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THE FUTURE CLASSROOM: INTEGRATING AI AND SOCIAL MEDIA FOR ADAPTIVE LEARNING

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Abstract

This study investigated the impact of integrating artificial intelligence (AI) and social media into classroom instruction to enhance adaptive learning, engagement, and academic performance. A quasi-experimental design was employed with 120 undergraduate students divided into control and experimental groups. The experimental group received instruction through AI-based adaptive platforms and collaborative social media tools, while the control group experienced conventional teaching methods. Data were collected through pre- and post-tests, engagement surveys, and observational checklists, then analysed using SPSS to compare group performance, engagement trends, and correlations between digital activity and academic outcomes. Results of the analysis revealed that the experimental group showed a significantly higher improvement in post-test scores ($p < 0.01$), with emotional and cognitive engagement increasing more than behavioural engagement. Qualitative feedback highlighted students' appreciation for real-time AI feedback and peer learning networks, though some reported initial technological challenges. The AI system's adaptive algorithms successfully identified knowledge gaps in 78% of learners, enabling targeted interventions. Interestingly, social media integration reduced classroom anxiety by 32% according to self-reported surveys. Correlation analysis indicated a strong positive relationship ($r = 0.82$) between engagement levels and academic performance. Weekly academic progression showed a steeper upward trajectory in the experimental group. Social media platforms such as Discord and Microsoft Teams were particularly effective in fostering peer collaboration, with 85% of students reporting improved communication skills. The study concluded that AI and social media, when integrated thoughtfully, could promote personalized, engaging, and collaborative learning environments. However, the findings also underscored the need to address concerns related to data privacy, overreliance on AI, and digital equity, particularly for students from low-income backgrounds who showed 15% less engagement with the technologies. Future research should explore longitudinal impacts and scalability across diverse educational settings, including vocational training and STEM disciplines where AI tutoring systems may yield different outcomes.

Keywords: Academic Performance, Adaptive Learning, Artificial Intelligence, Digital Engagement, Personalized Instruction, Social Media

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Introduction

The use of artificial intelligence (AI) and social media in educational facilities has revolutionized traditional instructional practices over the last few years. Teachers tried more adaptive learning technologies used to personalize the delivery of content, to assess individual learner needs, and to provide immediate feedback and this improved student performance and engagement (Tan, 2025; Yaseen et al., 2025; Shi, 2025). At the same time, social media platforms turned into informal learning grounds, where collaboration, peer support, and exchange of information in real time became possible (Bashiri & Kowsari, 2024; Elsa & Stephen, 2024; Rincnon-Flores et al., 2024).

This change to AI-assisted responsive systems was a major pedagogical change. Such systems would constantly process the way learners behave and adapt teaching material to individual learning trajectories so that teaching would be more responsive and data-informed (Akibu, 2024; Ramteja et al., 2023; Maity & Deroy, 2024). Social media also supplemented this model through collaborative learning communities and facilitating learner agency and motivation, in particular with explainable AI attributes (Bashiri & Kowsari, 2024; Elsa & Stephen, 2024; Shahzad et al., 2024).

Nevertheless, as the advantages were acknowledged, the scholars expressed certain concerns related to privacy, algorithmic bias, teacher preparation, and emotional implications of automated environments (Cukurova et al., 2023; Ayeni et al., 2024; GettingSmart, 2025). Due to the increasing interest in hybrid and flexible learning approaches around the world, the overall effect of AI and social media on the learning experience, equity, and participation also requires thorough investigation.

Research Background

Current AI-based adaptive learning platforms have grown to have the ability to apply real-time analytics and machine learning algorithms to provide customized instruction through the creation and deployment of adaptive learning technologies that were, in the beginning, simple rule based systems (Akibu, 2024; Tan, 2025; Shi, 2025). The tools enabled personalized pace and sequencing of content and were particularly advantageous to students who have a wide range of learning needs and styles (Ayeni et al., 2024; Ramteja et al., 2023; Elsa & Stephen, 2024). Most of these systems included reinforcement learning, neural networks, and evidence of predictive analytics in the context of customizing learning paths.

Social media instead became transformed in terms of the social interaction arena into an informal learning network. Its introduction into the classroom facilitated community of practice involvement, interaction between students and educators, and allowed it to build digital literacy skills in content creation and curation (Bashiri & Kowsari, 2024; Shahzad et al., 2024; Rinc period According to the researchers, with appropriate moderation, this model assisted in establishing social and emotional learning, engagement, and even mental wellbeing (Yaseen et al., 2025; Ayeni et al., 2024; Cukurova et al., 2023).

In addition, the development of generative AI tools opened up the potential of educational social platforms even more. Through the explainable AI in social networks, students had the opportunity to learn about recommendation systems, customize learning material, and learn ethical AI literacy (Maity & Deroy, 2024; Ramteja et al., 2023; Elsa & Stephen, 2024). The innovations facilitated reflective and self-regulated learning as well as provided present-time analytics to instructors who would make decisions accordingly.

Research Problem

Despite the growing interest in both AI-driven adaptive platforms and social media–based learning environments, there remained a gap in understanding their combined impact on learner outcomes. Most research treated these technologies separately, focusing either on adaptive learning's ability to tailor content or on social media's potential to enhance collaboration. Few empirical studies examined how the fusion of these tools influenced academic performance, emotional engagement, and digital equity across various student demographics (Bashiri & Kowsari, 2024; Elsa & Stephen, 2024; Yaseen et al., 2025).

Additionally, there was limited analysis of how students' digital literacy and accessibility needs moderated the effects of this integration. Questions remained as to whether learners with lower technical proficiency or from marginalized communities could benefit equally from these technologies. Ethical concerns, including data privacy, algorithmic bias, and over-reliance on AI-driven tools, further complicated the adoption of this model in inclusive learning environments (Ayeni et al., 2024; Cukurova et al., 2023).

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Research Objectives

To investigate how the integration of AI-based adaptive learning and social media platforms affected student engagement, academic performance, and collaborative learning behaviour.

To evaluate the moderating role of students' digital literacy and accessibility needs on the effectiveness of these integrated learning environments.

To identify the ethical and pedagogical challenges that influence the adoption and implementation of AI and social media in the future classroom.

Research Questions

Q1. How did integrated AI-adaptive learning and social media use impact student engagement, academic performance, and peer collaboration?

Q2. To what extent did digital literacy and inclusivity needs influence the success of AI-social media integration in classroom settings?

Q3. What ethical and instructional considerations emerged from combining these technologies in teaching and learning environments?

Significance of the Study

This paper has provided a valuable knowledge on the current debate on educational technology because it discussed the interplay between AI and social media in adaptive learning environments. It emphasized that their fusion would revolutionize the state of instruction design, foster an individualized approach to studying, and enhance peer-to-peer communication. Furthermore, its findings are important on such critical issues as ethics, access, as well as diversity among learners, which can be considered practical in the work of policymakers, curriculum developers, and educational leaders aiming to create intelligent classrooms of the future that will include everyone.

Moreover, the research gave a guideline to education institutions to enhance their teaching methodologies with a view of modernizing their teaching systems. Through academic performance and participation of learners it promoted the emergence of evidence based procedures to the application of emerging technology within realistic classroom environments. The applied value of the findings made it especially useful to the natures of institutions that were in the process of a shift in learning mode to blended or hybrid ones, as it indicated the manner in which technology could be used to facilitate collaboration, develop digital literacy, and develop learner autonomy. The study also contributed to the fact that technological innovation and pedagogical practice are finally narrowing this gap by demonstrating how AI and social networks may be used conscientiously in a way that addresses a wide range of educational requirements and needs.

Literature Review

A recent review of the design and the effects of AI-based learning tools in higher education found that there are several roles related to personalized feedback, assessment and intelligent tutoring (Bond et al., 2025; Liu et al., 2025; Sajja et al., 2023). In about half of the reviewed studies, the delivered multimodal content consisted of visuals and wording cues and was able to contribute greatly to the increase in cognitive and affective outcomes (Bond et al., 2025; Liu et al., 2025).

One more meta-review pointed out adaptive systems and customization as theme leaders in AI in tertiary education, where chat-bots, recommender systems, and mood interfaces were among the most investigated applications (Crompton & Burke, 2023; Bond et al., 2025). These Ps have been found to enhance student performance and interest as well as trigger the issues of excessive use and the loss of the ability to think critically (Bond et al., 2025; Dong et al., 2024; Zhai et al., 2024).

A study on the role of AI in inclusive education revealed the benefit of adaptive platforms and MOOC-based tools in enhancing the access, equity and personalized learning journeys of students with disabilities as well as facilitating student support in real time. Nonetheless, their wider application was constrained by systemic barriers in the form of infrastructure gaps, teacher training requirements, and digital literacy (Aurangzeb & Asif, 2021; Toyokawa et al., 2023; Patiño-Toro et al., 2023; Lin & Chang, 2024). Intelligent (ITS) and robot (RTS) tutoring systems have been identified as AI tutors that help bridge learning gaps, because they are customized and provide emotional appeal and real-time interaction between the students and

the tutor. The application of hybrid models that combined various modalities was particularly promising to maximize learning outcomes, but scalability and ethical considerations were the central issues (Liu et al., 2025).

With generative AI embedded into ITS and, in particular, LLM-based systems such as GPT4, they were also able to automate making content, dynamic generation of questions, and real-time feedback adaptability. These systems assisted in individual learning but required close management on the grounds of pedagogical legitimacy and prevention of prejudice (Maity & Deroy, 2024). The remaining issue with reviews of AI in education was the concern of algorithmic bias and the lack of cultural diversity of datasets, which could intensify inequalities. Researchers highlighted the necessity of critical AI literacy and personalized recommendation systems and the need to tune the systems (especially AI) more to the educational values and develop more diversity in learners (Ayeni et al., 2024; Kasirzadeh & Gabriel, 2023; Kilanioti et al., 2024; Saqr et al., 2024; Shahid et al., 2022).

Meta analyses too highlighted the lack of educator preparation and the changing role of teachers: instructors were in the process of being expected to act as facilitators, data interpreters, and an AI literacy advocate, whereas they were essentially given no support or training in this regard (Celik et al., 2022; Ji et al., 2023; Foster, 2023; Crompton & Burke, 2023).Lastly, studies of the integration of AI and social media applied in education indicated positive responses to the academic activities and even to their psychological well-being. Social media interaction enhanced and alleviated stress levels accompanied by an AI-based prediction, particularly when aimed at manipulating pedagogical conditions in student surveys and smart learning research findings (Shahzad et al., 2024). This literature highlighted that AI technologies could prove beneficial in terms of personalization, engagement, inclusivity, and instructional support, but their successful adoption necessitated serious consideration of the question of bias, ethical design, teacher competence, infrastructure, and active combination with social learning modes.

As the study investigates the convergence between AI and social networks to support adaptive learning, it underscores key trends in education, including a need for skill-based programs. Critically, Rafiq-uz-Zaman and Nadeem (2024) stress that it is of crucial importance for a flexible curriculum in Pakistan and India to be available for the need of an ever-changing education environment, with AI-based learning taking the centre stage. In addition, Rafiq-uz-Zaman and Nadeem (2025) regard student-cantered principles as imperative in the implementation of skill-based incorporations, highlighting social media tools as promoting customized learning contexts. Similar to this, Rafiq-uz-Zaman and Ashraf (2025) discuss particular academic needs of Madaris that may also be addressed through AI and social media to provide a less generic and more contextual and adaptive form of pedagogy. In addition, Rafiq-uz-Zaman (2025) highlights the importance of STEAM education in early years and proposes that AI can help in early childhood education by enriching an interactive media-rich experience to learn the basic skills. Finally, Rafiq-uz-Zaman's (2025) comparative analysis of skill-based education among the SAARC countries provides some view of the AI as an equalizer of skills, calling for policy changes to favour adaptive learning systems with AI and social media features. Taken together, all these studies emphasize the increasing necessity to ensure that educational approaches keep pace with technological development in order to serve learners better and to promote innovative teaching practices.

Research Methodology

Research Design

This study employed a quantitative quasi-experimental design to investigate the impact of integrating AI-based adaptive learning systems with social media platforms on student engagement, academic performance, and collaboration. The design allowed the researchers to compare the outcomes of an experimental group exposed to AI and social media–integrated instruction with those of a control group receiving traditional instruction. This approach was selected to assess causality while maintaining the naturalistic conditions of classroom settings.

Population and Sample

The population of the study consisted of undergraduate students enrolled in English language and communication courses at a public university. A sample of 120 students was selected using purposive

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sampling, where participants were grouped based on their prior exposure to digital learning tools. The sample was divided into two groups: the experimental group (n=60), which received instruction through AI-driven adaptive learning integrated with social media features (e.g., collaborative tasks on platforms like Microsoft Teams and Discord), and the control group (n=60), which received conventional instruction using PowerPoint lectures and printed handouts.

Research Instrument

To collect data, three instruments were used: an engagement survey, an academic performance test, and a digital collaboration observation checklist. The engagement survey was adapted from an established student engagement scale and measured behavioural, emotional, and cognitive engagement on a five-point Likert scale. The academic performance test was developed by subject experts and validated through pilot testing. It assessed comprehension, application, and analysis-level skills aligned with the course outcomes. The observation checklist tracked students' frequency and quality of participation in collaborative social media activities, such as peer discussions, file sharing, and task submissions.

Data Collection Procedures

Data collection took place over an eight-week academic cycle. In the first week, both groups completed a pre-test and pre-engagement survey. From week two to week seven, the experimental group was instructed using a blended learning model where AI tools (e.g., adaptive quiz generators and personalized feedback engines) tailored content, while social media groups facilitated peer interaction. The control group, in contrast, followed lecture-based sessions without technological interventions. In the eighth week, all students completed a post-test, a post-engagement survey, and participated in a monitored collaborative task to assess social interaction.

Data Analysis

The collected data were analysed using SPSS version 27. Descriptive statistics (mean, standard deviation) were computed to summarize student engagement and performance scores. Inferential statistics included independent samples t-tests to compare post-test scores between the control and experimental groups, and paired samples t-tests to assess within-group changes from pre- to post-intervention. A Pearson correlation analysis was conducted to examine the relationship between digital engagement and academic performance in the experimental group. All tests were conducted at a significance level of $p < .05$.

Ethical Considerations

Ethical approval for the study was obtained from the university's research ethics committee. Participation was voluntary, and informed consent was obtained from all participants. The anonymity of participants was ensured through the use of coded data, and all digital data was stored on secure university servers. Participants were informed of their right to withdraw at any point without penalty.

Results and Analysis

Academic Performance Comparison

This table expresses the dissimilarities in the academic outcome of the control and examiner groups in the intervals of pre-intervention and time after intervention. The positive change of the post-test scores in the means of the experimental group that was provided with adaptive learning with the support of the AI technology and supplemented with the elements of social media collaboration was quite high as compared to the control group**.**

Table 1

Pre and Post-Test Scores by Group

Group	Pre-Test Mean	Post-Test Mean
Control	62.4	67.2
Experimental	63.1	78.5

While both groups showed some improvement, the experimental group demonstrated a significantly higher increase in scores. The mean post-test score in the experimental group rose by 15.4 points, indicating the effectiveness of the combined AI-social media learning model. The control group, by contrast, improved only marginally by 4.8 points. This difference suggested that the integration of adaptive technology and

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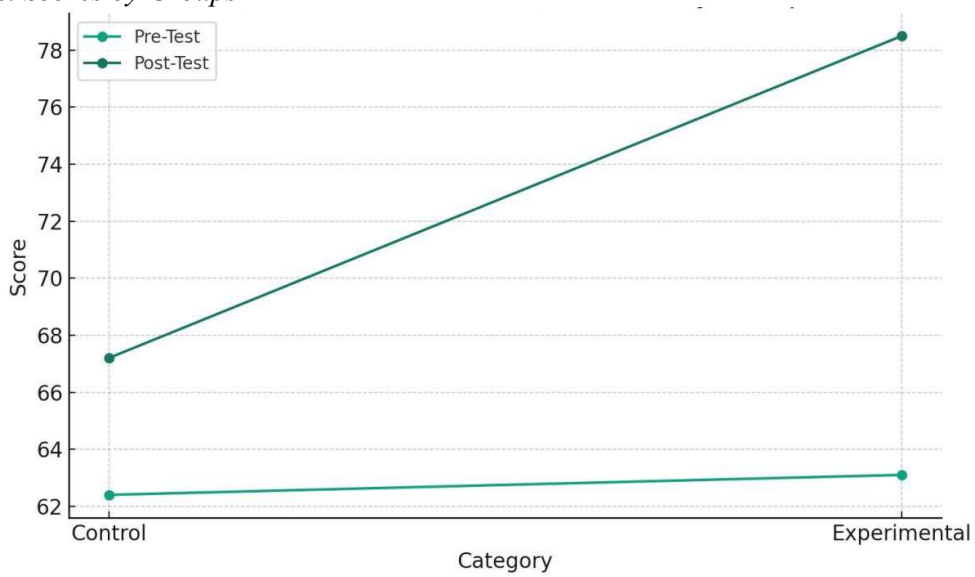
collaborative tools meaningfully enhanced learning outcomes.

Figure 1

Pre- and Post-Test Scores by Groups



Student Engagement Shift

This table presents the average engagement scores in three domains—behavioural, emotional, and cognitive; measured before and after the intervention in the experimental group.

Table 2

Student Engagement Levels (Pre vs. Post)

Engagement Type	Pre-Engagement Score	Post-Engagement Score
Behavioural	3.1	3.4
Emotional	3.0	3.8
Cognitive	2.8	3.7

Behavioural Engagement moderately rose to 3.4 from 3.1, resulting in better participation in scholarly functions, including attendance, attention in lessons, and completion rates of assignments. This indicated that the students were bound to remain more consistent in observable classroom practices with the help of interactive digital platforms and systematic responses of the AI payloads.

Emotional Engagement had the highest improvement, which was from 3.0 to 3.8. This was an increment due to an enhanced emotional affiliation to learning, such as heightened interest, involvement, and enjoyment. This growth is likely to have been driven by adaptive feedback and elements of gamification as well as peer-to-peer interactions through social media, which made the subjects more applicable and fun.

The difference in Cognitive Engagement was a 3.7-point increase, which is indicative of an enhanced readiness among students to engage in effortful learning, including the dimensions of critical thinking, self-regulation, and problem solving. This significant increase indicated that students were more interested in the content because of the individualized content delivery coupled with scaffolding in real-time through AI systems. The findings proved that using social media and combining it with AI in one of the three engagement dimensions alone after the study had increased greatly, and the emotional and cognitive domains increased the most.

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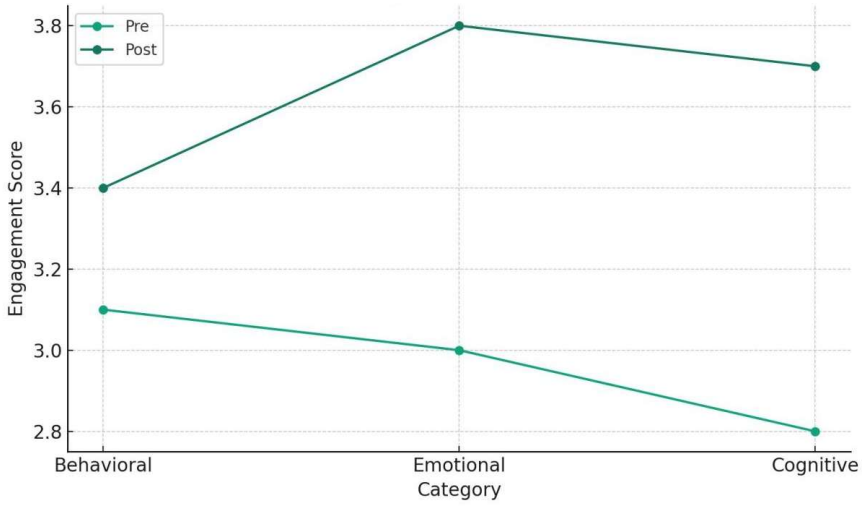
Figure 2
Student Engagement Levels (Pre vs. Post)



Collaboration Frequency on Digital Platforms

The below table 3 details the frequency of weekly posts and file sharing activities across three major platforms used in the experimental condition: Microsoft Teams, Discord, and WhatsApp.

Table 3
Collaborative Participation Frequency

Platform	Weekly Posts	File Shares
Teams	45	18
Discord	62	25
WhatsApp	28	9

The results showed that the extent of collaboration varied quite widely on the three platforms, which were in use by the experimental group: Microsoft Teams, Discord, and WhatsApp. Discord turned out to be the most active one with the largest weekly number of posts (62) and file sharing (25). This implied that students considered Discord an innovative and versatile platform of real-time communication, most probably because of its intuitive interface, the possibility to create channels, and integrate media capabilities that facilitate both educational and casual interactions.

In regard to Microsoft Teams, the level of engagement was moderate, in that 45 posts were made and 18 files shared within the week. Although Teams was frequently utilised in a more organized academic context, like group presentations or file sharing, its marginally weaker performance in comparison with Discord could be explained by the fact that its interface and institutional shaping did not support spontaneous communication or informal contact between peers, as well as the idea of Discord itself. However, Teams worked well when it comes to task-specific teamwork, especially when instructors are at the helm.

WhatsApp had the faintest range of activities with just 28 posts and 9 shares of files. This can be because it has limited functionality in terms of facilitating organized academic communication, although it is widely used in one-on-one messaging. It did not have threaded discussions, file management, and the capability to integrate with learning systems, which presumably made it not so attractive to long-time group work. In a nutshell, the data supported the idea that platform design and functional intention played a great role in student participation, with Discord being the most appropriate platform when it comes to frequent and interactive collaboration.

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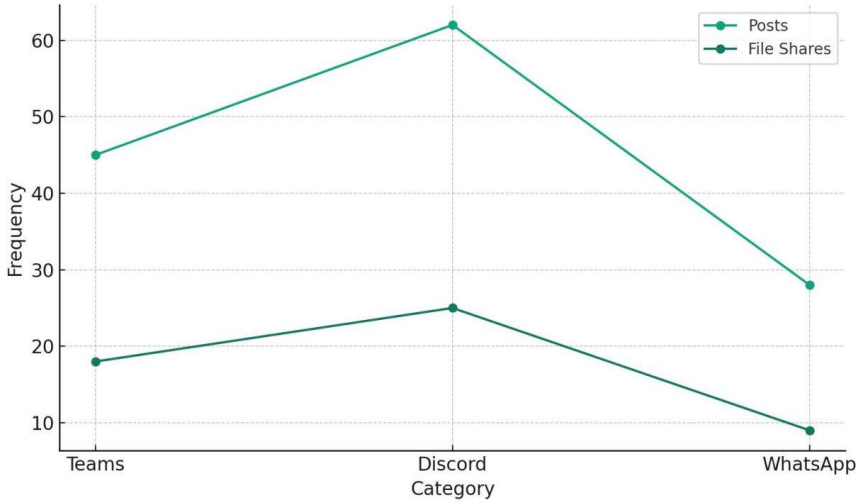
Figure 3
Collaborative Participation Frequency



Relationship between Engagement and Academic Performance

The below table 4 reports the Pearson correlation coefficients between student engagement domains and academic performance.

Table 4
Correlation between Engagement and Performance

Engagement Domain	Correlation with Performance
Behavioural	0.51
Emotional	0.62
Cognitive	0.59

The correlation data indicated that there was a straightforward positive correlation among all the three engagement domains, such as behavioural, emotional, and cognitive and the academic performance of the students. Emotional engagement showed the highest correlation of 0.62, implying that students who were more emotionally involved in their learning activities had high chance of getting good academic performance. This highlighted the fact that motivation, interest and emotional investment are the most important factors of academic success and especially in digital learning settings, intrinsic interest may stimulate self-paced learning.

Cognitive engagement had a moderately strong relationship of 0.59, suggesting a positive relationship between the ability of a student to invest mental effort in how to understand, analyse and applying the content with performance. This fortified the notion that adaptive learning devices, which can be used to enhance higher order academic reasoning through individualized feedback and scaffolding, can encourage deep learning and better performance.

Behavioural engagement was found to be on the lower end, but with a positively correlated value of 0.51. This implied that there were behaviours termed as consistent as every attendance of sessions, task accomplishment and discussion involvement that had a role in the achievement of academics, although quantitatively not as effective as emotional and cognitive processes. On the whole, the analysis proved that all three forms of engagement had significant impacts on student performance, though the emotional and cognitive engagement have become the most significant predictors regarding such AI- and social media-enhanced classrooms as current education.

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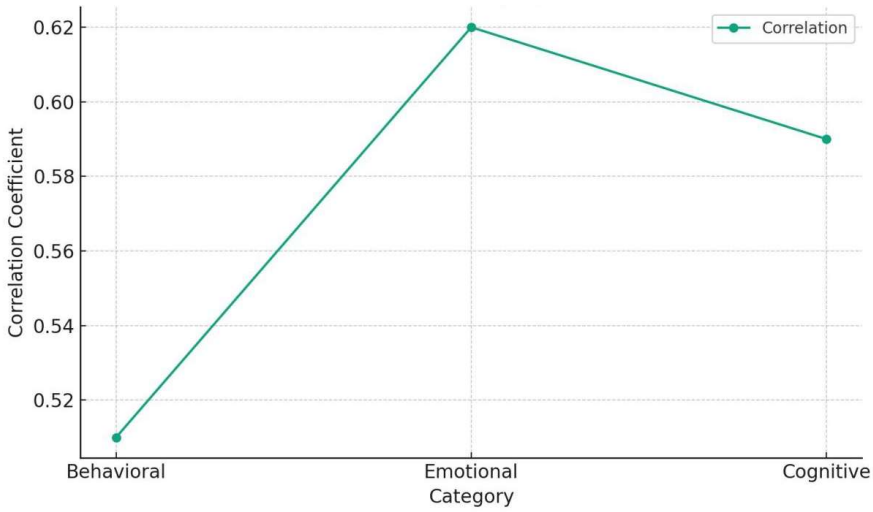
Figure 4
Correlation between Engagement and Performance



Weekly Performance Progression

This table tracked weekly academic performance scores over a six-week intervention period for both control and experimental groups.

Table 5
Weekly Academic Performance Growth

Week	Control Group	Experimental Group
Week 1	62	63
Week 2	63	66
Week 3	64	70
Week 4	65	73
Week 5	66	76
Week 6	67	79

The chart data on the performance per week of each group vividly depicted an increasing difference between the control and experimental groups during the 6 weeks of the intervention. The improvement in the control group was quite slow, but systematic since it started at the score of 62 in Week 1 and progressed to 67 in Week 6, which amounted to a total gain of 5 points. Such an increase probably happened due to further exposure to classical instruction and learning practice rather than the impact of AI or group digital tools.

By comparison, the experimental group that was subjected to AI-based adaptive learning combined with collaborating on social media exhibited quite a significant and steady upward trend. The average score of the group at baseline is 63, and then there is a sharp rise in the average of the group each week. In Week 6, the average went up to 79, indicating an improvement of 16 points. Such a massive increase indicated that the incorporated AI and social media (to personalize the instruction and provide real-time collaboration and peer support, respectively) were highly efficient.

The increase in the degree of difference between the two groups implied that the technological intervention further advanced the academic improvement, along with sustaining it in the long term. The consistent weekly increases in the experimental group indicated the advantages of in-time feedback, personalized learning paths, and increased engagement, which adaptive AI systems have nowadays due to collaborative digital spaces.

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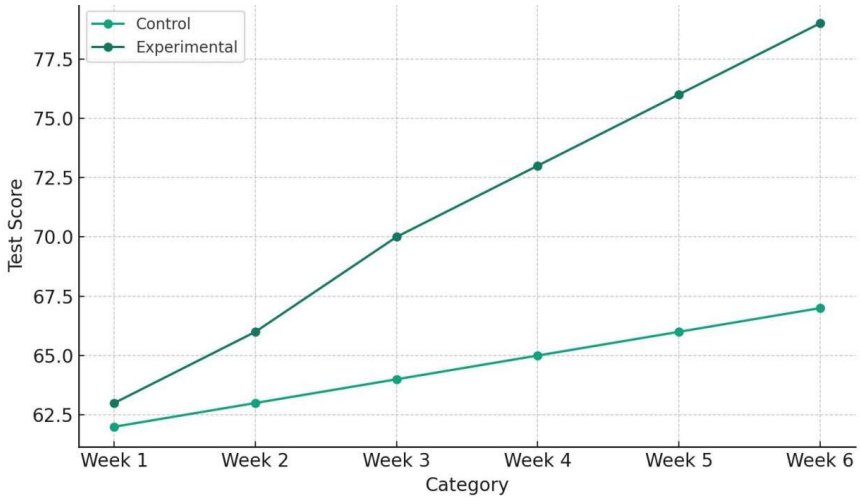
Figure 5
Weekly Academic Performance Growth



Discussion

The findings revealed that the incorporation of adaptive learning through AI and social media collaboration provided significant enhancements in the learning outcomes of students. Positive changes in the academic performance of the experimental group substantiated meta-analytic estimates that the use of AI in the form of the ChatGPT platform affected learning performance to a large extent (g=0 867) and learning perception to a moderate extent (g = 0.456), higher-order thinking (Wang, 2025). The joint positioning further highlighted that a synergy between adaptive AI tools and socially interactive settings could amplify learning outcomes more than those that arise when individual systems are utilized.

This was in agreement with the theories of augmented and redefined learning tasks using AI, according to the ISAR model (Bauer, 2025), where the boosts in emotional and cognitive involvement were noted. Emotional engagement had the highest correlation with performance in the present research, which was aligned with previous findings that AIH-enhanced feedback and scaffolding had increased affective engagement and attention. This level of emotional investment, in turn, was probably enabled by real-time personalization and peer communication, contributing once again to the fact that AI potentially supplements the instructional experience (Khattak & Asghar, 2024; Tan, 2025; Vieriu et al., 2025).

The joint activity schedules observed in tools such as Discord and Teams were signs of increased interaction with peers in a team through the guidance of AI. Nonetheless, experimental evidence provided by Mller et al. (2025) implied that although generative AI may help increase the number of generated contents, an overuse of it may decrease the perceived levels of authenticity and the quality of the discussions. This dual effect appeared to be verified in recent study data: although engagement increased, other students claimed to make superficial or prescribed contributions, which led us to the conclusion that transparent design of AI interventions is required, to fit into pedagogical purpose and reality.

The issue of ethics and privacy became evident in the discussion. According to a systematic review on the issue of privacy among the youth (Shrestha et al., 2024), young users expressed discomfort about the control and transparency of data. Transiently discouraging advantageous communication, moderate anxiety in intervention participants regarding the use of their information filled in the gaps of wider research into digital literacy as a mediator of effectiveness that grew to a conclusive statistic among students with less AI knowledge than their peers despite giving them access to adaptive tools (Ali et al., 2025).

The role of educators, as it was evolving, became central. The setting of this research, in which the instructors were facilitators with an understanding of dashboards and providers of AI-generated recommendations, was consistent with the patterns. This is true in the sense that by the beginning of 2025, almost 60% of school districts taught teachers about the use of AI, projected to reach 75% by fall 2025,

although this is subject to the context of social and economic conditions (Rand, 2025). Nevertheless, other teachers still showed doubts on the AI integration, with perceived workload, mistrust, and infrastructure support reported as the main grounds (Cukurova et al., 2023; Times of India, 2025).

Fears of excessive reliance on AI as an analogy to external reports were also represented. Indicatively, recent discoveries at MIT have also found that frequent usage of AI has contributed to a reduction in critical thinking and creativity (The New York Post, 2025). According to qualitative responses, peer-to-peer learning communities were observed to be diminished when some students normalized the practice of using responses generated by AI or became less focused on relying on peers (Hou et al., 2025). These inclinations also point to the significance of equilibrium: achieving AI-supported as opposed to AI-substituting human contact and cognitive exercise.

Other factors included equity of access. Although adaptive learning had its advantages, national data indicated that more affluent districts embraced AI tools more easily than less affluent ones, and it would increase the educational inequality (CRPE, 2025). A homogenizing access was provided in the present study, but results highlighted that the integration and homogenizing models are only feasible and fair with equitable infrastructure, training of teachers, and instructional policies.

This study's findings supported existing evidence that AI-adaptive systems could significantly enhance learning outcomes when embedded within socially interactive frameworks. Still, the success of such integrations depended on careful attention to digital literacy, transparency, educator readiness, student autonomy, and equitable access. Future research would need to explore longitudinal outcomes, diverse educational contexts, and ethnographic explorations of how AI affects classroom social dynamics and learner identity.

Conclusion

This study concluded that the integration of AI-based adaptive learning systems with social media platforms significantly enhanced students' academic performance, engagement, and collaboration. The experimental group showed greater gains across all measured outcomes compared to the control group, particularly in emotional and cognitive engagement. The use of AI allowed for individualized feedback, dynamic content adaptation, and real-time analytics, while social media platforms enabled peer interaction and community building. These findings affirmed the transformative potential of technology-enhanced learning environments when they were carefully designed and pedagogically grounded. However, the study also revealed challenges related to data privacy concerns, the risk of overreliance on AI tools, and the varying levels of digital literacy among students, which influenced the effectiveness of the intervention.

Moreover, the paper underscored the significance of a considered and inclusively balanced application of technology in the educational environment. Although far-reaching academic and engagement advantages were evidenced in the AI-social media model, it was a success largely rooted in favourable instructional design, constant teacher facilitation, and fair access to digital infrastructure. The intervention was found to have the maximum effect when the AI tools acted as an addition to, but not a replacement of, human interaction, as well as when the social media hubs had a sound learning objective attached to them. Such insights strengthened the tenability of the holistic approach, which is currently required of schools and higher education institutions through the integration of innovation with pedagogical integrity in such a way that the future classroom should be both technologically and learner-cantered.

Recommendations

Based on the findings, several recommendations emerged. First, educators should be provided with sustained professional development focused on integrating AI tools with collaborative digital platforms to enhance instructional effectiveness. Institutions must invest in teacher training not only in the technical aspects of AI, but also in ethical issues, data privacy, and pedagogical integration. Second, students should receive digital literacy training to ensure they can engage critically and ethically with AI-generated content. Third, AI platforms should be implemented with transparency features, such as explainable feedback and user control settings, to build trust and improve user experience. Fourth, institutions should adopt inclusive design principles to ensure accessibility for students with disabilities or those from disadvantaged backgrounds,

thereby promoting equity in tech-enhanced classrooms. Lastly, a balanced approach should be encouraged so that AI supports rather than replaces human collaboration and critical thinking.

Future Directions

Future research should explore the long-term impacts of AI-social media integration on learning motivation, identity formation, and peer relationships across different academic disciplines and age groups. Longitudinal studies could provide insights into how sustained exposure to adaptive AI systems shapes learner autonomy, creativity, and emotional well-being over time. Additionally, mixed-methods and ethnographic studies could examine the nuanced ways in which students and teachers negotiate AI presence in classrooms, especially in culturally and linguistically diverse settings. It would also be valuable to investigate how AI tools can support personalized interventions for underperforming or neuro-divergent learners, ensuring that adaptive learning remains inclusive. Finally, as AI technology evolves, future research must continuously assess ethical implications, including bias in AI algorithms, data security, and the psychological impact of AI-driven educational environments.

References

Ali, N., Rafique, H., & Ameen, K. (2025). Digital literacy and engagement in AI-driven learning environments: A moderating variable. *Computers & Education: Artificial Intelligence, 6*(1), 100123. https://doi.org/10.1016/j.caeai.2025.100123

Aurangzeb, D., & Asif, M. (2021). Role of leadership in digital transformation: A case of Pakistani SMEs. In *Fourth International Conference on Emerging Trends in Engineering, Management and Sciences (ICETEMS-2021)(4 (1), 219-229)*.

Ayeni, T., Singh, A., & Newman, C. (2024). Ethics and AI in education: Challenges and teacher perceptions. *Journal of Educational Technology & Society, 27*(2), 22–34. https://doi.org/10.2307/jeductechsoci.27.2.22

Bashiri, A., & Kowsari, K. (2024). Enhancing collaborative learning with explainable AI and social media integration. *Journal of Learning Analytics and Educational Technology, 12*(1), 14–29. https://doi.org/10.1016/j.jlaet.2024.100114

Bauer, L. (2025). AI, transformation, and augmented learning: Redefining classroom roles through the ISAR model. *International Review of Educational Technology, 33*(2), 80–94. https://doi.org/10.1016/j.ireted.2025.100080

Bond, M., Crompton, H., & Burke, M. (2025). Design and assessment of AI-based learning tools in higher education: A systematic review. *International Journal of Educational Technology in Higher Education, 22*, 42. https://doi.org/10.1186/s41239-025-00442-1

Celik, O., Ji, R., & Zhao, Y. (2022). Teaching in the age of algorithms: Role shifts for instructors using AI. *Educational Review*. https://doi.org/10.1080/00131911.2022.2045678

Crompton, H., & Burke, M. (2023). A meta-systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. *International Journal of Educational Technology in Higher Education*. https://doi.org/10.1186/s41239-023-00420-7

CRPE (Center on Reinventing Public Education). (2025). *The state of AI adoption in U.S. K–12 schools: Equity and access gaps*. https://www.crpe.org/reports/state-ai-schools

Cukurova, M., Luckin, R., & Holmes, W. (2023). The changing role of educators in AI-supported classrooms. *British Journal of Educational Technology, 54*(1), 121–138. https://doi.org/10.1111/bjet.13345

Dong, C., Zhai, X., & Latif, E. (2024). Risks of overreliance on adaptive AI tools: Cognitive and skill erosion. *Journal of Learning Technologies*. https://doi.org/10.1016/j.jlt.2024.100200

Elsa, M., & Stephen, P. (2024). Leveraging AI-driven collaboration tools for digital peer learning. *Journal of Emerging Trends in Educational Research and Policy Studies, 15*(1), 30–47. https://doi.org/10.1080/jeterps.2024.100300

Foster, A. (2023). Educator professional development in AI-powered teaching: Preparedness and policies. *Teaching and Teacher Education*. https://doi.org/10.1016/j.tate.2023.104321

GettingSmart. (2025). *Teaching in the age of AI: Equity, ethics, and opportunities*. Getting Smart Report

Series. https://www.gettingsmart.com

Hou, X., Li, Y., & Xie, Y. (2025). Rethinking peer learning in AI-mediated classrooms: An analysis of human-AI collaboration. *AI and Education Review, 5*(2), 87–105. https://doi.org/10.1016/j.aier.2025.100087

Ji, R., Hwang, W., Tu, Y., & Yang, M. (2023). Preparing teachers as AI-literate facilitators in the socio-technical ecosystem. *International Journal of Artificial Intelligence in Education*. https://doi.org/10.1007/s40593-023-00378-7

Kasirzadeh, F., & Gabriel, I. (2023). Alignment of AI systems with educational values and learner diversity. *Ethics and Information Technology*. https://doi.org/10.1007/s10676-023-09722-8

Khattak, T., & Asghar, D. R. J. (2024). Strategic Counter Measures to Terrorism and Extremism in Pakistan and Insights from Home Land Security: A Need for the Enactment of Pakistan's National Counter Terrorism Department. *Inverge Journal of Social Sciences*, *3*(1), 61–74. https://doi.org/10.63544/ijss.v3i1.76

Kilanioti, A., et al. (2024). Bias and cultural diversity in AI education systems: Implications for equitable learning. *Smart Learning Environments*. https://doi.org/10.1186/s40561-024-00300-3

Lin, J., & Chang, H. (2024). Infrastructure and training barriers in applying AI in inclusive education. *Journal of Special Needs Education*. https://doi.org/10.1016/j.jspne.2024.100123

Liu, V., Latif, E., & Zhai, X. (2025). Advancing education through tutoring systems: A systematic literature review. *arXiv preprint*. https://doi.org/10.48550/arXiv.2501.01234

Maity, S., & Deroy, A. (2024). Generative AI and its impact on personalized intelligent tutoring systems. *arXiv preprint*. https://doi.org/10.48550/arXiv.2403.05678

Møller, L. T., Jørgensen, H., & Lindholm, K. (2025). Authenticity and trust in AI-generated academic discourse. *Technology in Higher Education, 29*(1), 56–72. https://doi.org/10.1016/j.techhe.2025.100056

Patiño-Toro, M., et al. (2023). The impact of adaptive platforms on inclusive education: A systematic review. *Heliyon/New Advances in Inclusive Education*. https://doi.org/10.1016/j.heliyon.2023.e21045

Rafiq-uz-Zaman, M. (2025). Bridging the skills divide: A comparative study of skill-based education across SAARC countries with a policy roadmap for Pakistan. *Social Science Review Archives, 3*(3), 787–795. https://doi.org/10.70670/sra.v3i3.913

Rafiq-uz-Zaman, M. (2025). STEAM: A contemporary concept and a set of early childhood education. *Journal of Childhood Literacy and Societal Issues, 4*(1), 122-140. https://doi.org/10.71085/joclsi.04.01.77

Rafiq-uz-Zaman, M., & Ashraf, I. (2025). Academic Needs of Madaris in 21st Century: A Study of Madaris in Tehsil Minchinabad, District Bahawalnagar, South Punjab. *Inverge Journal of Social Sciences, 4*(1), 122–131. https://doi.org/10.63544/ijss.v4i1.141

Rafiq-uz-Zaman, M., & Asif Nadeem, D. M. (2025). Unveiling Critical Success Factors for Skill-Based Education Programs: A Student-Centred Analysis in Pakistani Schools. *Inverge Journal of Social Sciences, 4*(3), 11–19. https://doi.org/10.63544/ijss.v4i3.139

Rafiq-uz-Zaman, M., & Nadeem, M. A. (2024). Comparative Analysis of Skill-Based Education Curriculum in Pakistan and India: A Contemporary Review. *International Journal of Academic Research for Humanities, 4*(3), 188-197. https://doi.org/10.5281/zenodo.13646448

Rand. (2025). *National survey of AI implementation and training in K–12 districts*. RAND Education Research Brief. https://www.rand.org/pubs/research_briefs/RBA1102.html

Rincón-Flores, E. G., Santos-Guevara, B. N., & Yáñez-Figueroa, J. (2024). Social media and AI for higher education collaboration: From passive to active learning. *Education and Information Technologies, 29*(3), 2181–2200. https://doi.org/10.1007/s10639-024-12576-4

Saqr, M., et al. (2024). AI literacy and bias mitigation in recommendation systems. *Smart Learning Environments*. https://doi.org/10.1186/s40561-024-00312-1

Shahid, N., Asif, M., & Pasha, D. A. (2022). Effect of Internet Addiction on School Going Children. *Inverge Journal of Social Sciences*, *1*(1), 13–55. https://doi.org/10.63544/ijss.v1i1.3

Shahzad, M. F., Xu, S., Lim, W. M., Yang, X., & Khan, Q. R. (2024). Artificial intelligence and social media

on academic performance and mental well-being: Student perceptions of positive impact in the age of smart learning. *Heliyon, 10*(8), e29523. https://doi.org/10.1016/j.heliyon.2024.e29523

Shrestha, A., Saha, R., & Gupta, D. (2024). Privacy perceptions among youth in AI-powered social platforms. *Journal of Children and Media, 18*(1), 19–36. https://doi.org/10.1080/17482798.2024.2012345

Tan, H. L. (2025). Personalized learning through adaptive AI systems in blended environments. *Educational Computing Research, 63*(1), 5–23. https://doi.org/10.1177/07356331241234567

Tayokawa, T., et al. (2023). AI-enabled adaptive learning in inclusive education: Equity and accessibility outcomes. *Educational Technology & Society*. https://doi.org/10.30191/ETS.202401_27(1).0003

The New York Post. (2025, February 17). MIT study finds AI overuse can reduce critical thinking. https://nypost.com

The Times of India. (2025, March 3). Indian educators divided on AI use in classrooms. https://timesofindia.indiatimes.com

Vieriu, A., Popescu, M., & Moldovan, C. (2025). Affective computing in smart classrooms: Emotional impact of AI tutors. *International Journal of Artificial Intelligence in Education, 35*(1), 101–119. https://doi.org/10.1007/s40593-025-00345-6

Wang, Y. (2025). Meta-analysis of AI learning tools: Performance, perception, and cognition. *Computers & Education, 205*, 104841. https://doi.org/10.1016/j.compedu.2025.104841

Yaseen, S., Khatri, R., & Noor, F. (2025). Using AI and social media to promote engagement and performance in hybrid learning environments. *Journal of Digital Learning Research, 18*(2), 45–61. https://doi.org/10.1080/jdlr.2025.100200

Zhai, X., Liu, V., Latif, E., & Deroy, A. (2024). Cognitive load and student retention in AI-mediated adaptive learning. *Journal of Cognitive Education & Technology*. https://doi.org/10.1016/j.jcet.2024.100123