educational practices and digital innovation; of the two, artificial intelligence-enhanced education was found to be the better predictor of the two.

Table 4: Independent Samples t-Test Analysis of Student Psychological Well-Being by Gender (N = 467)

Gender	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Male	229	3.71	0.59			
Female	238	3.94	0.56	-4.324	465	.000

Levene's Test for Equality of Variances

F	Sig.
1.286	.257

An independent samples t-test was performed with 467 participants to investigate gender differences in student psychological well-being. Findings showed that the psychological well-being of female students ($M = 3.94$, $SD = 0.56$) was higher than that of male students ($M = 3.71$, $SD = 0.59$). The result of Levene's Test was not statistically significant ($F = 1.286$, $p = .257$), which would suggest that the variances are considered equal, thus the assumption was satisfied. Male and female students also showed evidence of a statistically significant difference when considering the independent samples t-test, ($t(465) = -4.324$, $p < .001$). Because the significance exceeded .05, it was evident that the psychological well-being of students differed significantly based on gender, as female students were found to have higher psychological well-being than male students in the present study.

Table 5: One-Way ANOVA Analysis of Student Psychological Well-Being across Academic Year Levels (N = 467)**Descriptive Statistics**

Academic Year	N	Mean	Std. Deviation
First Year	82	3.61	0.58
Second Year	114	3.74	0.55
Third Year	123	3.89	0.53
Fourth Year	91	4.02	0.51
Postgraduate	57	4.11	0.49
Total	467	3.86	0.55

ANOVA Results

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.834	4	3.209	10.846	.000
Within Groups	136.790	462	0.296		
Total	149.624	466			

A one-way analysis of variance (ANOVA) was performed to explore the difference among 467 respondents' psychological well-being across different academic years. According to the statistics, the highest level of psychological well-being was seen in postgraduate students ($M = 4.11$, $SD = 0.49$). This was followed by fourth year ($M = 4.02$, $SD = 0.51$), third year ($M = 3.89$, $SD = 0.53$), second year ($M = 3.74$, $SD = 0.55$), and first year students ($M = 3.61$, $SD = 0.58$). ANOVA reported students' psychological well-being across academic years ($F(4, 462) = 10.846$, $p < .001$). The findings revealed that students' psychological well-being significantly varied according to their academic year ($p < 0.05$). Overall, respondents in higher academic years had higher psychological well-being than respondents in first academic years. This finding suggests that students' psychological well-being improves with academic progression, indicating that first year students may have a lower level of psychological well-being. Further, it may indicate that first year students need to adapt to the university learning environment.

Discussion

This study aimed to explore the interplay of AI-improved education, digital innovation, and students' mental health in tertiary institutions in Punjab and Sindh, Pakistan. The results showed that AI-improved education was positively related to students' mental health. This result indicated that the students who were more exposed to the AI-empowered educational technologies were more likely to have a better quality of mental health. Correlation analysis indicated a strong, significant, and positive relationship between AI-improved education and students' mental health. Hence, it can be argued that AI-structured educational setups positively affect students' educational and emotional experiences. These results align with the recent literature, which identifies AI as one of the key drivers of the improvement of the educational process and the enhancement of students' engagement, self-confidence, and satisfaction (Holmes et al., 2022; UNESCO, 2023). Various AI technologies, including intelligent tutoring systems, adaptive learning systems, automated feedback systems, and virtual learning assistants, provide students with personalized learning and help decrease their learning gaps, and, therefore, the confidence with which they undertake learning tasks. Thus, the results of the research indicated that AI, if used in a responsible manner, has the capacity to provide learning frameworks that promote healthy learning and emotional engagement of students.

The regression analysis indicated that both artificial intelligence-enhanced education and digital innovation have the potential to impact students' psychological well-being, with artificial intelligence-enhanced education being the stronger of the two. This demonstrates that educational technologies do more than assist in the streamlining of instruction; they shape students' emotional and psychological experiences in the higher education setting. This is in agreement with Luckin and Cukurova (2019), who contend that AI-enhanced learning environments foster personalization of instruction, and the development of self-regulated learning and academic autonomy, thereby positively impacting students' psychological growth. In addition, Crompton and Burke (2023) noted that intelligent educational technologies employ different instructional strategies that adapt to students' individual needs and consequently promote student motivation, learning, and teaching satisfaction. It is also in agreement with the findings of Nambisan et al. (2019), where the positive impact of digital innovation on organizational and educational performance is due to the development of flexible and more learner-centered environments. In totality, the findings demonstrate that innovative technologies, pedagogical methods, and educational policies have the capacity to enhance educational quality and strengthen the psychological well-being of students.

Results concerning gender indicated that female students had higher tier levels of psychological well-being than male students, and gender differences that appear similar across a range of educational and psychological studies are found to exist, and in varying degrees in different countries and educational systems. Studies have shown that gender can impact emotional regulation, coping strategies, social support and attitudes to technology, all of which can impact an individual's psychological well-being in the context of a given education system (OECD, 2021). Differences in gender pedagogies may well have an impact on the integration of communication, interaction, and participation with AI teaching and learning systems. These studies also need to be taken within the broader context of the teaching and social system as psychological well-being is a multifaceted construct. There are several different academic, social and personally related issues that impact a students' psychological well-being. Following studies may further impact the understanding of moderators and intermediaries that account for these gender differences in AI-based educational environments.

The results of the study further showed remarkable differences in psychological well-being of students at different year levels. Students at the higher year level have shown the ability to possess higher psychological well-being compared to students at the lower year level. This finding indicated that if students spend more years engaging in university studies, they develop a higher ability to adapt, better confidence, and greater psychological resilience. Findings also indicated the engagement of students in different studies in digital and AI learning technologies helps students develop a higher level of psychological resilience, confidence, and adaptability. These findings align with findings by UNESCO (2023), which further indicated the great importance of digital and technological competencies in helping students develop more advanced adaptive abilities in learning environments that are driven by technology. According to Holmes et al. (2022), the ability to engage with AI technologies is directly related to student digital competencies, and more experienced students, especially in digital learning environments, have a higher ability to engage with AI technologies. The present findings, therefore, have greatly shown that the engagement of students in higher education and digital technologies has an enormous potential of AI-enhanced education for students while sustaining good psychological well-being.

Overall, this study's findings add to the increasing global agreement that artificial intelligence must be deployed with a people-first strategy that balances innovations with technology and the emotional and psychological needs of students. While AI helps create more efficient, personalized, and accessible learning, its successful deployment requires the governance of ethics, the socially responsible use of the technology, and the continued presence of people. UNESCO (2023) argued that AI should be used to assist educators, not be a substitution for them, and Holmes et al. (2022) said that emotional support, empathy, creativity, and critical thinking are all human characteristics and are important to the educational process. The findings of this study strengthen the argument

that AI technologies should be deployed in tandem with fully developed student support services, digital literacy programs, ethical AI governance, and mental health promotion services in the postsecondary sector to safeguard the emotional and psychological health of students while increasing the learning opportunities offered. This would allow the postsecondary sector to achieve a sustained digital transformation that balances educational aspirations and academic achievement with the psychological health of students.

Conclusion

This study explored artificial intelligence-oriented education and its impact on digital innovations and the psychological well-being of college students across the Punjab and Sindh regions of Pakistan. The results showed that AI-enhanced education positively impacts students' psychological well-being. This indicates that the AI-integrated learning model offers students better learning experiences while yielding better outcomes regarding students' psychological well-being. In addition, the predictive ability of AI-enhanced education and digital innovations concerning the psychological well-being of students from educational settings was substantial. This reflects the effective technology-enhanced educational frameworks' ability to engage learners while strengthening their psychological well-being, emotional strength, and self-confidence. Moreover, the study revealed that students' psychological well-being varies among different gender and academic groups, which means different demographics of students interact and engage with AI-Enhanced education differently. The responsible deployment of AI and other advanced technologies in higher education has the potential to transform the quality of educational services and positively affect the psychological well-being of students.

The study concludes that to achieve AI successfully within higher education, it is essential to go beyond the enhancement of performance and efficiency encompassing mental health and well-being. AAI should be a fusion of intelligent educational technologies, teaching, ethical AI governance, digital literacy and mental health support and services. This fusion of approaches will assist universities and colleges to gain the benefits of AI educational technologies within the framework of the balancing of psychological constraints related to the extensive use of technologies. The study results are a contribution to the research in the area of AI and education and will support teaching, policy and educational technology to create effective and flexible digitally augmented education within an inclusive framework and of psychological health.

Recommendations

1. Higher education institutions should integrate artificial intelligence technologies in ways that support both academic performance and students' psychological well-being.
2. Universities should provide regular digital literacy and AI competency training for students and faculty members to promote the effective and responsible use of AI tools.
3. Educational institutions should establish ethical AI governance policies that ensure transparency, data privacy, fairness, and accountability in AI-assisted learning systems.
4. Universities should strengthen mental health support services by integrating counseling programs with AI-enhanced educational environments.
5. Educators should adopt a balanced teaching approach in which artificial intelligence complements rather than replaces human interaction, mentorship, and collaborative learning.
6. Policymakers should invest in the development of inclusive and accessible AI-powered educational technologies that support students from diverse academic and socioeconomic backgrounds.
7. Future researchers should examine additional factors, such as academic self-efficacy, digital literacy, technology acceptance, and learning engagement, to further understand the relationship between artificial intelligence-enhanced education and students' psychological well-being.

Future Implications

This study strengthens the foundation for the advancement of artificial intelligence in education and the psychological well-being of students. The evolution of this technology calls for developing the psychological effects on students in terms of engagement, satisfaction, mental well-being, and the overall educational experience. This should be done in different educational environments, contexts, and cultures. The effects on students to adapt to education augmented with artificial intelligence could also be explored through the lenses of digital literacy, technology acceptance, academic self-efficacy, resilience, and learning motivation. The effects of artificial intelligence on psychological well-being should be studied through the use of new longitudinal and mixed research

methods. From the perspective of higher education, the use of ethical artificial intelligence, human-centered education, and digital well-being should be combined in the governance and practices of this sector. This will provide an innovative approach to technology that balances the needs of students and the new digital education technology.

References

1. Ahmad, A. Q. (2024). Navigating the Digital Transformation in Higher Education: Opportunities, Challenges, and Strategic Path-ways. Exploring the transformative impact of AI across industries and its role in shaping global advancements, 26.
2. Ahmadpour, M. (2024). Emerging Approaches in Enhancing Mental and Physical Health of the Elderly: Integration of Strength Training, Mindfulness, and Artificial Intelligence. *JOURNAL OF PSYCHOLOGICAL DYNAMICS IN MOOD DISORDERS* Учредители: KMAN Publication Incorporation, 3(5), 262-274.
3. Al Muoaeweed, O. (2025). Online Learning in Saudi HEIs during COVID-19: Embracing Challenges and Artificial Intelligence-Enhanced Opportunities. *Journal of Applied Research and Technology*, 23(5), 438-450.
4. Ali Khan, U., Kauttonen, J., Aunimo, L., & V Alamäki, A. (2024). A system to ensure information trustworthiness in artificial intelligence enhanced higher education.
5. Ali, K., Garcia, A., & Vadsariya, A. (2024). Impact of the AI Dependency Revolution on Both Physical and Mental Health. *Journal of Strategic Innovation & Sustainability*, 19(2).
6. Asif, F., Jamshed, K., Kishwer, R., Nouman, M., & Liaqat, F. (2026). Impact of Artificial Intelligence on E-Learning and Technology Education: Nexus of Technostress and Perceived Danger in E-Learning. In *Embracing the AI Frontier* (pp. 101-128). Apple Academic Press.
7. Chan, C. K. Y., & Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. *International journal of educational technology in higher education*, 20(1), 43.
8. Crompton, H., & Burke, D. (2024). The educational affordances and challenges of ChatGPT: State of the field. *TechTrends*, 68(2), 380-392.
9. Dąbrowska, A., Fandrejewska, A., Stańczyk, E., & Szalonka, K. (2025). Consumer and Innovations in E-Health Services: Examples of European Countries. Productivity Press.
10. Farid, F. (2023). Enhancing human resource decision making with image-based OSMI data analysis: leveraging PIX2PIX for accurate workplace mental health insights.
11. FR Oswald AJ Mascarenhas, S. J. (2018). Artificial intelligence and the emergent turbulent markets: New challenges to corporate ethics today. In *Corporate Ethics for Turbulent Markets* (pp. 215-242). Emerald Publishing Limited.
12. Hamilton, A. (2024). Artificial intelligence and healthcare simulation: the shifting landscape of medical education. *Cureus*, 16(5), e59747.
13. Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Shum, S. B., ... & Koedinger, K. R. (2022). Ethics of AI in education: Towards a community-wide framework. *International Journal of Artificial Intelligence in Education*, 32(3), 504-526.
14. Kashive, N., & Raina, B. (2025). Digital leadership competencies and emotional intelligence for digital well-being: examining through PLS-SEM and NCA. *International Journal of Organizational Analysis*.
15. Khan, M. Z. (2024). Book Chapter-IT driven innovation in Management. *Proceedings of National Webinar*.
16. Kulesa, A. C., Croft, M., Robinson, B., Wells, M. K., Rotherham, A. J., & Bailey, J. (2024). *Learning Systems: Opportunities and Challenges of Artificial Intelligence-Enhanced Education*. Bellwether.
17. Kumar, R., Chauhan, M., & Lakhera, A. (2025). Exploring the way Green HR Practices Impact Job Effectiveness and Job Satisfaction: A Comprehensive Conceptual Framework for Advancing Sustainable Workforce Development and Organizational Performance. *J Contemp Res Multidiscip*, 4(3), 519-528.

18. Liu, R., & Shen, W. (2025). Data acquisition of exercise and fitness pressure measurement based on artificial intelligence technology. *SLAS technology*, 33, 100328.
19. Luckin, R., & Cukurova, M. (2019). Designing educational technologies in the age of AI: A learning sciences-driven approach. *British Journal of Educational Technology*, 50(6), 2824-2838.
20. Mennella, C., Maniscalco, U., De Pietro, G., & Esposito, M. (2024). Ethical and regulatory challenges of AI technologies in healthcare: A narrative review. *Heliyon*, 10(4).
21. Najm, A., Wei, H., & Chew, E. (2025, January). Iva: A Playful Humanoid Robot with Educational Flare for Little Patients. In *Proceedings of the 23rd European Conference on e-Learning*. Academic Conferences and publishing limited.
22. Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research policy*, 48(8), 103773.
23. Ng, J., Crawford, J., Ng, J. W., & Razali, M. S. (2025). Developing well-being in young people using generative artificial intelligence (GenAI): a systematic literature review. *Young Consumers*, 26(5), 938-958.
24. Omar, G. A., Othman, Z. K., & Kakarash, Z. A. (2024). The transformative impact of artificial intelligence (AI) on enhancing healthcare systems in the Middle East. *Academic Journal of International University of Erbil*, 1(02), 1-16.
25. Ouanes, K. (2024). Transforming medical and health sciences education with gamification. In *Level Up! Exploring Gamification's Impact on Research and Innovation*. IntechOpen.
26. Özüdoğru, G., & Durak, H. Y. (2025). Conceptualizing pre-service teachers' artificial intelligence readiness and examining its relationship with various variables: The role of artificial intelligence literacy, digital citizenship, artificial intelligence-enhanced innovation and perceived threats from artificial intelligence. *Information Development*, 41(3), 916-932.
27. Panayotova, G. G. (2025). ARTIFICIAL INTELLIGENCE AND BIOFEEDBACK IN MENTAL DISORDERS MANAGEMENT.
28. Polanco-Diges, L., Saura, J. R., & Pinto, P. (2022). Setting the relationship between human-centered approaches and users' digital well-being: a review. *Journal of Tourism, Sustainability and Well-being*, 10(3), 148-171.
29. Rachmad, Y. E. (2024). *Transforming Digital Consumers: The Power of Viral Diffusion in Consumer Behavior*. PT. Sonpedia Publishing Indonesia.
30. Raza, S., Rais, L., & Ashraf, S. (2025). AI-Enhanced Learning Enjoyments an Empirical Analysis of Student Motivation Engagement Cognitive Outcomes and Academic Persistence. *Review of Applied Management and Social Sciences*, 8(4), 1659-1671.
31. Ryff, C. D. (2014). Self-realisation and meaning making in the face of adversity: A eudaimonic approach to human resilience. *Journal of psychology in Africa*, 24(1), 1-12.
32. Sabapathi, S., Mohan, S., Marimuthu, M., Peachimuthu, V., Thiyagarajan, G., Natarajan, S. T., & Marikannan, J. S. (2025, April). A study on artificial intelligence enhanced mental healthcare. In *AIP Conference Proceedings* (Vol. 3279, No. 1, p. 020202). AIP Publishing LLC.
33. Siraj, J. S., Zeib, F., Ilyas, F., & Ali, H. M. (2025). The Psychological Effects of AI-Augmented Classrooms on Teaching Identity and Professional Autonomy. *The Critical Review of Social Sciences Studies*, 3(3), 1941-1957.
34. Smith, S. R. (2022). The Fourth Industrial Revolution and Legal Education. *Ga. St. UL Rev.*, 39, 337.
35. Watson, A. L. (2024). Ethical considerations for artificial intelligence use in nursing informatics. *Nursing ethics*, 31(6), 1031-1040.
36. Yang, H., & Rui, Y. (2025). Transforming EFL students' engagement: How AI-enhanced environments bridge emotional health challenges like depression and anxiety. *Acta Psychologica*, 257, 105104.
37. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—where are the educators?. *International journal of educational technology in higher education*, 16(1), 39.

38. Zhao, X., Liang, H., Zhao, W., & Chen, Y. (2026). Self-Efficacy and Perceived Teacher Support of EFL Students in Predicting Their Engagement and Well-Being in Artificial Intelligence-Enhanced Settings. *European Journal of Education*, 61(1), e70501.



2026 by the authors; Journal of Global Social Transformation (JGST). This is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).