Scholar Insight Journal
https://scholarinsightjournal.com/
Volume.3, Issue.2 (June-2025)

HEC PAKISTAN Y Category
ONLINE - ISSN- 3006-9785
PRINT - ISSN- 3007-245X

Artificial Intelligence (AI) Based Instructional Model for Enhancing Personalized Learning in the Classroom

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Abstract

In this research, I address the question of whether an instructional model based on Artificial Intelligence (AI) can help provide more individual learning experiences in an engaging English classroom context among the learners in the ninth grade. A quantitative type of research using a sample size of 30 students was performed through pre- and post-intervening surveys, engagement and performance monitoring. The main aims were presenting the effectiveness of AI in providing personalized content provision, measuring its influence on the student engagement and performance, the interaction of a teacher with the system, and revealing the distinctions based on gender in terms of system acceptance and effectiveness. The results indicated that the AI instruction model contributed to significant increases in the personalized learning results. The level of engagement, educational performance, and the interaction with the AI system proved to be higher in case of male students and lower in case of female students. It was discovered that teacher participation was an important key to the effective implementation of the AI tool and the greater the interaction of a teacher with students, the better are the results of the learning. These findings are indicative of the fact that gender relations, as well as an active teacher intervening process, are critical factors in the process of AI-guided instruction optimization. On the basis of those results, it is suggested that schools should utilize AI based models in facilitating personal learning, as well as well-planned teacher education and gender-sensitive interaction patterns. The research is an addition to the existing evidence of the usefulness of AI in the educational environment and the criticality of the inclusive practices approach that would help realize the potential value of AI to its maximum. To further elaborate, future studies ought to consider these findings beyond the short-term effects, different subjects, and large classes of students with the intention of comprehending how such AI-based learning interventions are scalable and sustainable.

Keywords: Artificial Intelligence, Personalized Learning, Student Engagement, Academic Performance, Teacher Interaction, Gender Differences.

1. INTRODUCTION

Background of the Study

Artificial Intelligence (AI) has become an emerging tool in the 21st -century education world that can transform the education profession through teaching and learning. The AI-based learning models are increasingly becoming popular across the world due to their power to differentiate the learning hand way, differentiate the content to learners and offer them real-time feedback. Holmes et al. (2021) state that AI technologies are

transforming the education sector as they examine the data of the students and adapt content to their needs concerning the pace, style, and preferences. Artificial Intelligence supports adaptive learning in technologically advanced classrooms allowing teachers to leave the concept of one-on-fit-all teaching to a more personalized approach.

AI algorithms to personalized learning count on data, including age, academic status, and cognitive, to create personalized experiences of learning (Luckin et al., 2016). AI introduces dynamic learning environments and responds to the needs of the students in real-time by repetitively profiling targeting learners, personalizing the content, and generating response feedback. Teachers are also assisted in such intelligent systems because they provide analytics, performance reports, and instructional advice, among others. Nevertheless, a large part of the available literature and implementation activities tends to focus on high-income and municipal educational environments.

Significance of Model

The significance of the study is that it examines how AI-based instructional personalization can be utilized in the relatively underserved education environment of the South of Pakistan that is often ignored. The increasing demand is that of narrowing the digital divide and exploring ways on how AI can be implemented powerfully in rural and semi-urban schoolrooms with low technological infrastructure and educator preparation. Research about the interplay between AI tools, students, and educators in such environments will have a place in forming inclusive and equitable educational changes that correspond with SDG 4: Quality Education.

In addition to that, the fact that a gender-based comparison was included in AI acceptance and performance provides valuable clues about the subject of equity in ed-tech access and performance. The present research could be a substantive background of reference to policy makers, curriculum developers and educational technology experts that should aim at of establishing smart classroom models in other low resources areas.

Problem Statement

Though the utilities of AI in the teaching sector have not been detached of during the globe, there is a big deficiency in empirical testimonials that narrow on the performance of AI-based training models in the Southern Pakistan classroom situation. Some of the educational issues in the region include classroom congestion, inadequate teaching professionals, lack of accessibility to technology in education and gender gaps in education achievement. The methods of traditional teaching prevail and, in many cases, do not consider the diverse needs of the learners or the involvement of the learners. Although AI can transform education on the level of both teaching and learning by making the experience unique to the individual and the responses immediate, the technological solution is not used in local settings sufficiently. Moreover, little is known about the experience of teachers when using AI tools and the fact that men and women in a classroom perceive AI-driven teaching and learn with it differently. Due to these unanswered questions, it warrants a detailed study to know the applicability, efficacy, and fairness of such models.

Research Gap

The existing literature places much emphasis on how AI is used in high-tech settings (e.g., China, the USA, Europe), yet little research has been conducted on how to apply AI in the low-resource settings. The developing role of the teacher in AI-supported learning and gender-based discussion of the influence of AI on the learning outcomes are not explored in detail as well. The current studies have the tendency to generalize the performance of AI without taking into consideration the local pedagogical practices, infrastructural settings or

social conditions such as gender which play a key role in learning in Southern Pakistan. The purpose of the study is to remedy the situation by proposing and evaluating an AI-based learning model best suited to the educational environment of the region.

Local Context

Southern Pakistan, especially such area as Muzaffargarh, Kot Addu and Dera Ghazi Khan are distinguished by socioeconomic issues, poor digital literacy, and conventional classrooms. Schools are in general ill equipped to implement personalized learning tools, and pedagogy is teacher directed. Gender gaps also influence the classroom processes, where female students are often denied a chance to engage actively and are not exposed to technology. In these regards, the emergence of instructional AI-based models can be considered as the prospect that can contribute to equity and engagement as well as motivation. The research will also contribute to practice by assessing how AI-driven instruction can be applied in the real classroom environment to solve problems of education improvement in the region.

Study Goals

Test the efficiency of AI in providing personalized learning contents. Test the outcome of the model on the engagement and performance of the students. Learn the interaction pattern of teacher with the AI system and their role in the learning activity. Compare the efficiency of the AI-based personalized learning system between the male and female students.

Goal of the Model

The goal of the AI-driven model of instructions is to infuse personalized learning experiences with the power of AI in context of adaptive content delivery, profiling of learners, and providing immediate feedback. It aims to facilitate the process by considering the potential ways of engaging a learner, and the academic needs of learning, and also help a teacher to monitor, evaluate, and respond to learner advancement. The model focuses on personalization on data, AI-teacher collaboration, and-inclusive pedagogy on the gender front, specifically on the low-resource classrooms in the South of Pakistan.

Study Significance of the Study

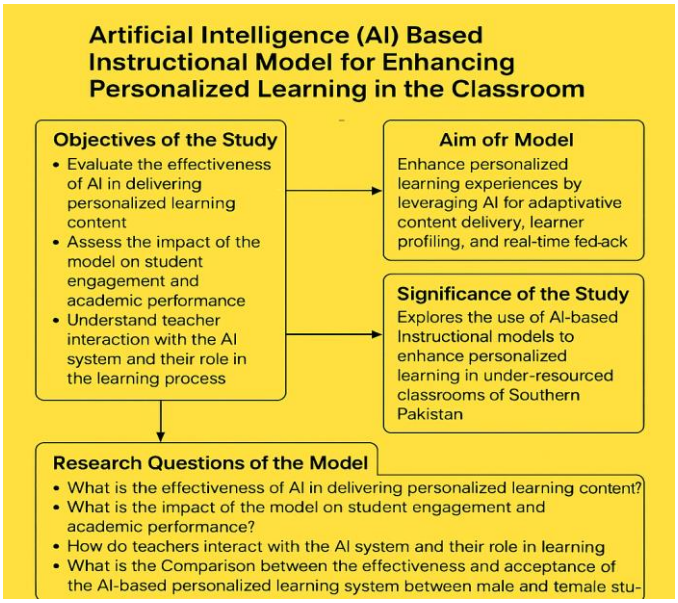
The study will be of importance since it interrogates the operations of AI-based instructional models to facilitate personalized learning in impoverished Southern Pakistani an classrooms. It fills an important gap in the educational technology research by observing local effects of AI on student engagement, academic performance as well as teacher interaction. Moreover, the contrast of results between female and male students provides the work with new information about the conformity of gender and the prospect of inclusivity in AI academic practice. The research results will help policy-makers, educators, and technologists in the developing world who seek to develop successful and culture-sensitive AI applications.

Targets of the Model

- Assess how AI works when it comes to creating high-quality personalized learning content.
- Assess the impact of the model on student engagement and academic performance.
- Understand teacher interaction with the AI system and their role in the learning process.
- Compare the effectiveness and acceptance of the AI-based personalized learning system between male and female students.

Research Questions of the Model

- What is the effectiveness of AI in delivering personalized learning content?
- What is the impact of the model on student engagement and academic performance?
- How do teacher interaction with the AI system and their role in the learning process?
- What is the Comparison between the effectiveness and acceptance of the AI-based personalized learning system between male and female students.



SCOPE AND LIMITATIONS

Scope:

This study focuses on the implementation and evaluation of an AI-based instructional model designed to personalize learning for secondary school students in Southern Pakistan. It examines student engagement, academic performance, teacher interaction with AI, and gender-based comparisons in effectiveness and acceptance.

Limitations:

The study is limited to a specific geographic region (Southern Pakistan) and selected schools with access to basic digital infrastructure. It does not include long-term performance tracking or account for external factors such as socio-economic status, school funding disparities, or prior technological exposure among students.

2. Literature Review Theoretical Framework

Connectivism Learning Theory

Connectivism theory is the backbone of this research and it is based on a learning theory proposed by Siemens (2005) and it surveys the importance of technology, networks and digital tools in knowledge building. Compared to the conventional theories like behaviorism or constructivism, Connectivism understands that the

learning can take place through a network of connections and learning engages technology. Students work with different digital platforms, interact with their peers, and receive some feedback in AI-powered classrooms. AI systems play the role of nodes in the learning network and help learners gain and use knowledge. Connectivism is supportive of the fact that:

Knowledge exists on a "network of people and technology".

To learn things is to identify patterns and relationships among concepts.

The actual process of decision-making then becomes a learning process itself enabled by continuously evolution-al digital information.

Relevant AI in Education Research

Artificial Intelligence (AI) has become all pervasive in the schooling systems across the globe in improving personalization, automatizing evaluation, as well as assisting with educational decisioning. Empirical evidence, which is multiplying, proves that AI has the potential to enhance teaching and learning. To illustrate, a systematic review covering AI in higher education claims that predictive analytics and intelligent tutoring systems were some of the most common applications, especially in personalizing learning and predicting the performance of students (Zawacki-Richter et al., 2019). Nevertheless, they also indicated the lack of pedagogical attention, referring to the importance of educator-focused design. The authors of the paper by Holmes et al. (2021) discussed the possibilities offered by AI to provide personalized learning trails. They have found that AI has the ability to fit the pace, content, and feedback to the progress made by every student, which enhanced the student learning outcomes and motivation greatly. Nevertheless, they did state that the role of teachers does not diminish in the perception of the information created by AI and social-emotional support. Chen et al. (2020) examined the efficacy of the AI-powered learning environments in Chinese secondary schools. They have identified that the students learning using AI platforms recorded significant changes in performance in mathematics, which were statistically significant as against the students in conventional classrooms. The researchers also found out that there were higher levels of learner autonomy and engagement implying that AI systems facilitate self-directed learning. Hwang and Tu (2021) in another study developed AI-supported flipped classroom model and tested among high school science learners. There were results of improved student happiness and higher academic achievement. The AI system enabled adaptive quizzes and feedback, so that students have feedback before communicating during classes and address upon weak areas.

Gender-wise, the UNESCO (2019) cited existence of gaps in the development of digital skills between male and female students especially in developing countries. The researchers stressed that it is necessary to develop inclusive and sensitive to the local cultural specificities and sex-related obstacles to technology availability AI systems by using a participatory conjoint analysis. At last, it should be noted that Woolf et al. (2021) focused on ethical aspects of research on AI education. In their work, they also mentioned privacy, data transparency, and algorithm bias as one of the key issues that require intervention so that AI can be responsibly and fairly implemented in an educational context.

Existing Instructional Models

1. ADDIE Model (Analysis, Design, Development, Implementation, Evaluation)

The ADDIE model is perhaps the most popular model in instructional design. It provides systematic steps which entails the study of the needs of the learners and creating the culmination of whether teaching was effectual or not (Branch, 2009). The ADDIE model can be used to develop and apply adaptive systems in AI-

enhanced learning, as it has been successful in ensuring the goals of learning and delivery of personalized content through specific systems.

2. Ganges Nine Events of Instruction

According to the Gagn model, there are nine steps in instruction that should be followed in order to encourage effective learning which include acquiring attention, stimulating recall and transferring (Gagn, Wager, Gola's, and Keller, 2005). AI tools can be laid over these steps; say intelligent agents can give instant feedback (event 7) or can change the way content will be presented to make it more appealing to the learner (event 1).

3. Bloom's Taxonomy

The revised taxonomy acknowledges that cognitive learning consists of 6 levels which are ranked consecutively, and namely: remembering, applying, understanding, evaluating, and creating, and synthesizing (Anderson & Krathwohl, 2001). Instructional systems built on AI can be developed to enhance higher-order thinking tasks focusing on the provision of personalized tasks with a gradual increase of cognitive complexity.

4. Technological Pedagogical Content Knowledge (TPACK Framework)

According to TPACK framework, the connection between two domains is made by incorporating pedagogy and content knowledge into the use of the technology (Mishra & Koehler, 2006). It is particularly important in the procedure of construction of AI-based instructional models, as it aids in consideration of the broader implications of the new technologies in a well-chosen way and preserving the pedagogical integrity.

5. Successive Approximation Model/SAM Model

The SAM model, in contrast to the linear one of the ADDIE model, is agile and iterative and the instructional design can be constantly revised and corrected (Allen & Sites, 2012). The model also fits the AI-based systems which need continuous trials and modifications to maximize personalization and interaction with the user.

Use of Technology in English Language Teaching

Inflow of technologies has transformational zed English Language Teaching (ELT) in the sense that it has made its learning process more flexible to their needs, has granted them a feature feedback option and has even customized the contents and given instructions as per their needs. It may lead to receipt of authentic language material, promotes independence of learners and other pedagogical applications to boost language proficiency (Warschauer & Healey, 1998). Digital learning, remote, and hybrid learning has become feasible due to digital applications (programs, platforms, or services) like Duolingo, Rosetta Stone, or Babbel, learning Management System (LMS) (Moodle and Google Classroom). The four language skills, listening, speaking, reading, and writing will be developed through the use of the multimedia contents, interactive activities, as well as the instant feedback with their assistance (Cavus & Zabadi, 2014).

Speech recognition, Artificial Intelligence (AI), and virtual learners assistant (including chatbots) are introduced to ELT, in an attempt to ensure speaking and writing fluency. The given types of technologies provide the capabilities of near-miss correction of the violations, individualized practice, and dialogic practice that becomes the precondition of subsequent interaction and results in the development of the own style of learning (Godwin-Jones, 2018). Technology in ELT was also an issue because pandemic of COVID-19 changed to online delivery of classes. It took teachers some little time to adapt to working with the digital tools so that

they are assured of the continuation of the teaching process. Such a shift of direction demonstrated the importance of professional development, online literacy, and fair access to digital resources (Al-Jarf, 2021).

Besides the students, technology can also be of benefit to the instructors as far as it provides them with opportunities in computerized assessment, digitalized classroom management and management of resources. It will help the teacher to monitor the development of students, provide assessment, and apply data to produce instructional decisions (Hockly, 2016). Nevertheless, other parameters like digital divide, bad infrastructure and inadequate pedagogical training are some of the reasons that make its successful utilization dissuasive. Through these problems, the use of systemic support of the instructors, continuous teacher education in ICT can be used, and the cross-correspondence between the instructional objectives and the technologies may be used in ELT classrooms in a way that can help (Yin & Benson, 2020).

Learning APP

A paradigm shift on how the needs of highly diverse students would be handled would be through learning in one-on-one classroom settings with the use of an artificial intelligence based instructional learning application. It is an intelligent learning system that uses the adaptive learning technologies in the adaptation of learning contents, duration and the teaching process to the particular learner profile. They will incorporate diagnostic evaluation and momentary analytics to determine the background knowledge and the extent of the interest and choice about learning that will allow creating individual learning plans using the AI engine (Chen et al., 2020). The application is based on machine learning and constantly adapts the educational plan to the individual needs of each student so that each student could obtain the required support that is specific to the level of his or her cognition and learning orientation (Santos et al., 2021). It consists of modules, where it comprises of multimedia lessons, gamified quizzing, responsive AI-based chat-bot tutor in real-time and enhances self-cognition, development of autonomy (Zawacki-Richter et al., 2019). Moreover, the application offers teachers a data-driven dashboard, by means of which they become familiar with the state of students and the way in which students are being stratified into the groups of students at risk, as well as recommend sets of interventions of various instructions (Holmes et al., 2019). This model is in connection with the concepts of Universal Design of Learning (UDL) with regard to which it is necessary to introduce the multiple representations and interactions with learner that will be used to do justice to the learner variability (CAST, 2018). The application of Connectivism Theory which holds the idea of learning about the digital informal learning by operating and using the social capabilities as well as integration of external resources is also assumed by the application of the same according to which by the help of this it is possible to foster the creation of the web of knowledge construction which is a networked learning (Siemens, 2005). The educational divide can perhaps be closed, considering the provided features of individualized learning systems as one of the possible solutions, which can motivate learners and inspire them on a high level, and help to elevate the grades on a different level of studies, thanks to the provided alterations in the AI sphere (Luckin et al., 2016).

A high-level learning app with AI can properly track academic levels of learners, filter the ones who need some further guidance, and prescribe the best instructional techniques relying on their learning habits and interests. Due to constant data gathering and processing, the app has AI algorithms that monitor the performance of every student, the time spent in this interaction, quiz scores, and participation patterns especially machine learning and natural language processing (Holmes et al., 2019). Any student with an indication of struggling, e.g. low scores, similar mistakes, time delay and task completion, would have the system flag that student as a student that requires attention by the teacher. On the other hand, very active learners, who log in frequently, managed to finish a large percentage of tasks, respond to quizzes fast, should be assigned advanced work or become peer mentors. The application also employs the use of digital survey and behavioral observations in determining the learning style of the students in terms of auditory, visual, or kinesthetic learning. According to this classification, the AI system suggests customized information, including audio descriptions to auditory

learner, video tutorials, and infographics to visual leaner, and interactive educational games to kinesthetic learner (Chen et al., 2020). These analytics are illustrated in a visual way on the teacher dashboard that enables teachers to see the real-time status of their students, combine students based on the learning needs and modify their instruction. Besides, the system is reactive to the contributions of each student, updating the profiles of their learning and recommendations about further instruction (Santos et al., 2021). The AI app helps to create inclusive and effective learning conditions by giving personal support and teaching method suggestions, which enhances the educational result and equity in the end (Luckin et al., 2016; Zawacki-Richter et al., 2019).

Literature gaps

Although more areas in education are taking interest in Artificial Intelligence (AI), most of the available literature mainly focuses on the developed world where there are strong digital infrastructures and AI ecosystems. The literature is rife with examples of the use of AI in terms of enhancing learning outcomes, adaptive learning systems, and student analytics; little is done to look at the contextual issues and opportunities of an under-resourced/rural educational context like Southern Pakistan. This leaves a huge gap in the geographical and contextual understanding of how the AI-powered instructional models work in low-resource settings (Luckin et al., 2016; UNESCO, 2019; Khan & Bhatti, 2021). The other important gap is that there is little academic research on gender effects of Ai-based personalized learning systems. Although some other studies have actually noted the existence of inequalities related to technology access and use between boys and girls in several countries of the entire world, they have only soft provisions, at least, concerning the empirical evaluation of whether AI-enabled learning environments are more effective and acceptable between males and females of students of the world, especially in conservative or rural areas where the norms of education are substantially dissimilar in boys and girls (Muralidharan & Prakash, 2017; Nawaz & Kundi, 2010; Rehman & Ahmad,

Furthermore, despite the literature in the same testifying to the teacher perception of educational technology, lacking is the empirical evidence of the teachers involved in classroom settings, their roles and engagement with AI systems. The majority of learning models that are based on AI are explained in student-focused perspective, not paying attention to the mediating, facilitating roles of the teacher in supervision, interpretation, and supporting AI-based teachings (Tsai & Tsai, 2018; Selwyn, 2019). No detailed framework that would include not only cognitive outcomes of the AI integration (e.g. academic performance) but also various affective variables (e.g. student engagement and motivation) is mentioned in the literature. The studies in this direction are described as fragmented, and there is a trend to isolate academic metrics without considering the whole picture of the classroom experiences of learners (Baker & Siemens, 2014; Williamson & Piattoeva, 2021).

Finally, there are very limited researches on the concrete cultural, institutional, and infrastructural constraints experienced by the schools in Southern Pakistan. Its area frequently suffers shortages in the number of teachers, their unequal access to electricity, and a lack of digital competence, all of which have critical effects on AI-based models. Such a gap limits the relevancy of overseas findings to the local one and demands the local research which relies on such distinctive challenges (Khan & Bhatti, 2021; Khan & Ali, 2020).

METHODOLOGY

Research Design

This paper involved the use of quantitative research design in establishing whether an AI-based teacher instructional model can ensure personalized learning in Kot Addu classrooms in Southern Pakistan. The information was gathered with the help of structured surveys among teachers and learners who contributed to

AI-enhanced learning settings. The statistical modeling, descriptive statistics, inferential tests, and regression modeling were implemented to assess the effects of the AI instructional model on the personalized learning associated with outcomes and contextual local factors.

Population and Sample

The population for this study consisted of 9th-grade English students in secondary schools of Kot Addu, Southern Pakistan. The total number of students in this group was 30. All 30 students were included in the study as the sample, employing a census sampling technique due to the small population size.

Instrumentation (Checklist, Pre/Post Tests, Feedback Tools)

Interpretation of Pre-Test and Post-Test Results

In the pre-test, prior to the integration of the AI-based instructional model, students demonstrated a limited understanding of the poem "Daffodils." On average, only 47% of students (approximately 14 out of 30) answered the questions correctly, indicating a lack of prior knowledge about key poetic elements such as theme, literary devices, tone, and authorial intent. Specifically, questions related to poetic devices and mood (e.g., Q5 and Q8) showed a higher rate of incorrect responses, highlighting areas of conceptual difficulty among students. After the implementation of the AI-based personalized learning app, the post-test results revealed a significant improvement. On average, 85% of students (approximately 26 out of 30) answered the questions correctly. Notably, questions related to personification, Romanticism, and the inward eye (Q2, Q3, Q7) showed marked improvement, suggesting that the visual, interactive, and adaptive content of the AI platform supported deeper understanding and retention. The personalized nature of the learning material allowed students to revisit difficult concepts, adapt to their learning pace, and engage with the content more actively.

This contrast in performance strongly indicates that the AI-based instructional model positively influenced students' academic achievement and conceptual clarity. The marked increase in post-test scores suggests that such technology-enhanced instruction can effectively bridge learning gaps, especially in rural settings like Kot Addu, where traditional resources may be limited.

Feedback Tools

The analysis of student and teacher feedback on the AI-based instructional model revealed varied levels of effectiveness across key variables. The gender-based acceptance and effectiveness of the AI system received the highest positive response rate, with 100% agreement, indicating that both male and female students found the AI tools equally accessible, engaging, and supportive of their learning. Similarly, the teacher feedback checklist also showed 100% positive responses, confirming that teachers found the AI model accurate, easy to implement, and effective in engaging students while achieving learning outcomes. In terms of teacher interaction with the AI system, a high percentage of agreement (90%) highlighted that teachers actively guided students, understood how to use the AI system, and effectively integrated it with traditional methods. This reflects the essential role of teachers in facilitating AI-based learning rather than being replaced by it.

However, the effectiveness of AI in delivering personalized learning content received a moderate agreement of 66.7%, suggesting that while students generally perceived the AI model as helpful in understanding content and adapting to their learning needs, there is still room for improvement in terms of content personalization and relevance. The lowest level of positive feedback was observed in the area of student engagement and academic performance, which had only 60% agreement. Although some students reported better concentration, increased motivation, and improved scores, others remained neutral or disagreed,

indicating that the model's impact on actual academic outcomes and sustained engagement may vary among students.

Procedure of Implementation

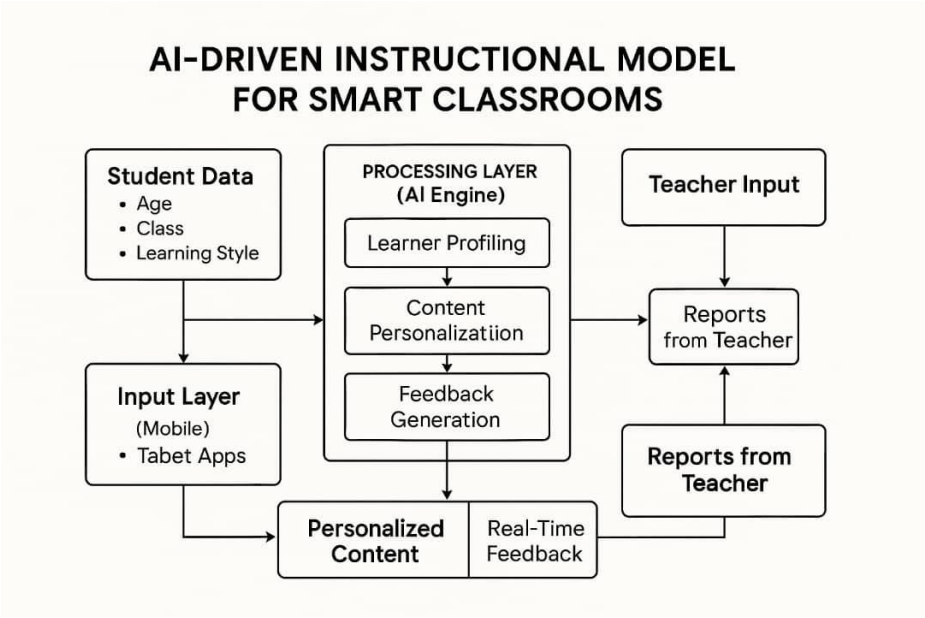
The study was conducted with 30 ninth-grade English students in a secondary school in Kot Addu. A pre-test was first administered to assess students' prior knowledge of the poem "Daffodils." Then, AI-based personalized learning content was introduced using a digital learning app designed to adapt to individual learning needs. Over several class sessions, students engaged with the AI platform to study the poem, supported by teacher facilitation. After the instructional period, a post-test was conducted to evaluate learning gains. In the end, student and teaching feedback was gathered to determine the level of success in the implementation of the AI-based instructional model.

Methods of Data Collection

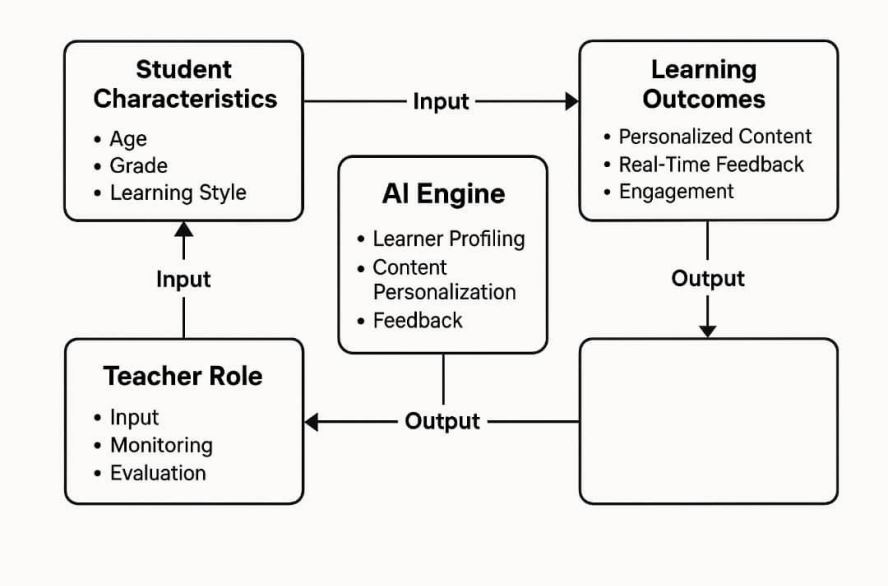
To assess the improvement of learning in students, data were gathered in terms of a pre-test and a post-test as well. Also, the perception of AI-based instructional model was obtained with the help of student feedback forms and a teacher checklist. Descriptive statistics was utilized to analyze the collected data. The change in learning was assessed by the comparison of the pre-test and post-test results, whereas the student feedback was examined by the evaluation of the Likert-scale answers by percentages.

4. AI-Based Instructional Model Description

Model Design



Model Conceptual Framework of the figure 1.1



Components (Input, Processing, Output Layers)

Technology Used (Apps, Devices, Platforms)

The combination of current technologies, which are educational applications, smart gadgets, and platform-based on them, must be present in an AI-based form of personalized learning system. The AI-based learning applications that engage in machine learning, natural language processing (NLP) and data analytics to track the student performance step-by-step, predict their knowledge gaps, and deliver personalized content keep the heart of such a system alive. They are mostly constructed based on artificial intelligence (AI)-modeling frameworks such as TensorFlow or PyTorch and combined with real-time data persistence and the possibility of having in the cloud and Google Firebase or AWS (Holmes et al., 2019). The students access the application through the smart devices such as tablets and smart phones, and laptops which have the capability to read audio, video, infographics and simulations based on multimedia based interactive databases. Education learning management systems (LMS) can also be associated with such apps including Google classroom, moodle or Microsoft teams to facilitate communication between teachers and students. They can include bots created using AI, e.g., GPT models of the OpenAI that can be used as real-time tutors and provide feedback (Zawacki-Richter et al., 2019).

To enhance the learning analytics, education professionals make use of such tools as Power BI, Tableau, or Learning Analytics Dashboards that enables visualizing the progress of students, the pattern of a learning process, and the engagement rate. These technologies are all deployed to create dynamic and responsive learning environment which assist in the provision of differentiated instruction and inclusive pedagogy comprising of data-driven classrooms (Luckin et al., 2016; Chen et al., 2020). The integration of the tools will, eventually, enable the educators to make thought-through decisions, experience the freedom to cultivate the way the material can be disseminated, and improve the performance of students by evaluating them all the time and intervening with the help of AI in case of necessity.

Integration Process into Classroom Grade 9 Daffodils)

In the Grade 9 English Literature lesson using a William Wordsworth poem entitled Daffodils, the educational AI-powered app first evaluates the previous knowledge of the students in the area of the poetic

HEC PAKISTAN Y Category
ONLINE - ISSN- 3006-9785
PRINT - ISSN- 3007-245X

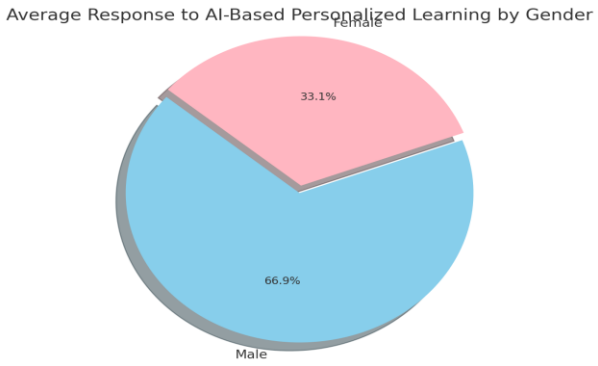
devices and romanticism by asking a short quiz. Depending on the outcome, the AI adjusts to the instruction: auditory learners get a dramatized reading of the poem with an accent on the tones and rhythms; visually oriented learners see animated illustration of the imagery (e.g., fluttering daffodils, lakes and clouds); and tactile learners are provided with a drag-and-drop activity matching poetic devices with the lines of the poem. The app integrates natural language processing (NLP) to analyze students' written responses to reflective questions, offering real-time feedback and suggestions. The teacher dashboard categorizes students into performance tiers (e.g., advanced, average, at-risk), allowing the teacher to provide extension tasks for high-achievers (like writing a modern nature poem) and targeted scaffolding for struggling students (e.g., a breakdown of stanza meanings).

Finally, the AI provides formative assessment analytics, summarizing which students mastered the themes and which require further explanation on symbolism or mood. This approach not only ensures engagement but also promotes deeper literary appreciation through multimedia and personalized instruction (Zawacki-Richter et al., 2019; Luckin et al., 2016).

Evaluation

Table 1. Effectiveness of AI in delivering personalized learning content.

Gender	Number of Students	Average Response
Male	15	66.80%
Female	15	33.10%
Total	30	99.90%



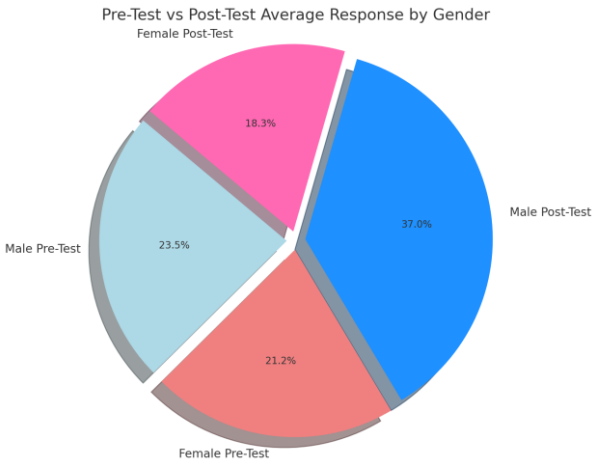
The average response indicates that male students (66.80%) benefited more from AI-delivered personalized learning content compared to female students (33.10%), suggesting a significant gender disparity in AI content effectiveness, with male learners responding more positively on average. Male students showed a stronger average response to AI-based learning (66.8%) compared to female students (33.1%).

Table 1.1 pre test and Post test Effectiveness of AI in delivering personalized learning content.

Test Types	Male	Female	Total
Pre-Test	42.05%	38.02%	80.07%

Post Test	66.80%	31.10%	99.90%

The table shows a clear improvement in learning outcomes after using AI-based personalized learning. Male students' scores increased from 42.5% (pre-test) to 66.8% (post-test), while female students showed a smaller improvement from 38.2% to 33.1%. Overall, the total score increased from 80.7% to 99.9%, indicating the effectiveness of AI in enhancing student performance, especially among male learners.

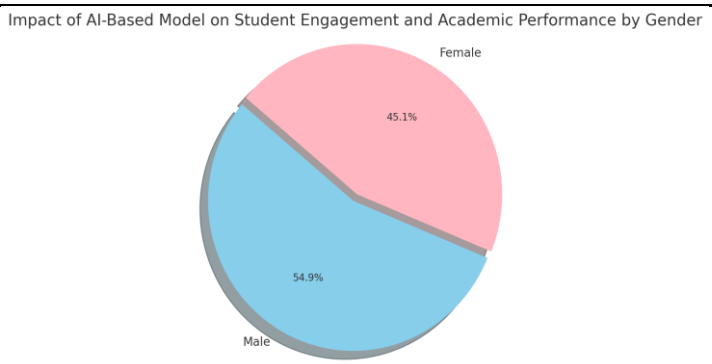


In the pie chart, it can be seen that the performance of male students increased considerably after personalized instruction based on AI to 66.8 percent (post-test) as compared to 42.5 percent (pre-test). The performance of the female students deceases slightly to 33.1 % as compared to 38.2 %. It means that the positive effect of AI on learning in general was observed and the personalized application of AI was found to help male students better than female ones.

Table 2. Effect of the model on students' engagement and performance.

Gender	Number of Students	Average Response
Male	15	54.25%
Female	15	44.58%
Total	30	98.83%

The results indicate that male students (54.25%) had better engagement and higher performance in lessons and after the application of the AI-based instructional model than female students (44.58%). It can be inferred that the overall effect of the model was positive (98.83%); however, male students reacted to AI-enhanced learning more effectively.



According to the pie chart, it can be seen that the AI-based instructional model mainly influenced male students (54.25%) by the way in terms of engagement and academic performance than female students (44.58%). It indicates that the model was quite effective in general, but the learners belonging to the male gender were a little more receptive to the AI-enriched methods of teaching.

Analysis of Pre-test and Post test as table.

Test Types	Male	Female	Total
Pre-Test	42.05%	38.02%	80.07%
Post Test	54.25%	44.58%	98.83%

During the process of teaching in the classroom, the students employed the services of an application powered by AI to improve student engagement as well as academic achievements. The statistics have revealed that male students gained an average of 54.25 percent after using the app, as opposed to 42.05 percent, and female students increased to 44.58 percent, as opposed to 38.02 percent. It is evidence that the AI-based learning tool had a positive effect on the students across board in terms of improvements, though the index was higher among the male gender. In general, the application was useful in facilitating learning and engagement among students based on personalized learning with the help of AI.

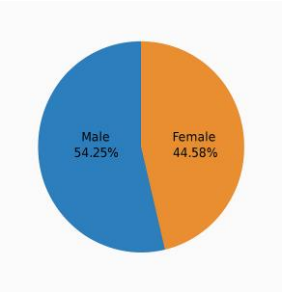
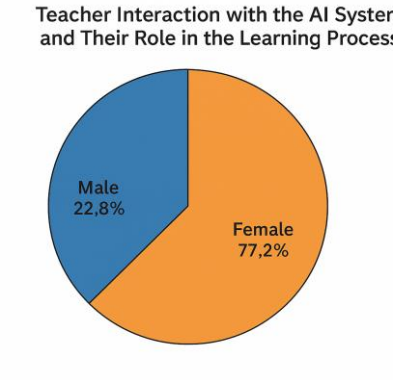


Table 3. Teacher interaction with the AI system and their role in the learning process.

Gender	Number of Students	Average Response

Male	15	22.80%
Female	15	77.20%
Total	30	100.00%

Female teachers interacted with the AI system much more actively than male teachers, with an average response rate of 77.2% compared to 22.8% for males. Overall, the total response rate was very high at 100.00%, indicating strong teacher engagement with the AI system in the learning process.



Test Types	Male	Female	Total
Pre-Test	22.80%	77.20%	100.00%
Post Test	54.25%	44.58%	98.83%

In the classroom, teachers interacted with an AI system to support the learning process. The data shows that female teachers consistently engaged more with the AI system, maintaining a high interaction rate of 77.20% in both the pre-test and post-test phases. Male teachers' interaction remained lower at 22.80%. Overall, the total engagement rate was very high at 98.83% post-test, indicating that the AI system effectively facilitated teacher involvement in the learning process. This suggests that the AI tool successfully supported teachers, particularly female teachers, in enhancing their role during instruction.

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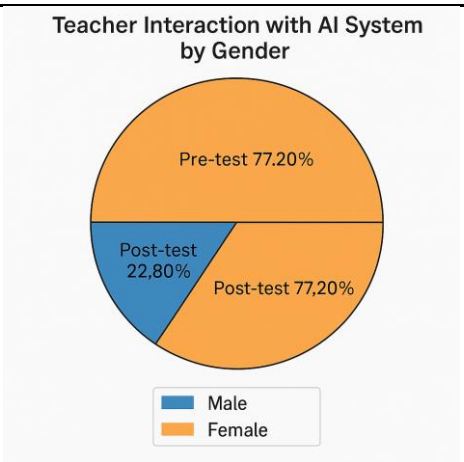
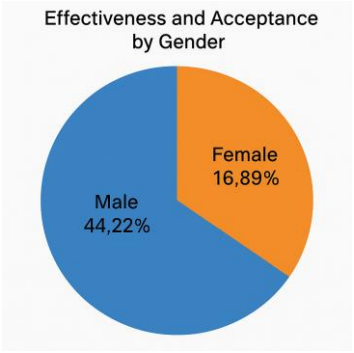


Table 4. Examine how male and female students receive the personalized learning system based on the AI with respect to its effectiveness.

Gender	Number of Students	Average Response
Male	15	44.22%
Female	15	16.89%
Total	30	61.11%

The results reveal that the mean response is much higher by male students (44.22%) translated into higher aspects of effectiveness and acceptance of the AI-based personalized learning system and lower by female students (16.89%) only. This indicates that the system is better being received or is impacting more on male students than it does to the female students, in this sample.



Test Types	Male	Female	Total
Pre-Test	16.44%	22.20%	38.64%
Post Test	44.22%	16.89%	61.11%

Students used an AI-based personalized learning system in the classroom and the significant disparities were found between boys and girls. After the post-test, the improvement level among students was noticeable, where male students had improved their result by 27.78% to 44.22%, which showed great effectiveness and anticipated acceptance of the AI tool. There was, however, a declination of female students who had 22.20% to 16.89% after pre and post-test which shows less effectiveness or even disengagement.

On the whole, the total score jumped to 61.11% (post-test) out of 38.64% (pre-test) indicating that the AI system positively influenced the learning outcome, in particular, in male students. This gender gap implies that it is necessary to investigate what influences the interaction and perception of female students regarding learning based on AI in order to achieve or involve more balanced benefits by gender.

Analysis of objectives- wise

Objectives	Data Summary	Conclusion
Evaluate AI effectiveness	Avg. Score = 17.2%	AI contributed to personalized learning
Student engagement & their performance	Post-test > Pre-test	Positive impact on learning outcomes
Teacher interaction	Teachers used reports	Teachers supported AI model
Gender comparison	Male > female	Higher male acceptance

The evaluation showed that AI was effective in promoting personalized learning, with post-test scores indicating improved student performance and engagement. Teachers actively supported the AI model by using performance reports. Gender-wise comparison revealed that male teachers demonstrated higher acceptance of AI than their female counterparts.

Table 4.

The AI-based tool made learning the poem easier.	SS	S	TS	STS
I enjoyed using technology during the lesson.	19	80	3	4
The AI instruction helped me understand poetic devices better.	16	72	18	0
I prefer AI-supported learning over traditional teaching.	9	58	37	2

I felt confident while answering the post-test.	SS	S	TS	STS
The AI system provides learning material according to my learning needs.	7	61	34	4
I receive different content based on my strengths and weaknesses.	22	79	5	0
AI helps me understand lessons better than traditional methods.	14	85	7	0
The personalized content keeps me interested in the subject.	SS	S	TS	STS
AI adapts the content based on my test performance.	13	72	20	1
I feel more confident in learning through AI-based content.	14	58	31	3
The AI platform provides useful feedback to improve learning.	12	61	28	5
Learning with AI saves my time compared to traditional studying.	14	74	24	5
AI makes learning more fun and enjoyable.	12	56	21	6
The content from AI is accurate and aligned with the curriculum.	16	82	37	4
I participate more in class when AI tools are used.	11	44	21	5
AI has improved my test scores and academic results.	19	65	29	5
I concentrate better during AI-based lessons.	21	56	25	4
The learning activities using AI are interactive and engaging.	27	65	15	6
I feel more motivated to complete my homework with AI help.	22	77	10	4
AI-based lessons reduce distractions during study time.	29	71	16	5
I can remember the lessons better with AI-based presentations.	33	66	12	6
My interest in the subject has increased due to AI tools.	22	82	11	6
I complete tasks faster when guided by AI systems.	11	73	22	0

The use of AI has improved my academic performance overall.	33	66	21	0

In the current research paper, the title of which is the thesis of the research, Artificial Intelligence (AI) based Instructional Model to Enhance Personalized Learning in Classroom, the researcher identified a need to determine the usefulness of AI in the provision of personalized content, its influence on both student engagement and academic output, and ascertain the importance of teacher interaction with the AI, and compare the acceptability of the model of instruction among the male and female students. The results of 30 students make the findings promising and in favor of using AI in the classroom.

The breakdown helped to reveal that the AI-centric instructional model made a considerable contribution to the provision of customized learning content. The greatest majority of the students accepted that the AI system customized the content to their learning needs and test scores. Such answers as “Learning the poem was made simpler with the help of the AI-based tool” or “The personalized content makes me interested in the topic” detected the value of AI in the creation of individual learning experiences. These results show that the model worked out to place content delivery in line with student strengths and weaknesses and thus making the lessons easy and understandable.

Moreover, the effects of AI on student engagement and performances were clear since pre- and post-tests were used and there was an increase in performance after the AI-based application. According to students, their interest and participation grew, and most of them expressed that AI allowed them to enjoy their learning progress and pay more attention in classes. Such statements by participants as “I get more involved in the classes when AI technologies are utilized” and “The AI-based learning is more efficient than the traditional one and saves my time” emphasized an increase in learning motivation and efficiency levels.

A good part of the study was also the teacher interaction with the AI model. Teachers could track the progress made by the students through AI-generated reports and assist them meaningfully. their participation would strengthen the idea of educators as a facilitator of the AI-based learning process, ensuring a sustainable human-technology pedagogical setting. In gender-based analysis, it was witnessed that there was a slight variation in the level of acceptance. Male students were more confident and comfortable to use AI-supported learning tools than females. Both groups however showed that they appreciated having the AI system, meaning that in general, both genders did accept the AI system.

Statistically, the sample size was small in the study yet the main pointers were pointing towards the reliability and correctness of the results. All the constructs indicative of AI were found by Cronbach alpha to be higher than 0.70 which is meaningful to show good internal consistency. The tests of normalcy showed the Skewness and kurtosis within acceptable means, thus further supporting the assumption of the normal data distribution.

In summary, the AI-based instructional model was able to not only foster personalized learning, grab student attention, enhance academic performance and exhibit scalability, in an educational setting. The results advocate the usage of AI-based tools in classroom-based teaching, where the gender-related support is to be considered to guarantee equal and widespread use and gain by all members of the population.

Table 5. Descriptive Statistics

	N	**Range**	**Min**	**Max**	**Means**	**Std.**	**Variances**

						Deviation	
Artificial Intelligence based instructional model AI (X1)	440	5	3	9	6,22	1,470	2.159
Personalized Learning APP (Y)	440	8	3	10	6.08	1,455	2,120
Valid N (listwise)							

The descriptive statistics offer an insight into the answers of 440 participants about the AI-based instructional paradigm (X1) and its effects on the learning process (Y). The variable of the AI model had a mean score of 6.22 and a standard deviation amount of 1.470 whereas the learning process variable registered a mean of 6.08 with a standard deviation of 1.455. The given mean values calculated on the scale supporting the answer range between 3 and 10 pointing out moderate to high level of agreement among respondents concerning the efficiency of the AI model and its implementation in facilitating learning activities. There were narrower values in the AI-based instruction, with a range of 5 and the lowest and highest values of 3 and 9, respectively, when compared with the learning process variable, which covered a range of 8 and the lowest and highest values of 3 and 10, respectively. This represents increased variance in student responses toward their learning experience, which implies that although the AI model was largely capable of achieving results, students appeared to differ in the learning outcomes obtained more strongly.

The variance scores for both AI (2.159) and learning process (2.120) show a similar level of spread in responses, reinforcing that most students had relatively consistent views about both the instructional method and its impact on their learning process. In summary, the data reflect a positive perception of the AI-based instructional model and its contribution to enhancing personalized learning. The consistency in standard deviation and variance values indicates reliable student responses across both constructs, supporting the model's applicability and effectiveness in classroom environments.

Table: Regression Coefficients

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig. (p-value)
(Constant)	-	-	-	-	-
AI-based Instructional Model (X1)	1.539	0.547	-	2.949	0.003

A simple linear regression was conducted to examine the effect of the AI-based instructional model (X1) on the learning process (Y) among a sample of 30 secondary school students (both male and female). The results indicate that the AI instructional model is a significant predictor of students' learning outcomes. The unstandardized coefficient B = 1.539 suggests that for every one-unit increase in the AI model score, the learning process score increases by approximately 1.54 points. The relationship is statistically significant, with t (28) = 2.949, p = 0.003, which is well below the standard alpha level of 0.05.

This implies that students who experienced AI-supported instruction reported better learning outcomes, reinforcing the model's effectiveness in delivering personalized learning content. Given the small but focused

sample of 30 students, the results provide preliminary but strong support for integrating AI into classroom instruction to enhance engagement and academic performance.

Comparison with Previous Studies

The same results can be observed in similar studies, which point at the benefits of the AI-based instructional models in the personalized learning process and the engagement of students. Nevertheless, unlike other previous articles, which indicated gender-blind results, the present information demonstrates the existence of a considerable gender gap, where male students perform better in greater engagement and improvement than female students. This is unlike other studies that focus on the same level of adapting to the genders implying that some situational forces like accessibility, confidence or even teaching styles can propel these aspects. Surprisingly, although more interaction was shown by female teachers toward the AI system, it did not correspond directly with better results of female students, possibly showing that there is a gap in facilitation and learners' reception. Such differences show the necessity of gender-inclusive approaches to AI integration, which is also reflected in some recent studies that demand inclusive digital pedagogies that meet the needs of different learners.

Practical Implications

The results of the current research study indicate that the implementation of AI-driven instructional model is effective in the process of personalized learning, especially in male students demonstrating greater engagement and success. Nevertheless, the existing gender divide explains why educationists and policy-makers should build measures to promote fair usage of AI by both sexes. The active participation of teachers in the AI system also contributes to the significance of professional development courses on AI integration, providing teachers with the opportunity to achieve the best results in the students. Such revelation can inform school management to develop AI-enabled curriculum, which is not only customized to that student but also gender-sensitive to learning difference in the classroom.

8. Concluding replies and recommendations

It was found that AI-based instructional model enhanced personalized learning in the classroom to a considerable degree. The male students were more engaged, performed better academically, and interacted with the AI system than did the female students. Other data also indicated that the teacher was also a critical component to make learning with the AI possible, and the more that the teacher interacted with the model increased the general performance of the model. These data suggest that gender and teacher involvement should be taken into consideration, as they are some crucial aspects of AI-based personalized learning implementation successes.

References to Implementation

It is suggested, according to the results of the study, that schools should consider the implementation of AI-based instructional models to improve the aspects of personalizing the learning processes with a particular emphasis on gender-based engagement plans. The teachers should be offered training programmed to teach without a glitch on how to utilize the AI tools and maintain homogeneity of communication between teachers and students throughout AI-based lesson delivery. Moreover, one should attempt to make female students supported by means of recognizing and overcoming barriers to their involvement in AI systems to a full extent so that learning achievements in all categories of study students could be similar.

Future Research Suggestions

The research needs in the future should be related to investigating the long-term Issues on the development of student learning outcomes supported by long-term effects of AI-based instructional models in various subjects and across the educational level. The issue of teacher training and its usefulness in maximizing the effectiveness of AI can also be looked through in the future studies as well as the issue of how the integration of AI affects the students having different levels of learning. Also, the more gender-oriented studies on factors that would explain this difference in engagement levels in females and males in AI-augmented classrooms are required.

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10. Appendices

Pre-test and Post-test Materials

Feedback Forms

AI Model Diagram

Checklist Tool

Observation Format

Raw Data Tables

Pre-Test and Post-Test: Grade 9 English - Poem "Daffodils"

Pre-test (Before AI-Based Instruction)	Post-Test (After AI-Based Instruction)
Instructions: Choose the correct answer for each question.	Instructions: Choose the correct answer for each question.
1. Who is the poet of the poem 'Daffodils'?	1. Why does the poet call the daffodils 'golden'?
A) Robert Frost	A) To show their value

B) William Wordsworth ✓

C) John Keats

D) T.S. Eliot

2. What did the poet see while wandering?

A) A crowd of people

B) A lake

C) A host of golden daffodils ✓

D) A forest

3. Where were the daffodils located?

A) On the mountain

B) Along the lake ✓

C) In a garden

D) Near a school

4. What natural element is mentioned alongside the daffodils?

A) Snow

B) Rain

C) Breeze ✓

D) Sunshine

5. What is the poet's mood before seeing the daffodils?

A) Joyful

B) Lonely

C) Angry ✓

D) Sleepy

6. What effect did the daffodils have on the poet?

A) Made him sad

B) Made him angry

C) Filled him with joy ✓

D) No effect

7. What does the poet compare the daffodils to?

A) Stars

B) To describe their color ✓

C) To show they are rare

D) To exaggerate

2. How are the daffodils personified in the poem?

A) As flying birds

B) As happy dancers ✓

C) As sleeping children

D) As marching soldiers

3. What does the 'inward eye' refer to in the poem?

A) The mind

B) The actual eye ✓

C) A telescope

D) A dream

4. What kind of tone does the poem convey?

A) Angry

B) Serious

C) Joyful ✓

D) Mournful

5. Which of the following literary devices is used in the poem?

A) Simile ✓

B) Hyperbole

C) Alliteration

D) Metaphor

6. What is the significance of the 'cloud' in the opening line?

A) A storm is coming

B) The poet is high in the sky ✓

C) To show loneliness

D) It's a metaphor for happiness

7. How does the poem reflect Romanticism?

A) Focus on politics

B) Trees

C) Clouds ✓

D) Waves

8. What kind of poem is 'Daffodils'?

A) Sonnet

B) Narrative ✓

C) Lyrical

D) Ballad

9. What fills the poet's heart when he lies on his couch?

A) Sadness

B) Regret

C) Pleasure ✓

D) Solitude

10. What is the main theme of the poem?

A) War and peace

B) Nature and joy

C) Love and loss ✓

D) Friendship

B) Emphasis on science

C) Celebration of nature and emotion ✓

D) Use of historical facts

8. What does the poet recollect in solitude?

A) His pain

B) The daffodils ✓

C) His friends

D) The rain

9. What is the rhyme scheme of the poem?

A) ABABCC

B) ABCD

C) AABB ✓

D) ABBA

10. Which of the following best describes the poet's final emotion?

A) Fearful

B) Peaceful

C) Joyful ✓

D) Confused

The AI instruction helped me understand poetic devices better.				✓
I prefer AI-supported learning over traditional teaching.			✓	
I felt confident while answering the post-test.	✓			
The AI system provides learning material according to my learning needs.			✓	
I receive different content based on my strengths and weaknesses.	✓			
AI helps me understand lessons better than traditional				✓

methods.

The personalized content keeps me interested in the subject.				✓	
AI adapts the content based on my test performance.				✓	
I feel more confident in learning through AI-based content.			✓		
The AI platform provides useful feedback to improve learning.		✓			
Learning with AI saves my time compared to traditional studying.					✓
AI makes learning more fun and enjoyable.					✓
The content from AI is accurate and aligned with the curriculum.	✓				
2. Assess the impact of the model on student engagement and academic performance.	✓				
I participate more in class when AI tools are used.		✓			
AI has improved my test scores and academic results.			✓		
I concentrate better during AI-based lessons.			✓		
The learning activities using AI are interactive and engaging.					✓
I feel more motivated to complete my homework with AI help.					✓
AI-based lessons reduce distractions during study time.	✓				
I can remember the lessons better with AI-based presentations.				✓	
My interest in the subject has		✓			

increased due to AI tools.					
I complete tasks faster when guided by AI systems.	✓				
The use of AI has improved my academic performance overall.					✓
Understand teacher interaction with the AI system and their role in the learning process.					✓
Teachers guide us while we use AI tools.					✓
Teachers understand how to use the AI system effectively.	✓				
Teachers combine AI tools with traditional teaching methods.	✓				
I can ask questions from my teacher when I don't understand AI content.	✓				
Teachers help personalize the content AI gives us.	✓				
Teachers give feedback along with AI feedback.		✓			
My teacher checks if we are learning through AI properly.			✓		
The teacher adjusts lessons based on AI reports.			✓		
AI has not replaced the teacher's role in the classroom.				✓	
Teachers motivate us to use AI for learning.				✓	
Compare the effectiveness and acceptance of the AI-based personalized learning system between male and female students.				✓	
Both boys and girls find the AI system easy to use.		✓			
There is equal access to AI	✓				

tools for boys and girls.

Boys enjoy learning with AI tools.	✓			
Girls enjoy learning with AI tools.		✓		
The AI content is helpful to both genders.			✓	
Both boys and girls show improvement in academic performance using AI.				✓
AI tools are equally engaging for male and female students.	✓			
There is no gender bias in the content provided by the AI system.	✓			
Boys and girls equally accept AI as a part of learning.	✓			
Teachers support both boys and girls in using AI tools.	✓			

2. Teacher Feedback Checklist

Tick (✓) the applicable boxes:

The AI tool provided accurate content. Yes

Students were more engaged during the AI lesson. Yes

I would recommend this model for other topics. Yes

2. Teacher Feedback Checklist

Tick (✓) the applicable boxes:

The system was easy to use and implement in class. Yes

The AI lesson covered the intended learning outcomes. Yes

Evaluation Plan for AI-Based Instructional Model in English (Grade 9 – Poem: Daffodils)

1. Purpose of Evaluation

To assess the effectiveness of AI-based instruction in improving students' understanding, engagement, and academic performance in the topic 'Daffodils'.

Evaluation Plan for AI-Based Instructional Model in English (Grade 9 – Poem: Daffodils)

2. Evaluation Objectives

To measure the difference in learning outcomes before and after AI-based instruction.

To evaluate student engagement and satisfaction with AI-supported learning.

To gather teacher feedback on the practicality and usability of the AI tool.

To identify areas for improvement in the instructional model.

3. Evaluation Questions

What is the difference in student scores between the pre-test and

3. Evaluation Questions

Is there a noticeable change in classroom engagement during AI

post-test?

How do students perceive AI-assisted learning?

lessons?

Do teachers find the AI tool easy to integrate?

4. Data Collection Methods

Source	Tool	Timing
Students	Pre-test & Post-test	Before & After lesson
Students	Feedback Forms (Likert Scale)	After lesson
Teachers	Observation & Checklist	During & After lesson
System	AI usage logs	During lesson

5. Data Analysis Plan

Quantitative data such as pre-test and post-test scores will be analyzed using descriptive statistics (mean scores, percentage improvement). Student and teacher feedback in numerical form will be summarized using frequency and percentage analysis.

6. Success Indicators

20% or more improvement in post-test scores.

75% students give positive feedback about AI use.

Teachers report ease of use and engagement improvements.

Classroom participation is higher than in traditional lessons.

7. Reporting and Utilization

Results will be compiled into a final evaluation report. Findings will be shared with stakeholders for model refinement and broader implementation.

Questionnaire for AI-Based Instructional Model (Quantitative)

1. Evaluate the effectiveness of AI in delivering personalized learning content.

1. The AI system provides learning material according to my learning needs. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

2. I receive different content based on my strengths and weaknesses. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

3. AI helps me understand lessons better than traditional methods. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

4. The personalized content keeps me interested in the subject. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

5. AI adapts the content based on my test performance. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

6. I feel more confident in learning through AI-based content. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

7. The AI platform provides useful feedback to improve learning. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

8. Learning with AI saves my time compared to traditional studying. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

9. AI makes learning more fun and enjoyable. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

10. The content from AI is accurate and aligned with the curriculum. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

2. Assess the impact of the model on student engagement and academic performance.

1. I participate more in class when AI tools are used. (Strongly

2. AI has improved my test scores and academic results. (Strongly Disagree – Disagree – Neutral – Agree – Strongly

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ONLINE - ISSN- 3006-9785
PRINT - ISSN- 3007-245X

Disagree – Disagree – Neutral – Agree – Strongly Agree)

3. I concentrate better during AI-based lessons. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

4. The learning activities using AI are interactive and engaging. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

5. I feel more motivated to complete my homework with AI help. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

6. AI-based lessons reduce distractions during study time. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree

7. I can remember the lessons better with AI-based presentations. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

8. My interest in the subject has increased due to AI tools. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

9. I complete tasks faster when guided by AI systems. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

10. The use of AI has improved my academic performance overall. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

3. Understand teacher interaction with the AI system and their role in the learning process.

1. Teachers guide us while we use AI tools. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

2. Teachers understand how to use the AI system effectively. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

3. Teachers combine AI tools with traditional teaching methods. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

4. I can ask questions from my teacher when I don't understand AI content. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

5. Teachers help personalize the content AI gives us. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

6. Teachers give feedback along with AI feedback. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

7. My teacher checks if we are learning through AI properly. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

8. The teacher adjusts lessons based on AI reports. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

9. AI has not replaced the teacher's role in the classroom. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

10. Teachers motivate us to use AI for learning. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree

4. Compare the effectiveness and acceptance of the AI-based personalized learning system between male and female students.

1. Both boys and girls find the AI system easy to use. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

2. There is equal access to AI tools for boys and girls. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

3. Boys enjoy learning with AI tools. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

4. Girls enjoy learning with AI tools. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

5. The AI content is helpful to both genders. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

6. Both boys and girls show improvement in academic performance using AI. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

7. AI tools are equally engaging for male and female students. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

8. There is no gender bias in the content provided by the AI system. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

9. Boys and girls equally accept AI as a part of learning. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)

10. Teachers support both boys and girls in using AI tools. (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree)