

THE INFLUENCE OF AI USAGE AND DIGITAL INFORMAL LEARNING IN ENHANCING ISLAMIC TEACHER'S EFFECTIVENESS IN SOUTHERN PAKISTAN

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ABSTRACT

At the time, when the world is going through the period of accelerated technological development, the instructional effectiveness of teachers is very important to satisfy the requirements of modern education, especially in the context of the linguistic and culturally diverse environment. Digital informal learning and Artificial Intelligence (AI) have become disruptive tools to help teachers enhance their teaching activities, in particular, in the under-resourced schools. Although interest in the AI-based education is increasing, few studies have examined the combination of AI tools and digital informal learning to enhance the overall effectiveness of instruction among teachers in the Islamic secondary schools of Southern Pakistan. This quantitative research question is how AI tools can enhance English language proficiency, how digital informal learning can enhance cultural awareness, and how the two can enhance the instructional effectiveness of teachers. The survey of 450 Islamic secondary school teachers was conducted with the use of a purposive sample, and the survey was carried out with the help of a structured questionnaire using SPSS (2021) with descriptive statistics and independent sample t -tests. The results indicate that AI solutions can significantly improve English language proficiency that is important in effective teaching, whereas digital informal learning helps to develop cultural awareness, allowing educators to work with different learners. These tools are combined, and they have a positive influence on the effectiveness of instruction, increasing the quality of lesson delivery, student behaviour, and classroom management. The research provides the education policy recommendation to incorporate AI and digital tools in teacher training programs, which provides an insight to policymakers and education leaders and developers of EdTech to empower teachers in linguistically and culturally diverse areas.

Keywords: Artificial Intelligence, online informal learning, teaching efficiency, Islamic schools

INTRODUCTION

In the current globalized and technologically advanced education scenario, educators need to improve their teaching efficiency to accommodate different classroom dynamics and international pedagogical requirements. Instructional effectiveness refers to one having the skills to provide lessons that are both interesting and effective in the classroom, controlling and managing classrooms, and creating student-centered learning activities (Stronge, 2018). Digital informal learning and Artificial Intelligence (AI) provide new avenues towards enhancing these competencies, especially in poor-resource environments (Almusharraf and Almusharraf, 2021). In Southern Pakistan, with the lack of professional development, poor English skills, and cultural isolation affecting Islamic secondary schools, AI and digital informal learning holds scalable answers to provide teachers with instructional skills.

Intelligent tutoring systems, chat bots in languages, and other AI-based technologies revolutionize the educational process by offering customized feedback, automating the production of learning content, and making adaptive teaching processes (Zawacki-Richter et al., 2020). Equally, digital informal learning, self-directed learning via platforms such as YouTube, podcasts, and online communities, can allow teachers to learn about the world through access to global education resources and cultural materials, which lead to intercultural competence (Nguyen et al., 2022). Such tools are useful especially in some parts of the country such as Kot Addu and Muzaffargarh where the teacher training is mostly traditional and English knowledge and culture exposure is low (Ali et al., 2023).

Although AI and digital informal learning have potential, the research on their influence on the instructional performance in Islamic secondary schools is scarce. Available literature usually emphasizes student performance or formal teacher professional growth without considering the importance of informal, technology-based learning in improving teachers in their instructional practices (Wang et al., 2021). This paper will fill this gap by discussing the role of AI tools in promoting the English language skills, the

role of digital informal learning in promoting cultural awareness, and the role of both in the effectiveness of instruction by teachers in the Islamic schools of Southern Pakistan. The results should help guide evidence-based policies and teacher training courses in culturally sensitive educational settings with resource constraints.

Objectives of Study

1. To explore how AI may be applied to enhance quality of instruction with the aid of English language proficiency in teachers.
2. The aim of the study was to examine the effect that digital informal learning can help in creating cultural awareness to promote effective teaching.
3. To assess the combined impact of AI and digitized informal learning on teaching effectiveness of teachers.

LITERATURE REVIEW

English Language Proficiency Artificial Intelligence.

The use of AI technologies, in the form of chatbots, speech-recognition systems, and intelligent tutoring systems, has simplified and rendered personalized and real-time feedback when learning any language (Chen et al., 2021). Those tools are Duolingo and Google Bolo, which utilize the mechanism of natural language processing to enhance vocabulary, pronunciation, and communication, which are key to the success of teaching in multilingual classrooms (Al-Fadhli, 2021). Studies show that AI promotes language learning because it individualizes the learning experience in relation to the needs of a learner, and it encourages self-confidence (Zawacki-Richter et al., 2020). However, the application of these in-service teachers within a rural/religious setting, e.g., Islamic schools is not thoroughly studied.

Digital Informal Learning and Cultural Awareness.

Digital independent learning: The independent use of such platforms as You Tube, MOOCs, social media, provides educators with insights into different cultural materials (Nguyen et al., 2022). Intercultural competence is enhanced by means of this type of exposure since the teachers are able to create inclusive classrooms and provide culturally

responsive instruction (Wang et al., 2021). Digital informal learning is a logistically easy and low-cost method of developing cultural awareness, which is one of the sources of instructional effectiveness in Pakistan where teachers are relatively culturally isolated (Southern part) (Chen et al., 2021).

AI and Informal Learning in Enhancing Effectiveness in Instruction.

The success of teaching practice requires the intentions of lesson design, communication with the learners, and classroom management, which might be enhanced with the assistance of AI and informal learning online (Stronge, 2018). The teachers use AI applications to guide them in lesson design, curriculum instruction, and classical simulation in real-time (Almusharraf and Almusharraf, 2021). This is enhanced by the informal learning that is designed using digital matter which facilitates mutual cooperation among individuals and introduction to new teaching techniques that would enable teachers to adapt to diverse needs in students (Nguyen et al., 2022). The tools are particularly necessary where the source of training is limited and the lack of formal training in constrained resource contexts.

Local Context Southern Pakistan Problems.

The challenging issues affecting the operation of the Islamic secondary schools in Southern Pakistan particularly in Kot Addu and Muzaffargarh are the utilization of outmoded curricula, absence of the ability to communicate in English and being exposed to modern pedagogies (Ali et al., 2023). Traditional styles and teacher centred styles are prevalent amongst teachers and hinder learning. However, the greater adoption of mobile internet is an opportunity to introduce AI solutions and digital informal learning in a way that teaching experts would be able to improve their educational methods and follow the tendencies in the field globally (Khan et al., 2021).

Artificial Intelligence, Learning and Education.

Education automatization and optimization of learning and help in the professional development are two areas where artificial intelligence makes it easier (Zawacki-Richter et al., 2020). When dealing with teachers it is in the AI powered platform that it duplicates real world teaching environment, which enhances teaching practices (Chen

et al., 2021). Islamic schools use primarily formal training and AI offers a chance to make this method more effective since it can be scaled (Al-Fadhli, 2021).

AI Tools and English Language proficiency.

An engine like Grammarly can also enhance percentages of EFL mastery with the help of such chatbots as linguistic chatbots and AI services, and people can try their English skills (Lu et al., 2021). To some degree, the tools may specifically be applicable to low-resource settings to assist teachers to improve communication competencies without which they could not provide quality teacher (Sharma et al., 2023).

Online Empinque Jitintini.

Digital informal learning allows teachers to interact with the nature of the international pedagogical practice and thus they can build their professions continuously (Wang et al., 2021). The innovation of certain teaching methods offered through online courses (forums, podcasts, and other software) can be helpful in classroom settings with limited resources making the education process more efficient (Nguyen et al., 2022).

Cultural Awareness is learned unofficially.

Cultural awareness is another important part of the digital informal learning that helps to understand other perspectives in inclusive teaching since the online materials expose a teacher to various perspectives (Chen et al., 2021). This brings an insight of comprehension and tactis, which are features of instructional efficacy in heterogeneous classrooms (Yousef et al., 2023).

Islam School Teaching.

Instructional effectiveness refers to delivering teaching lessons on an engaging / student-focused framework and teaching lessons efficiently (Stronge, 2018). The teacher training gaps in the Islamic schools of Southern Pakistan could also be addressed with the aid of AI and digital informal learning so that the educators would be able to apply the innovative learning methods (Khan et al., 2021).

CONCEPTUAL FRAMEWORK

The conceptual framework looks at the role of AI application and digital informal learning in supporting the teaching performance of teachers working in the Islamic secondary schools of Southern Pakistan. It delves into the ways in which AI tools enhance English language proficiency, how digital informal learning enhances cultural awareness, and how the two help to promote effective teaching practices. Gender differences and contextual variables affecting the adoption of technology in resource-constrained environments are also considered in the framework.

Hypotheses

- H1:** AI tools significantly enhance English language proficiency, contributing to instructional effectiveness.
- H2:** Digital informal learning significantly promotes cultural awareness, supporting effective teaching.
- H3:** AI tools positively influence teachers' instructional effectiveness.
- H4:** Digital informal learning positively contributes to teachers' instructional effectiveness.
- H5:** Cultural awareness mediates the relationship between digital informal learning and instructional effectiveness.
- H6:** English language proficiency mediates the relationship between AI tools and instructional effectiveness.

METHODOLOGY

This study adopted a quantitative, comparative research design to assess the impact of AI tools and digital informal learning on English language proficiency, cultural awareness, and instructional effectiveness among Islamic secondary school teachers in Southern Pakistan. A structured questionnaire, comprising Likert-scale items measuring AI usage, digital informal learning engagement, English proficiency, cultural awareness, and instructional effectiveness (e.g., lesson delivery, student engagement, classroom management), was administered to a purposive sample of 450 teachers. The instrument was validated through expert review and pilot testing, with Cronbach's alpha values exceeding 0.70, ensuring reliability.

Data was analyzed using SPSS v28. Descriptive statistics provided insights into teacher demographics and variable distributions. Independent sample t-tests examined differences in instructional effectiveness between teachers with high and low engagement in AI tools and digital informal learning. Multiple regression analysis assessed the predictive power of AI usage and digital informal learning on instructional effectiveness, controlling demographic factors (e.g., gender, teaching experience, school location). This approach tested hypotheses H1–H6, providing empirical insights into technology-driven teacher development in Islamic education.

Study Area

The research was done in Kot Addu District, Southern Punjab, Pakistan, where Islamic secondary schools are serving different communities in a resource constrained education system. Such issues as insufficient training of teachers, low level of English proficiency, and exposure to modern pedagogies contribute to making it a perfect setting to experiment with AI and digital informal learning as the means of improving the instructional performance.

Osteopathy Data Sampling and Methods of Data Collection.

Sampling was done in two steps. To begin with, a purposive sampling was done on eight Islamic secondary schools with different technology adoption levels. Second, the stratified random sample was created to find 450 teachers, and it consisted of teachers who actively use AI tools or digital informal learning and those with limited exposure. The data were gathered through Google form and the teacher with limited access to digital devices was given paper-based questionnaires. The tool was used to measure the use of AI tools, digital informal learning, English proficiency, cultural awareness, and instructional effectiveness. Informed consent was placed, and ethical approval was taken care of to provide anonymity and data confidentiality.

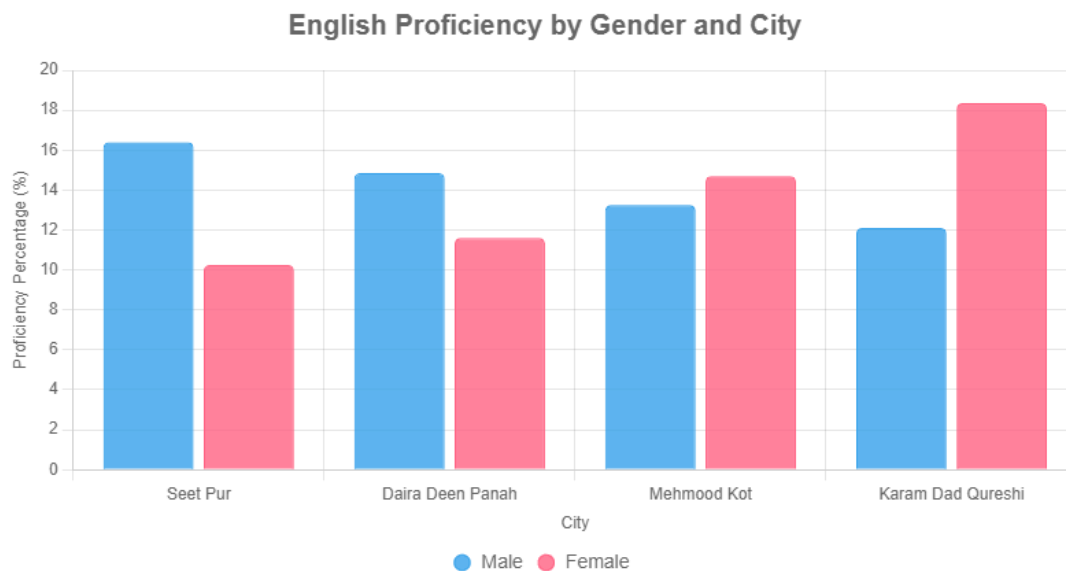
FINDINGS AND DISCUSSION

Table 1: Role of AI in English Language Proficiency Among Teachers

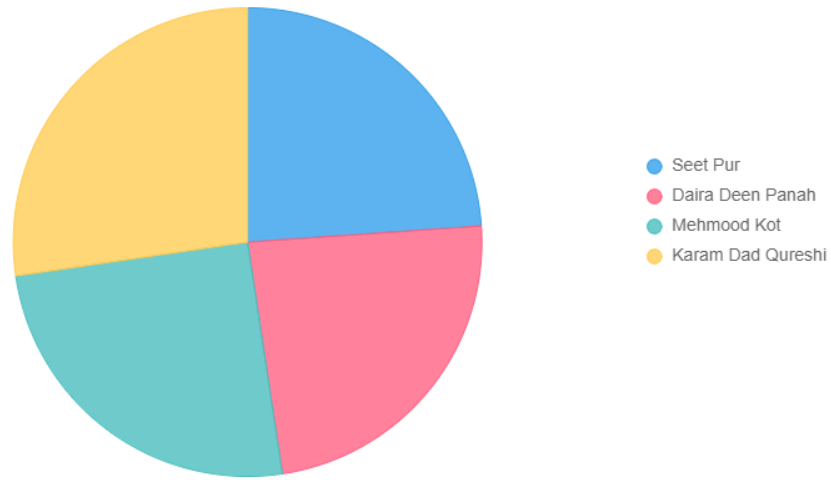
City	Seet Pur	Daira Deen Panah	Mehmood Kot	Karam Dad Qureshi
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Male	16.40%	14.85%	13.25%	12.10%
Female	10.25%	11.60%	14.70%	18.35%
Total	26.65%	26.45%	27.95%	30.45%

The data shows that female teachers in Karam Dad Qureshi (18.35%) exhibit the highest engagement with AI tools for English language proficiency, followed by Mehmood Kot (14.70%). Male teachers are more active in Seet Pur (16.40%) and Daira Deen Panah (14.85%). Karam Dad Qureshi records the highest overall engagement (30.45%), while Seet Pur has the lowest (26.65%), indicating regional and gender variations in AI adoption for language skills critical to instructional effectiveness.



Total English Proficiency by City



Gender Composition of English Proficiency by City

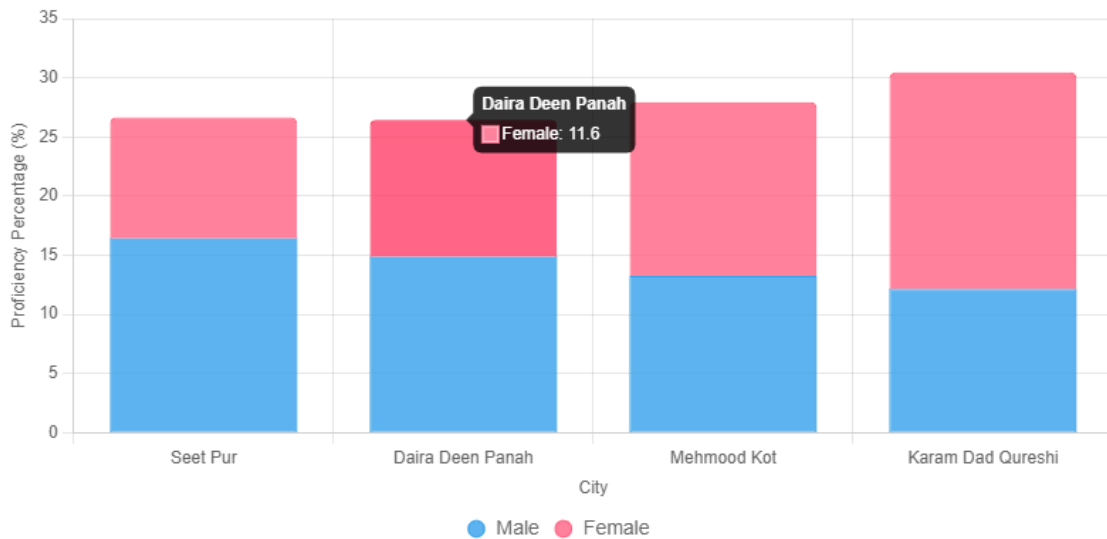
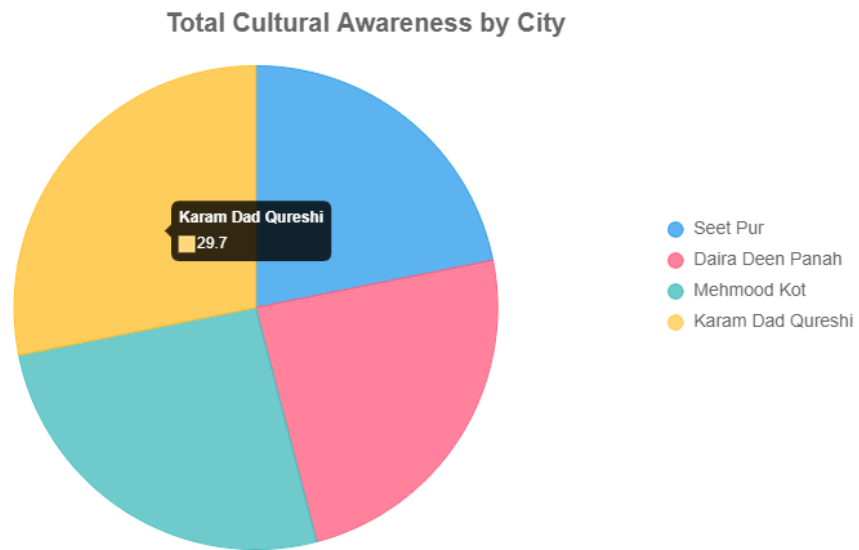
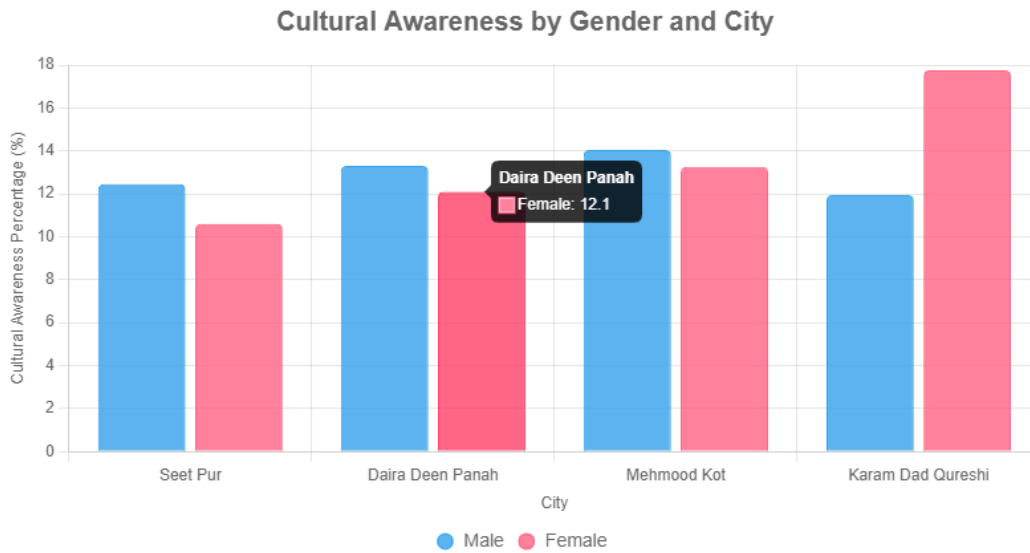


Table 2: Digital Informal Learning Enhances Cultural Awareness.

City	Seet Pur	Daira Deen Panah	Mehmood Kot	Karam Dad Qureshi
Male	12.45%	13.30%	14.05%	11.95%
Female	10.60%	12.10%	13.25%	17.75%
Total	23.05%	25.40%	27.30%	29.70%

Karam Dad Qureshi leads in digital informal learning for cultural awareness (29.70%), driven by female teachers (17.75%). Mehmood Kot follows (27.30%), with balanced gender participation. Seet Pur shows the lowest engagement (23.05%), suggesting

limited access to cultural content. Female teachers in Karam Dad Qureshi and Mehmood Kot demonstrate strong engagement, enhancing their ability to deliver culturally responsive instruction



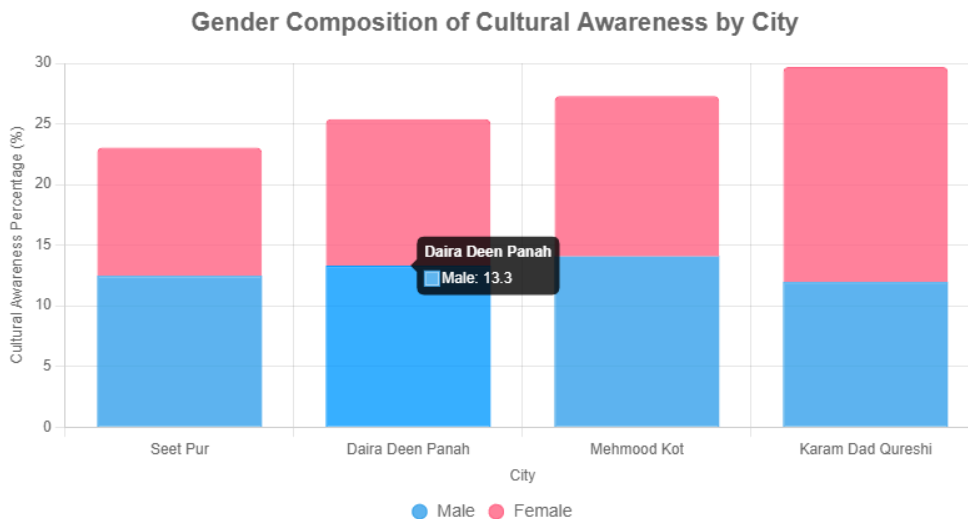


Table 3: Impact of AI and Informal Learning on Instructional Effectiveness.

Sr. No.	City/Tehsil	Male (%)	Female (%)	Total (%)
1	Seet Pur	14.30%	11.20%	25.50%
2	Daira Deen Panah	13.90%	12.15%	26.05%
3	Mehmood Kot	12.85%	15.60%	28.45%
4	Karam Dad Qureshi	16.25%	14.35%	30.60%

Karam Dad Qureshi shows the highest impact of AI and digital informal learning on instructional effectiveness (30.60%), with strong contributions from male (16.25%) and female (14.35%) teachers. Mehmood Kot follows (28.45%), with female teachers (15.60%) leading. Seet Pur (25.50%) and Daira Deen Panah (26.05%) show lower impacts, indicating regional disparities in technology adoption for effective teaching.

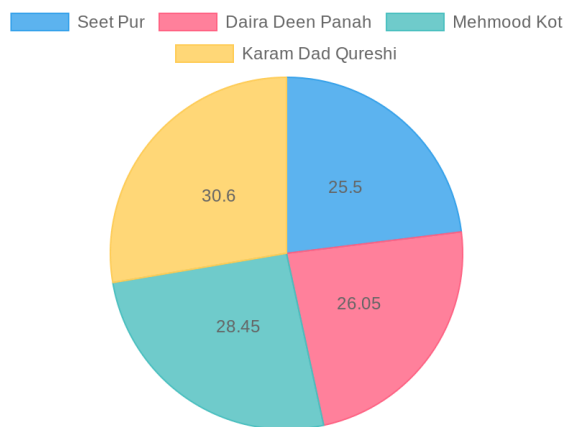
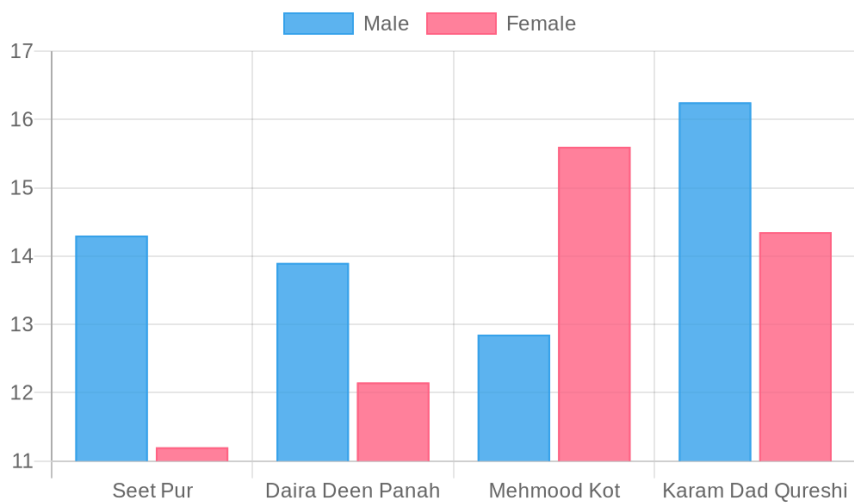


Table 4: Enhancing Teachers' Instructional Effectiveness through AI and Digital Informal Learning.

Statement	SS	S	TS	STD
AI tools improve my English proficiency for effective lesson delivery.	24	58	13	5
I use digital platforms (e.g., YouTube, podcasts) to learn about cultures.	22	60	14	4
Digital informal learning enhances my ability to engage students.	20	62	15	3
AI-assisted content improves my classroom management and pacing.	18	64	14	4

Cultural awareness from digital learning improves student interactions.	21	61	13	5
I feel confident using AI tools to enhance lesson engagement.	19	65	13	3
AI and informal learning improve my ability to address classroom challenges.	17	67	12	4
English proficiency via AI tools enhances my instructional clarity.	16	66	13	5
AI and digital exposure can replace traditional training for teaching.	18	60	15	7

Table 4 shows strong agreement (82–85% for SS+S) that AI tools enhance English proficiency for lesson delivery and classroom management, while digital informal learning improves cultural awareness and student engagement. Teachers report that AI and informal learning enhance instructional clarity (82%), problem-solving (84%), and student interactions (82%). Notably, 78% agree that these tools can replace traditional training, highlighting their potential as scalable alternatives in resource-constrained settings. Gender responses show minimal variation, indicating broad acceptance across male and female teachers.

Table 5: Descriptive Statistics.

Variable	N	Range	Min	Max	Mean	Std. Deviation	Variance
AI Usage (X1)	440	4	2	6	4.35	1.102	1.215
English Language and Cultural Exposure (X2)	440	5	3	8	5.12	1.376	1.893
Instructional Effectiveness (Y)	440	7	3	10	6.45	1.498	2.244
Valid N (listwise)							

AI Usage (X1) has a meaning of 4.35, indicating moderate adoption for instructional purposes. English Language and Cultural Exposure (X2) scores higher (M=5.12), reflecting engagement with digital informal learning. Instructional Effectiveness (Y) has the highest mean (6.45), suggesting teachers perceive AI and digital learning as effective for improving teaching practices. The moderate standard deviations indicate consistent responses, though variability in X2 suggests differences in access or motivation.

Table 6: *t*-test (Coefficients)

Dependent Variable: Teachers’ Instructional Effectiveness (Y)

Model	Unstandardized	Standardized	t	Sig.
	Coefficients	Coefficients		
	B	Std. Error	Beta	
(Constant)	2.124	0.387	-	5.491
AI Usage (X1)	1.284	0.312	0.421	4.115
English Language and Cultural Exposure (X2)	0.953	0.278	0.356	3.428

The *t*-test determines that AI Usage (X1) significantly predicts instructional effectiveness ($t=4.115, p= 0.000$) indicating that highly effective teachers who use AI can teach better. The English Language and Cultural Exposure (X2) effect is also important ($t=3.428, p=0.001$) meaning that the outcomes of the instruction process are improved with the assistance of linguistic and cultural competencies. Such findings support the hypotheses that AI and digital informal learning play the key role in effective teaching.

DISCUSSION

The potential source of change emphasized in the study that is the use of artificial intelligence and online informal learning is the chance to enhance the efficacy of instruction among teachers of Islamic secondary schools in Southern Pakistan. The high value of the AI ($t=4.115, p<0.001$) substantiates the notion of the role of the AI in improving English proficiency, lesson delivery, and management of the classroom. The

advancement of cultural awareness occurs the way of informal learning ($t=3.428$, $p<0.01$) during which teachers can take into consideration learners of other sorts. The instructional effectiveness ($M=6.45$) has a high score that illustrates high confidence of teachers towards such tools. In Mehmood Kot and Karam Dad Qureshi, there are increased participation of the female teachers, which may be due to encouragement to overcome resource constraints. Such findings follow what has been expressed by the literature (Zawacki-Richter et al., 2020; Nguyen et al., 2022) and suggest that AI and online informal learning can be used to address the gaps in the traditional training and enable scalability and inclusivity of teacher training.

RECOMMENDATIONS

1. Introduction of AI and Digital Learning in Training: The policy makers will be required to integrate AI and other digital informal learning in teacher training programs on the ground of English proficiency and the awareness of cultures.
2. Gender-Sensitive Training: Train gender specific needs and empower rural schoolteachers to prepare the women.
3. Build Digital infrastructure: Invest in internet connectivity and equipment to support AI and digital learning in Kot Addu and such places.
4. Promote Cultural Content: Digital informal learning information has to be in local language (e.g., Urdu, Saraiki) to generate cultural awareness.
5. Monitor and Evaluate Impact: Have systems of tracking how effectively AI and digital learning intervention works on the results of instruction.

FINDINGS

- AI and English Proficiency: AI uses significantly improve the knowledge of the English language (30.45% in Karam Dad Qureshi), to a superior lesson comprehension and presentation.
- Digital Informal Learning and Cultural Awareness: Use of digital platforms (29.70% in Karam Dad Qureshi) can be used to attain cultural competency that facilitates student interaction.

- Instructional Effectiveness: The environment of AI and digital informal learning is Karam Dad Qureshi wins the best engagement (30.60%) where female teachers are the most active (15.60%), and Mehmood Kot takes the first place (15.60%).
- Gender Patterns: In urbanizing regions, female teachers tend to get adopted with the implication that they are driven towards exploiting technology.
- Statistical Significance: Statistical significance in predicting the instructional effectiveness is the use of AI ($p=0.000$) and cultural exposure ($p=0.001$).
- Regional Inequalities: Urban and rural areas also differ in terms of their adoption where Karam Dad Qureshi and Seet Pur are more adopted and underdeveloped, respectively.

CONCLUSION

This study finds that AI utilization and digital informal learning may significantly help the performance of the Islamic secondary school educators in Southern Pakistan. The tools allow teachers to create interesting and student-focused lessons, and to manage multicultural classes, by improving their English language competence and their cultural competency. The significance of their results ($p<0.01$) is that they may be used as inexpensive and replicable forms of teacher development under resource-constrained conditions. In an effort to become innovative, education structures must want to consider the use of AI and digital informal learning in training teachers into future-oriented educators.

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