INFLUENCE THE DIGITAL COMPETENCIES AND AI USAGE ON ISLAMIC TEACHERS' FUNCTIONAL SKILLS IN SOUTHERN PAKISTAN

Muhammad Kashif Majeed
International Islamic University Malaysia.
kashich4302399@gmai.com
Tunku Badariah Binti Ahmad
International Islamic University Malaysia.
badariah@iium.edu.my
(Corresponding author) e-mail kashich4302399@gmai.com

Abstract

This study investigates the influence of digital competencies and artificial intelligence (AI) usage on the functional skills of Islamic secondary school teachers in Southern Pakistan. In the midst of accelerating digital transformation, the integration of digital tools into education alongside AI opens up a debate on how able are teachers to integrate AI and how much they understand about AI and digital tools for education. The study involved a quantitative analysis of the responses from 450 Islamic teachers selected based on the criteria of a specific study on rural regions in South Punjab. Multiple linear regression was applied to measure how digital competencies and usage of AI, affect functional teaching skills, and the data were analyzed in SPSS 22. The findings show that digital competencies have a strong influence on the development functional skills ($p = 0.000 < 0.05$), while the adoption of the use of AI also has a statistically significant impact ($p = 0.003 < 0.05$), although it is moderate as resource and training factors limit its spread. The implication for teachers is the need to have the right digital skills and ethical integration of AI strategies. Duration: This study contributes to the developing literature on religious technologies in education, as well as offering practical suggestions to policymakers, teacher trainers and school managers about how to suitably design digital training frameworks to educate Islamic teachers in rural Pakistan.

Keywords: Digital Competencies, Artificial Intelligence (AI), Functional Skills, Islamic Education, Teacher Development, Southern Pakistan.

INTRODUCTION

Digital transformation is becoming a buzz phrase across schools in the world to optimize and reach out to students. This integration of digital tools, artificial intelligence, and Information and Communication Technology into the classroom cover the way of content delivery in classrooms in particular and learning and the involved responses in general. Also, in the backdrop of this, digital competencies and the adoption of AI have emerged as the critical drivers of functional skill development, particularly for the educators working in technology-constrained terrain such as rural Pakistan. Digital strategies are not applied successfully by teachers successfully not because of a lack of devices or infrastructure, but largely because of a lack of teachers' ability to use digital strategies effectively and teacher confidence in using their digital skills (Zhao et al., 2002).

At the same time, educators in Pakistan's Islamic secondary schools are also culturally and religiously oriented in their pedagogy and hence digital readiness amongst the teachers there in a challenge as well as a great opportunity. The specific teachers' digital competencies (i.e., their ability to use technology to access, evaluate, and apply it effectively) have a major impact on how they can utilize technology to enhance 21st century skills (Šabić et al., 2022). However, many teachers in different corners of Southern Punjab are still training inept and lacking in sufficient resources to assist with students's learning via digital cadence. With the growing amount of AI-enabled educational platforms delivering personalized learning, intelligent feedback, and automated administrative tasks, which can empower or alienate the teachers based on their competencies and the trust they have (Ramorola, 2013, Bøe, 2018).

Teachers at Islamic schools in Pakistan have extra pressures to pledge the method of technology usage conforms to religious attitudes and ethical principles. Teachers need to have functional skills like digital communication, collaboration, critical thinking and problem solving in an environment where everything is tech integrated here. However, the direct learning of these skills is closely tied to the educators' level of digital literacy, willingness to use AI tools that meet both educational and spiritual standards (Alotaibi, 2023). The more capable and secure an Islamic teacher feels he can bring such technologies into the classroom, the more successful will be his classroom performance, the outcome he achieves, and how involved he can get his students (Mundy et al., 2012).

Previous studies have studied other variables that affect the implementation of technology in the education but research on how digital competencies and AI impact the functional skills in Islamic school context is denied. In addition, rural and culturally affiliated regions in Southern Punjab are still scattered across the empirical research (Salehi & Salehi, 2012). Hence, this study seeks to fill that gap by investigating how digital skills and AI use dovetail with Islamic secondary teachers' functional capability in Southern Pakistan, which include ethical view and pedagogical duty.

This research addresses the confluence of digital competences, AI integration and how these in turn influence functional skills of stakeholders in the teaching process of Islamic institutions in Southern Punjab. Ultimately, the findings seek to shape policymakers, curriculum developers, and educational leaders' knowledge of the actual barriers and facilitators to technology adoption in the religious school setting. Understanding these dynamics allows stakeholders to create the digital literacy, and AI training programs that foster Islamic values while supporting teachers in leading 21st century classrooms.

METHOD

The design of research employed was quantitative, and it was done to study the impact of digital competencies and artificial intelligence (AI) usage on functional skills of Islamic secondary school teachers at Southern Pakistan. In the study, the process of ground was from empirical data collection, where definite variables were used to investigate the relationships and test the hypotheses statistically (Sugiyono, 2018). It enables the generalculaion of findings from the sample to a larger group of teachers.

Specific criteria regarding teaching roles, digital exposure and subject alignment were used for purposeful sampling of the participants from Islamic secondary schools. This sampling was done in accordance with Purposeful Measurement as a sampling framework that links participant characteristics to research variables to increase the relevance of the result (Sugiyono, 2018).

A structured questionnaire, which was sent through a Google Form link was used to collect data. The survey comprised a total number of 450 Islamic secondary school teachers of Kot Addu District, South Punjab. For instance, the questionnaire was created to evaluate three core variables; digital competencies, integration of AI in the work of teaching, and functional teaching skill in the Islamic education background.

Data analysis in the study was carried out using SPSS module version 27. Validity and reliability testing, descriptive statistics, multiple linear regression and heteroscedasticity tests were used statistical procedure to find out the consistency as well as strength of predictive factors. In addition, a t test was conducted to determine the significance of the relationships between teachers' digital competencies, AI usage and the development of teachers' functional skills. This ensured a serene and structured analysis on the implications of digital transformation and AI on instructional practices in faith based educational settings.

Data Source and Collection

Due to the main reason of this research is to get reliable, real evidences this research used a quantitative research approach. Therefore, the researcher developed a structured questionnaire when gathering direct and accurate responses from the participants through in person and online platforms. In this case, the primary data were Islamic secondary school teachers in Southern Pakistan which, in line with Sugiyono (2017)'s definition, is original information gotten from the source such as in our case.

To ensure accuracy and ease of access, the researcher used the Google Forms as its digital data collection tool. The questionnaire was composed to investigate teaching teachers' digital competencies, usage of AI technologies in education, and the subsequent impacts towards their functional teaching skills. Participants were directly invited via direct invitation links to send the form.

Out of all the Spiral Schools, they were selected from Islamic secondary schools within the Kot Addu District in South Punjab. Taking purposive samples of 450 teachers who were all active teachers, had access to digital tools, and invested their time in experience of AI assisted instruction. The questionnaire was given to all of the respondents and completed voluntarily was completed online through the given Google Form link by the respondents. This approach according to Sugiyono (2017), affected selection of primary data that was appropriate, up to date and reflected the current process of technological integration in Islamic educational institutions. Here, the researcher first emphasized the importance of accuracy and completeness during the collection of the responses so that the data was good enough for rigorous statistical analysis.

Study Area

It was carried out in Kot Addu District of Punjab Province, Pakistan, in southern region. It is a rural dominated area with majority of the families surviving on seasonal labour and informal work. This region does not receive the support it needs in development in terms of economics and how resources are distributed.

The national education policies in which Islamic secondary schools are run follow the guidelines of Article 25A of the Constitution of Pakistan 1973 which assures free and compulsory education to all children. However, while the government has been pursuing efforts aimed at addressing problems of infrastructure, access to digital tools and teacher training, there are many schools in this district which are struggling to fulfill their responsibilities.

Local landowners have important economic power that affects the availability of educational resources, and they further influence socio-economic dynamics of Kot Addu. Given these conditions, it is an area relevant for investigating how digital competencies, and the use of artificial intelligence (AI) impact Islamic teachers' functional skills particularly within under resourced educational settings.

Data Collection Methods and Sampling Technique

For that, this study applied a quantitative research method to explore the relationship between the digital competencies and AI usage on the functional skills of the Islamic secondary school teachers at Southern Pakistan. Specifically, the research examined how teachers make use of digital tools and artificial intelligence in their ways of teaching and how this influences their professionalism.

A structured questionnaire was used to collect data on levels of digital competency that teachers, their level of exposure to and application of AI tools, and ways that those technologies help them in day to day classroom functions. Aside from their input, the survey also inquired about teachers' training experiences, comfortable level, and perceived barriers when it comes to using digital and AI based educational tools.

Among a total of 500 questionnaires distributed to Islamic secondary school teachers in District, Kot Addu, a proper sample of teachers who were actively teaching in Islamic institutions was deliberately selected with a purposeful sampling technique. These yields 450 responses which can be analyzed out of these 450 responses 450 are received as a valid response. Sampling was made to include people with broad array of teaching experiences and subject specializations and access to technology to capture a diverse view.

The data collected were analyzed using SPSS (version 22) for descriptive and inferential statistics including multiple linear regression analysis to find out correlation between digital competency, AI usage and functional teaching skills. Data collection process had been ethical at all time and our participants provided informed consent; data was confidential.

Conceptual framework

This study comes up with the framework to comprehend whether digital competencies and using AI will give impact to the functional skills of Islamic secondary school teachers in Southern Pakistan. In this research I examine how well teachers have been trained with digital skills, to what extent they bring AI tools into their classroom and in what ways the agglomeration of these factors collectively contribute to how effective teachers are in their professional classroom effectiveness. This research presents the conceptual framework below.

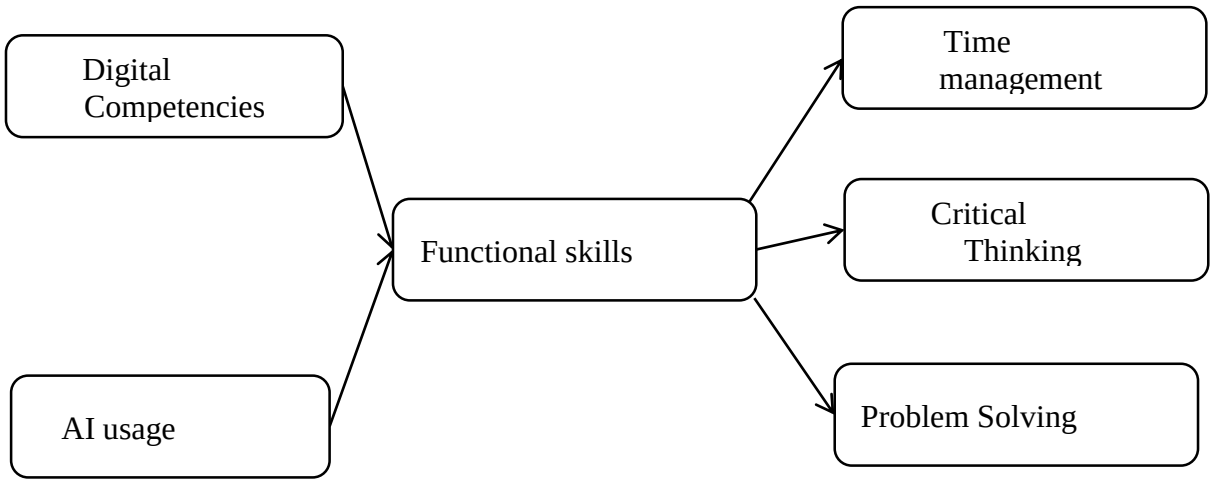

Figure 1.1 Conceptual Framework

Hypotheses

Today, Islamic secondary school teachers in Southern Pakistan are more and more to use the digital tools and AI to expand their functional teaching skills. This study examines the effect of digital competencies and AI usage on a teacher's capability with the classroom. It explores also the extent to which the confidence in using these technologies is a factor in the development of their functional skills. This research is guided by following hypotheses:

Hypothesis 1: The relationship between digital competencies and the functional skills of Islamic secondary school teachers in Southern Pakistan is significant.

Hypothesis 2: The use of AI is related to functional Islamic secondary school teachers skills in the Southern Pakistan.

Hypothesis 3: The functional skills of Islamic secondary school teachers in Southern Pakistan are highly influenced by the digital competencies and the usage of AI.

Hypothesis 4: Using Digital competencies and AI usages together will affect the functional skills of the Islamic secondary school teachers in Southern Pakistan.

Hypothesis testing

The material of hypothesis testing is testing a hypothesis based on sample data. The purpose of this research was to apply key statistical methods that analyze frequency-based data using the method to explore relationships between variables. In significance testing we can determine whether variation in independent variable (X) lead to variation in dependent variable (Y). In this study, digital competencies and AI usage serve as the independent variables. The dependent variable is the functional skills of Islamic secondary school teachers in Kot Addu district of Southern Pakistan. To test these relationships we employ the t-test as our main means of analysis.

As stated by Widjarjono (2010), the t-test evaluates the effect of individual independent variables on the dependent outcome. This method allows us to determine the significance and

strength of influence that digital competencies and AI usage have on teachers' functional performance in educational settings.

RESULT AND DISCUSSION

Result

Table 1. Digital competencies influence the functional skills

	Kot addu	Khan Bela	Daira Din Panah	Nawan chowk
Male	19.62%	08.18%	16.09%	11.44%
Female	6.32%	12.65%	10.76%	14.97%
Total	25.94	20.83	26.85	26.41

It shows that male teachers in Kot Addu Tehsil did 19.62% of the work and female Teachers as a whole completed 25.94% of total tasks in all schools. 20.83% of teaching tasks came from Khan Bela Tehsil teachers where males performed 08.18% and females completed 12.65%. Out of all work in Tehsil Daira Din Panah male teachers delivered 16.09% whereas female teachers completed 10.76% for a combined result of 26.85%. Teachers in Nawan Chowk Tehsil handled 11.44% of the teaching work but female teachers managed only 14.97%.

Together, they did 26.41 percent. The teachers in Tehsil Nawan Chowk performed 14.97% better than their male counterparts. However, this outcome was higher than the 12.65% result achieved by female educators in Tehsil Daira Din Panah. The female teachers in Nawan Chowk Tehsil received better outcomes from digital resources because they mastered technology tools faster than their male counterparts in Kot addu.

Table 2. AI usage enhance Islamic teacher's functional skills in delivering religious content

	Kot addu	Khan Bela	Daira Din Panah	Nawan Chowk
Male	14.44%	10.13%	7.59%	10.42%
Female	08.30%	08.96%	13.00%	20.95%

Total	22.74%	29.09%	20.59%	31.37%

In Kot Addu Tehsil male teachers worked 14.44% of the lessons while female teachers taught 08.30%. Together, they did 22.74%. In Khan Bela Tehsil the male teachers handled one fifth of the work while female teachers performed one tenth. Together, they did 29.09%. The teaching workload of Tehsil Daira Din Panah split 7.59% for men and 13.00% for women. Together, they did 20.59%. At Tehsil Nawan Chowk males taught 10.42% of the lessons while females delivered 20.95% of instruction.

Together, they did 31.37%. The data shows female teachers in Tehsil Daira Din Panah handled 20.59% more work than male teachers while they only earned 7.59% more tasks in Tehsil Daira Din Panah. Female teachers at Nawan Chowk outperformed male teachers at Khan Bela when it came to how much they AI usage enhancing functional skills for educational work.

Table 3. Combined effect of Digital competencies, and AI usage of Islamic functional skills.

	Kot addu	Khan Bela	Daira Din Panah	Nawan Chowk
Male	12.05%	13.13%	7.22%	08.77%
Female	17.24%	09.96%	11.45%	17.70%
Total	29.29%	23.09%	19.67%	26.47%

Based on our findings male teachers in Kot Addu Tehsil made up 12.05% of total while female teachers represented 17.24% but still achieved 29.29% overall in teaching performance. Khan Bela Tehsil reported 13.13% male participation compared to 09.96% female participation but achieved 23.09% total success. Daira Din Panah Tehsil had 07.22% male teachers combined with Female participants ranked first in Nawan Chowk Tehsil at 08.77% more than Khan Bela Tehsil's 09.96%. In the Kot addu area

male students outperformed female students in our evaluation of digital tools and teacher AI usage.

Table 4.

Use of digital tools, of secondary teachers 'functional skills on technology.	SS	S	TS	STS
I feel confident using digital tools to enhance my teaching practices.	19	80	3	4
Digital tools positively influence my ability to uphold ethical standards in teaching.	16	72	18	0
I can use AI for deliver Content that my colleagues use digital tools in ethically responsible ways.	9	58	37	2
Digital competencies tools, teachers' trust in technology for educational purposes.	SS	S	TS	STS
I feel confident in troubleshooting basic technical issues while using AI tools in the classroom.	7	61	34	4
I can effectively integrate AI tools into my lesson plans to improve student learning outcomes.	22	79	5	0
I feel capable of learning new digital tools and technologies for teaching purposes.	14	85	7	0
Combined effect of digital tools, AI and Digital competencies of secondary teachers in ethics of technology for educational purposes.	SS	S	TS	STS
Digital tools enhance my ability to teach effectively.	13	72	20	1
I can use AI for teaching maintain data security and privacy.	14	58	31	3
I can effectively use AI tools to manage my classroom activities.	12	61	28	5

The verification team tested the study outcomes based on research conducted with 450 participants. Nine observations across X1 (computer self-efficacy), X2 (digital literacy), and Y (trust in technology use) gained validation status during the testing process. The nine questions reflect the level of functional digital skills and ethical technology use among secondary school teachers. The study confirms that participants from Islamic secondary schools demonstrate strong digital confidence and practical competence in using ICT tools. All evaluated variables surpassed the minimum Pearson correlation score of 0.1891 at the 0.05 significance level, confirming the statistical validity of the instrument. Checking the validity of these nine items ensures the reliability of the data interpretation. Teachers agreed that they feel confident using digital tools to enhance their teaching practices and believe that digital resources support ethical standards in education.

Many participants reported that they can troubleshoot basic technical issues and integrate AI tools into their lesson plans. Teachers also indicated that they are capable of learning new digital tools, managing classroom activities with AI, and protecting data privacy in digital teaching. Through their responses, it is clear that digital teaching tools make their instruction more effective and meaningful, and that they trust technology to positively impact student learning outcomes.

The study analyzed responses from 450 secondary school teachers to assess their functional skills in using digital tools, AI integration, and their trust in technology for educational purposes. The findings indicate a generally high level of digital confidence among respondents. A majority of teachers agreed (80) or strongly agreed (19) that they feel confident using digital tools to enhance their teaching practices. Similarly, most teachers (72) agreed that digital tools positively influence their ability to uphold ethical standards in education. While 58 teachers expressed agreement in using AI to deliver content in ethically responsible ways, a significant portion (37) were somewhat neutral, suggesting ongoing development is needed in AI ethics. Regarding digital competencies and trust in technology, 61 teachers agreed they can troubleshoot basic technical issues using AI tools in class, while 34 were somewhat sure, pointing to a moderate level of technical self-efficacy. Notably, 79 teachers agreed they could effectively integrate AI tools into lesson plans, and 85 expressed confidences in

learning new technologies for teaching demonstrating a strong foundation in digital adaptability.

In exploring the combined impact of digital tools and competencies on ethical teaching, most teachers agreed (72) that digital tools enhance teaching effectiveness, and 58 believed they could use AI while maintaining data security and privacy. When asked about classroom management through AI, 61 agreed and 28 were somewhat sure. These results reflect a consistent pattern of digital trust and skill development among secondary teachers, with particular strength in digital learning adaptation and a moderate need for deeper training in AI ethics and privacy. This data supports the conclusion that secondary teachers show high levels of readiness and functional capability in integrating digital tools for effective and ethical teaching.

Table 5. Descriptive Statistics

	N	Range	Min	Max	Means	Std. Deviation	Variances
Digital competencies skill (X1)	440	4	3	9	5,22	1,570	2.160
AI usage (X2)	440	9	3	10	7.08	1,355	2,119
Functional skills Y)	440	9	3	12	6.57	1,977	4,520
Valid N (listwise)							

According to this table, 440 teachers sent their responses. The scale of digital competencies skill (X1) runs between 3 for low users up to 9 for advanced users. These results demonstrate that teacher responses to digital competencies span the score from 3 to 9. The table shows that the standard deviation of 1.570 ranks slightly below the average score of 5.22, indicating moderate variation in digital skill levels among respondents. Given that our measurement scale for AI usage (X2) runs from 3 to 10, the results show a wide range of responses. The average score is 7.08, with a standard deviation of 1.355, reflecting a consistent yet slightly dispersed level of AI usage among participants. For functional skills (Y), the scale ranges from 3 to 12, showing the broadest span among the variables. The average score is 6.57, with a standard deviation of 1.977, suggesting greater variation in responses.

The variance for functional skills is also the highest at 4.520, compared to 2.160 for digital competencies and 2.119 for AI usage. This indicates that while most teachers show

moderate to high skill levels, functional digital abilities differ more significantly across the sample group.

Hypothesis testing

T test

Table 6. t test

Coefficients a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Betas		
1 (constant)					
Digital literacy skills (X1)	1,539	,547		2,949	,003
Computer self-efficacy (X2)	,657	,335	,468	1,868	,065
Functional skills (Y)	,716	,162	,678	4,123	,000

Experiments show significant relationships between teachers' digital competencies and functional skills with p-values of 0.003 and 0.000 respectively, while AI usage shows a less significant impact with a p-value of 0.066. Our research suggests that H1 should be supported, as the p-value for digital competencies skills (X1) is 0.003, which is below the 0.05 threshold, indicating a significant relationship. School administrators in Islamic secondary schools across Kot Addu, Pakistan observed that digital competency levels positively influence teachers' functional skills. However, our analysis shows H2 should be rejected because AI usage (X2) recorded a p-value of 0.066, which exceeds the 0.05 significance level. This suggests that AI usage alone does not have a statistically significant effect on functional skills in this context. Finally, the results strongly support H3, as the functional skills variable (Y) shows a highly significant p-value of 0.000, confirming a strong relationship between functional digital skills and the ethical use of technology in teaching. Our evaluation concludes that the combination of digital competencies and functional abilities plays a critical role in shaping ethical technology practices among Islamic secondary school teachers in Kot Addu, South Pakistan.

Recommendations

Based on these findings, it is suggested that the South Pakistan educational policymakers and school administrators, focus on structured digital literacy and AI training programs for the Islamic secondary school teachers. Since digital competencies affect functions skills strongly, professional development should target building teachers' confidence and their ability to use digital tools for ethical and capable instruction. Though AI is something that has promise, it hasn't been lucratively used thus far because there has been a shortage of training and resources.

Hence, integration of culturally popular and faith corresponding AI educating modules may aid enhance acceptance and ethical implementation. Further, the access to technology will be in a way that is equitable and support the teachers to address the changing requirements in the classrooms in the modern world in those under resourced rural areas of Kot Addu. In general, granting such tools, skills and ethical guidelines of teachers will help work towards better instructional outcome as well as promotes the sustainable adoption of technology in the religious education setup.

Findings

It is found that Islamic secondary school teachers in Kot Addu, South Pakistan have marked levels of digital and AI competencies. This p value of 0.003, which is below 0.05, allows to conclude that the higher are teachers' digital skills, the stronger will be the maintained Functional Skills. This indicates that the more teachers become digitally skilled, the more efficient they become in their teaching and using technology in their classrooms. In contrast to AI usage, a p-value of 0.066 is in excess of 0.05 sample significance level, indicating that using AI does not significantly increase teachers' functional skills in this context.

When it comes to the interplay of the digital and the use of AI on ethical technology usage, the study found that digital competencies as well as AI usage as critical factors that determine which way teachers will adopt in adopting the ethical practice with p value = 0.000 between digital skills and ethical technology use, which is strong support for the hypothesis that digital competencies are key player in influencing and shaping teachers' ethical practice when using technology.

Additionally, the descriptive statistics show that the teachers of the region are not adequately proficiency in the three major areas assessed: digital competencies, AI usage,

functional skills. The average score for the digital competencies was moderate (mean = 5.22) with some differences for the teachers (standard deviation = 1.570). With the usage, the usage had a higher average score of 7.08 with a standard deviation of 1.355, which means that while they were more consistently used, they still fell out in each case. However, the variability of functional skills (mean = 6.57; stdev. = 1.977) suggests that on the one hand most of the teachers possess moderate to high functional skills, yet, on the other hand, there is a large difference in how these teachers use their functional skills in the classroom.

In fact, further analysis of teaching performance in different regions in Kot Addu Tehsil showed that female teachers performed better than their male counterparts in a number of key areas. Specifically, female teachers in Nawan Chowk Tehsil scored the highest in terms of the proficiency of their use of digital tools and AI to improve teaching performance with 31.37 %, while the corresponding performance levels were 26.47 % in Daira Din Panah and 23.09 % in Khan Bela. The result of this performance suggests that gender affects how quickly teachers develop and implement these technologies. AI usage in religious content delivery was also positively correlated, especially in Khan Bela and Nawan Chowk Tehsils; a man who has taught female teachers indicated higher success rate in AI tools integration on their lessons.

The study overall proposes that while the use of AI itself has little impact on the teachers' functional skills, the use of digital competencies in combination with doing AI, and the use of technology ethically are important to the professional growth and development of the Islamic secondary school teachers. It is argued that professional development programs need to be customized based on the diversity of teachers' needs in this region as the variability in responses signifies.

CONCLUSION

Finally, it indicates the role of digital competencies for improving the functional skills of Islamic secondary school teachers in Kot Addu, South Pakistan. Based on the results, it shows that teachers who possess higher digital competency levels are able to effectively integrate technology in their teaching practices. However, the use of AI did not seem to exert much impact on teachers' functional skills, indicating that the AI tools can be useful, but not significantly, if not filled with structure. Additionally, the research emphasizes the significance of technology ethics in use since teachers who had strong digital skills, also showed more responsible and better use of technology in classrooms. Finally, the findings show significant

gender differences in technology acceptance, with female teachers outpacing their male counterparts in some parts, most notably the adoption of AI tools.

These insights suggest that professional development programs for teachers should be tailored according to the differences in their technological needs and their levels of skill. However, as the research concludes, it is ultimately the case that digital teaching in the digital age requires holistic approach which involves integration of experience of digital competencies use, AI usage and ethical practices. It is therefore important to help teachers further realize the potential of technology in education and address their different levels of digital skills to ensure sustained improvement.

Acknowledgement

The authors express their gratitude to teachers from selected schools who helped make this research successful. Their participation made it easier to show what the research did well alongside its limitations.

REFERENCES

- Alotaibi, M. (2023). Ethical integration of digital tools in Islamic education: A cultural framework. *Journal of Educational Technology and Ethics*, 11(2), 123–138.
- Bøe, M. (2018). Trust in educational technologies: Teachers' perceptions and adoption decisions. *International Journal of Digital Learning*, 15(1), 22–35.
- Mundy, M.-A., Kupczynski, L., & Kee, R. (2012). Teacher self-efficacy in 21st-century classrooms. *Journal of Research in Innovative Teaching*, 5(1), 46–57.
- Ramorola, M. Z. (2013). Challenge of effective technology integration into teaching and learning. *Africa Education Review*, 10(4), 654–670.
- Salehi, H., & Salehi, Z. (2012). Challenges for using ICT in education: Teachers' insights. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 2(1), 40–43.
- Šabić, D., Nemet, F., & Radić, T. (2022). Digital competencies of teachers in modern education. *Journal of Educational Computing Research*, 60(5), 1104–1121.
- Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record*, 104(3), 482–515.