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EXPLORING TEACHERS' EXPERIENCES IN USING AI-INTEGRATED INSTRUCTIONAL DESIGN FOR EQUITY, INCLUSION, AND GENDER SENSITIVITY IN PUBLIC SECONDARY SCHOOLS, DISTRICT WEST KARACHI

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Abstract

This paper examines the experiences of teachers with the implementation of AI-based instructional design to encourage equity, inclusion, and gender sensitivity in government secondary schools in District West, Karachi. According to Human-Centered AI Pedagogy (HCAIP) and Student-AI Collaboration (SAC) models, the study follows a qualitative approach with purposive sampling. Semi-structured interviews were used to collect data and thematic analysis was implemented to determine common patterns. The results indicate that AI tools can be used to facilitate differentiated instruction, increase accessibility of students with disabilities, and offer them the chance of personalized learning. Nevertheless, there are still issues like a lack of infrastructure, the absence of digital literacy, and the bias of algorithms. Disparities in accessibility and use of them were identified by gender, but the interventions aimed at minimizing the disparity proved to be promising. This paper concludes that AI can be used as an equity enabler in contextual and ethically implemented, focusing on teacher agency and culturally responsive practices. Suggestions are capacity-building initiatives, the creation of AI content locally, and support of inclusive integration of AI at policy level.

Key words: *Artificial Intelligence, Inclusive Education, Gender Sensitivity, Digital Divide, Instructional Design*

Introduction

Equity, inclusion and gender sensitivity are key principles of modern education systems to provide equal opportunities for quality learning to all students. Artificial intelligence (AI) is a rapidly evolving technology for the instructional design and pedagogical practices. In less developed nations such as Pakistan, especially in the state secondary schools of District West Karachi the inequality of access, inclusion, and gender equity is still a thorn in the flesh (Amin, 2025). Potential solutions to the issue can be found in the use of the AI-based instructional design that enables customized learning, dynamic content delivery, and inclusive teaching methods. Nevertheless, the success of these developments is mainly based on the experiences, willingness, and adaptability of the teachers to the real-life context (Imran, Zaidi, and Khanzada, 2023).

This study aims to understand teacher's experiences and perceptions of AI-integrated instructional design in promoting equity, inclusion, and gender sensitivity in the classroom (Imtiaz, et al., 2025; Amin, et al., 2024; Imtiaz, Malik & Khan, 2024). It also examines the structural and pedagogical factors impacting the implementation.

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Research Objectives

The primary goal of the research is to investigate the experiences of teachers using AI-based instructional design to encourage equity, inclusion, and gender sensitivity in publicly-run secondary schools in District West, Karachi.

In particular, the research will seek to:

1.To explore the ways in which teachers apply AI-based instructional design to help facilitate inclusive teaching methods in regular public secondary classrooms.

2.To understand how teachers think AI can be used to enhance educational equity among diverse learners.

3.To examine whether AI-based teaching tools have the effect of gender sensitivity and the involvement of male and female students in the classroom learning.

4.To determine the main institutional, pedagogical, and infrastructural issues associated with the implementation of AI-integrated teaching practices among teachers.

Research Questions

To achieve the above objectives, the study is guided by the following research questions:

1. How do teachers experience and utilize AI-integrated instructional design to facilitate inclusive education in public secondary schools?
2. In what ways does AI contribute to promoting or constraining equity among diverse student populations?
3. How does AI-integrated instruction influence gender dynamics and participation in classroom learning?
4. What challenges do teachers face in adopting and implementing AI-based instructional strategies in their teaching practices?

Literature Review

With the introduction of Artificial Intelligence (AI) into the design of the instruction, new possibilities that can be considered game-changing to create equity, inclusion, and gender sensitivity in the teaching profession are introduced, particularly in marginalized schools, like secondary schools in public districts in Karachi, District West. Recently, AI is slowly becoming perceived as an educational consideration not merely as a technological supplement to education but as a socio-technical infrastructure changing pedagogy, equity, and governance (Holmes et al., 2019; Luckin et al., 2016).

The unequal access to technological infrastructure has long been considered to define digital divide (Amin, Said and Butt, 2025; Shah, Amin and Khan, 2025; Dash, et al., 2025). Recent literature, however, extends this concept to inequalities in digital literacy and the capability to attain meaningful learning outcomes, which are in some cases also known as second- and third-level digital divides (UNESCO, 2023; World Bank, 2021). Developing situations are also exaggerated in these inequalities where the institutional preparedness is minimal and the opportunity of professional development is insufficient to support teachers to apply the new technologies in a meaningful manner (OECD, 2022).

In addition to access, AI generates an algorithmic divide, where systems that are trained with Western-centric data may not reflect the local linguistic, cultural, and the pedagogical reality. Such misalignment can provide output of bias, which promotes structural inequities in assessment and learning design (Zhao and Watterston, 2021). To overcome these risks, UNESCO (2021) encourages the ethical AI in education to aim at transparency, inclusiveness, and human-related governance (Amin, 2025; Hossain, et al., 2025). The idea of AI-based instructional design is increasingly being equated with adaptive learning systems, automated feedback systems, and intelligent tutoring systems to support differentiated instruction (Imran,

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Zaidi, and Rehan, 2024). Empirical syntheses show that technology-enhanced learning can be potentially helpful to student achievement in the cases when this technology is integrated into successful pedagogical strategies (Tamim et al., 2011). On the same note, Zawacki-Richter et al. (2019) note that AI applications in education are most effective as they support and never replace teacher judgment and decision-making (Imran, Sultana, and Ahmed, 2023).

However, the critical researchers caution against blindly using AI in education. Selwyn (2019) points out that the histories of automation are inclined to overlook the fact that teachers are central to the long-term relational and ethical aspect of the learning process (Imran, Sultana, and Ahmed, 2023). Furthermore, Zuboff (2019) warns of the educational systems relying on data will contribute to surveillance capitalism, where learning behavior among the students will be commodified by the use of endless data mining and algorithmic profiling (Ahmed, Ahmed and Buriro, 2023). The challenges demonstrate the need to safeguard the privacy and agency of learners in AI-enabled classes (Imran, et al., 2023).

There is also a balanced attitude towards the implementation of AI supported by policy frameworks. The OECD (2021) recommends that AI in education should not replace the human ability, but it should be in a way that allows it to personalize without the freedom of the pedagogue. Similarly, UNESCO (2021) promotes human oriented AI solution that ensures equity, accountability and cultural sensitivity in educational technologies (Hafeez, Iqbal, and Imran, 2021). Within the framework of inclusive education, AI is situated as a guide of different learning needs (Khan, Hussain and Ahmad, 2023). The technologies that can be applied to the contents of the curriculum in a flexible manner are adaptive platforms, speech-to-text systems and multilingual translation tools that are consistent with the principles of the Universal Design of Learning (UDL) (CAST, 2018). When applied appropriately, these tools will be able to support learners with disabilities and those with a different linguistic background and thereby educational equity.

Nonetheless, AI in learning is reliant on the agency of an instructor and situational modification. SAC model emphasizes learning as an active process and makes teachers act as guiding forces that are going to direct the application of AI to achieve meaningful learning outcomes (Oad, et al., 2024; Hussain, et al., 2023). This is compatible with pedagogical approaches that are rooted in humanism that prioritize augmentation instead of automation and cement the role of the teacher as an ethical, instructional intermediary. Lastly, AI-driven instructional design, according to the literature, can be a significant opportunity to achieve equity, inclusion, and gender sensitivity (Amin, 2025; Soma, et al., 2025; Amin, Daudpota and Khan, 2025). However, it is subject to infrastructural readiness, the ability of teachers, ethical government, and cultural contextualization of its impacts. These dynamics are crucial to the understanding of the experiences of teachers in the District West, Karachi where socio-economic and technological constraints intersect with the evolving pedagogical requirements.

Research Methodology

Research Design

This research design is based on the qualitative research design to have an in-depth understanding of the experiences of teachers. The choice of phenomenological approach was to gain insights into lived experiences in the integration of AI in instructional practices.

Sampling

The sample was selected using purposive sampling of the public secondary schools in the District West Karachi. Ten teachers who were exposed to digital or AI-assisted tools were involved.

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Data Collection

The data were gathered using a semi-structured interview that concentrated on:

- Use of AI tools in teaching
- Perceptions of inclusion and equity
- Gender-related challenges
- Institutional support and barriers

Data Analysis

Coding, categorization and development of the themes were followed by thematic analysis. Patterns were derived using NVivo-type manual methods of coding.

Results and Discussion

Thematic analysis yielded five major themes reflecting teachers' lived experiences.

Theme 1: AI as a Tool for Inclusive Instruction

Educators always claimed that AI tools helped to improve differentiated instruction as they could support the needs of various learners. Special features like speech-to-text and translation, and adaptive assessments allowed the inclusion of students with disabilities and low academic achievement.

Illustrative Quotes:

- "With AI solutions, I will be able to assign students in the same classroom different degrees of tasks without making anyone feel like they are left behind."
- "Text-to-speech feature: It is a great aid to my weak readers and learning-challenged students."
- "AI-generated quizzes are automatically adjusted which saves time and helps each student at their level".

Sample Coding Table

Code	Category	Theme
Adaptive quizzes	Personalized learning	Inclusive Instruction
Text-to-speech	Accessibility	Inclusive Instruction
Automated feedback	Learning support	Inclusive Instruction

Theme 2: Infrastructure and Capacity Constraints

The participants noted such systemic barriers as poor internet connectivity, inadequate digital gadgets, and training. These limitations provided a restriction to the regular AI integration.

Illustrative Quotes:

- "The internet is not always available all day long, and thus we cannot afford to use AI tools on a routine basis."
- "We don't have enough devices for all students, so only a few can benefit at a time."
- "We need proper training; otherwise, these tools are difficult to use effectively."

Theme 3: Gendered Access and Participation

Educators noted that female learners could access digital resources relatively less because of socio-cultural limitations. But, properly organized AI classroom activities enhanced female participation.

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Illustrative Quotes:

- "Many girls are hesitant to use technology because they don't have access at home."
- "When we use AI tools in class, girls participate more because everyone gets equal opportunity."
- Some parents do not feel comfortable when girls use digital devices when not at school.

Theme 4: Algorithmic Bias and Cultural Relevance

The AI-generated content was usually viewed as culturally inappropriate. The teachers pointed out the importance of localized content to boost student interest and understanding.

Illustrative Quotes:

- "Examples given by AI are sometimes based on foreign contexts which our students cannot relate to."
- "AI tools do not necessarily use a language that is appropriate to the level of our students".
- "We need to change the content to make it culturally relevant. The AI-created content was frequently seen as culturally inappropriate. The teachers highlighted the necessity of localized content in order to improve student interest and understanding."

Theme 5: Teacher Agency and Pedagogical Adaptation

The role of teachers was to play the role of facilitators who adapted AI tools in a critical manner. AI was considered an enhancement of-not a substitute to-teacher role.

Illustrative Quotes:

- "AI is helpful, but the teacher is still the main guide in the classroom."
- "I modify AI-generated content according to my students' needs."
- "These tools save time, so I can focus more on interacting with students."

Analytical Discussion

Results correspond to Human-Centered AI Pedagogy, with an accent on augmentation rather than automation. The SAC model was translated into the classroom environment where students actively worked with AI tools with the teacher. Systemic obstacles are reflective of international evidence of digital inequality and support the importance of local implementation plans.

Conclusion

The research comes to the conclusion that AI-based instructional design is potentially very useful in promoting equity, inclusion, and gender sensitivity in open secondary education. Its effectiveness however lies in the contextual adaptation, teacher training and moral implementation. Instructing infrastructural and socio-cultural obstacles is essential to efficient integration of AI in the design of instructions.

Recommendations

This study recommends the following:

Strengthen teacher training for AI-integrated instructional design:

Use of AI in instructional design is limited to task-oriented manner i.e., worksheet generation, rather than as too for inclusive instructional design, in district west. The targeted continuous professional Development (CPD) focuses on AI-supported lesson planning is recommended where teachers learn to design inclusive lesson that address heterogeneous classroom, language diversity, & marginalized learners. The teacher trainings should include the practical classroom simulations, enabling teachers to critically evaluate the output for bias, cultural relevance and

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gender sensitized before implementing it in their teaching. This approach help to shift the emphasis from general capacity building to instructional transformation at the classroom level.

Develop culturally and contextually responsive AI tools for classroom use:

Teachers in District West often report that AI-generated content lacks relevance to students' socio-cultural realities, which limits its effectiveness in inclusive teaching. It is recommended that AI tools used in classrooms be adapted to incorporate local languages (Urdu and Sindhi), familiar contexts, and community-based examples. Additionally, AI systems should be designed or filtered to avoid reinforcing gender stereotypes, ensuring that examples equally represent girls and boys in diverse roles, including leadership and STEM fields. This contextual alignment will allow teachers to adopt AI as an inclusion tool instead of an exclusion tool and make learning more relatable and fair.

Improve classroom-level digital access and usability:

The lack of infrastructure is not the only problem in District West as revealed by the findings but the low usability in real classroom settings. Access solutions at the classroom level, such as shared tablets, teacher-controlled devices, or pre-loaded AI-assisted content that can operate without constant internet connectivity are recommended. The AI should be allowed to be used by teachers in real-time learning, and not as a learning aid that is applied outside the classroom.

Promote gender-inclusive AI use within classroom practices:

Although the study is a reflection on the fact that AI integrated instructional design has an enormous potential influence in Public secondary schools of District west Karachi, it also illuminates the fact that the use of technology in classrooms may unintentionally contribute to the existing gender imbalances, where boys tend to be more active in digital activities. It is advisable to put in place classroom level-based procedures of fair participation so that girls are equally engaged in AI-assisted learning. It is necessary to encourage teachers to actively employ AI tools to generate gender-balanced content, including examples, stories, problem situations, which challenge traditional roles and encourage female involvement in various areas. In addition, AI usage in classrooms should be sensitized to observe patterns of interaction among the teachers. By integrating gender inclusion into the teaching practice, AI will enable AI to operate like a force of equity instead of a social bias.

Limitations of the study

This paper has a number of shortcomings that ought to be accommodated in subsequent studies. The paper is based on a single district of Karachi i.e., District West. The current research will serve as a valuable ground in the future research on AI-based instructional design to promote equity, inclusion, and gender sensitivity. Based on these results, future studies can no longer be exploratory and perception-based but impact-based research that will help to understand how AI-assisted instructional methods can affect student learning outcomes, participation patterns, and gender relationships in classrooms.

The area of interest of District West Karachi indicates that the results cannot be entirely generalized to other areas with varying socio-economic or infrastructural background. The self-reported teacher experiences imply the risk of response bias, and they may not be an accurate representation of classroom practices. More so, the study fails to include any quantitative measures of student learning outcomes or equity indicators, which constrain its capacity to determine the direct effect of integration of AI.

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