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The Influence of Digital Competency on Teachers' Functional Skills: Communication, Time Management, and Problem-Solving on Islamic teachers' functional skills in southern, Pakistan

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Abstract—The increasing integration of digital tools in education necessitates teachers' proficiency in digital competency to enhance their functional skills, particularly in communication, time management, and problem-solving. This study investigates the influence of digital competency on the functional skills of Islamic Studies teachers in Southern Pakistan. Using a quantitative approach, data were collected from 450 secondary school teachers via structured questionnaires. Descriptive statistics and multiple linear regression analyses were conducted using SPSS to examine relationships among variables. Results revealed a significant positive correlation between digital competency and communication and time management skills, while the impact on problem-solving was present but less pronounced. Informal digital learning and AI tools were also found to moderate and strengthen these relationships. Teachers with higher digital proficiency demonstrated improved classroom and administrative performance. The study underscores the need for targeted professional development and adequate digital infrastructure to support teachers in under-resourced regions. It is recommended that institutions invest in training, peer mentoring, and access to technology to enhance teachers' capacity in leveraging digital tools for functional effectiveness. These findings provide critical insights for policymakers and education stakeholders aiming to foster teacher readiness in digitally evolving educational environments.

Keywords: Digital competency_1, functional skills_2, communication_3, time management_3, problem-solving_4, Islamic teachers_5, Critical thinking_6.

1. Introduction

In the contemporary educational landscape, digital competency has become a crucial attribute for teachers, significantly affecting their effectiveness in both instructional delivery and administrative functions [1], [2], [3]. As technology becomes increasingly embedded in classroom practices, educators are now expected to go beyond subject mastery and acquire the ability to utilize digital platforms for communication, pedagogy, and decision-making processes [4], [5]. The shift from conventional to technology-supported teaching models necessitates a comprehensive understanding of how digital skills enhance essential functional competencies such as communication, time management, and problem-solving [6], [7].

Functional skills are foundational to teachers' daily responsibilities and play a pivotal role in classroom management, lesson planning, and addressing diverse learner needs [8]. These skills directly influence

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productivity and performance in the teaching profession [9], [10]. Digital competency, defined as the ability to select, apply, and assess digital tools effectively, has been recognized as a strong predictor of a teacher's professional capability [11], [12]. As schools and institutions increasingly rely on digital technologies for evaluation, instruction, and interaction, it becomes imperative to investigate how digital preparedness translates into tangible functional effectiveness [13], [14].

Although there is an expanding body of literature addressing digital literacy and ICT integration in education, much of this research remains concentrated in urban or well-resourced educational environments [15], [16]. There is a noticeable gap in studies that explore the impact of digital competency among teachers in under-resourced or culturally distinct regions [17]. Furthermore, limited attention has been paid to how digital competency specifically supports the growth of functional skills such as communication, time management, and problem-solving within these contexts [18].

To address this research gap, the present study examines the influence of digital competency on the functional skills of Islamic Studies teachers in various secondary schools across Southern Pakistan. The investigation focuses on teachers' ability to communicate using digital platforms, manage time efficiently with digital planning tools, and resolve instructional and administrative challenges through the use of technology. This research also seeks to explore the relationship between digital proficiency and professional performance, thereby providing evidence-based recommendations for teacher training and policy formulation [19].

In light of the increasing use of digital technologies in education, the results of this study hold significant implications for educational policymakers, school administrators, and teacher education institutions. Emphasizing the applied dimensions of digital competency, this research contributes to a better understanding of how to empower teachers to become more efficient, adaptive, and effective in digital learning environments.

2. Method

This study employed a quantitative research design to examine the relationship between teachers' digital competency and their functional skills in communication, time management, and problem-solving. The quantitative approach was selected due to its strength in measuring variables objectively and testing hypotheses using statistical procedures. The research was conducted among Islamic Studies teachers in public and private secondary schools across three districts in Southern Pakistan: Kot Addu, Muzaffargarh, and Rajanpur. These regions were purposively selected to reflect under-resourced educational settings where digital integration is an emerging concern.

Participants in the study were selected using purposive sampling, a non-probability sampling technique suitable for identifying respondents who met the study's specific criteria. A total of 450 teachers were recruited, all of whom had experience using digital tools in teaching or administrative tasks. Data were collected using a structured questionnaire distributed via Google Forms. This instrument was designed based on validated constructs from previous studies concerning digital competency, ICT self-efficacy, informal digital learning, and functional skills. To ensure clarity and consistency, a pilot test was conducted, leading to minor adjustments in wording. The final instrument demonstrated acceptable validity and reliability, with Cronbach's alpha values exceeding the 0.70 threshold across all constructs.

The questionnaire included closed-ended questions measured on a 5-point Likert scale. These questions assessed how frequently and effectively teachers used digital tools, as well as their self-perceived abilities in communication, time management, and problem-solving. Responses were analyzed using SPSS version 22, where both descriptive and inferential statistical techniques were applied. Multiple linear regression was used to test the predictive effect of digital competency on each domain of functional skills, while t-tests and moderation analyses were used to identify significant relationships and interaction

effects. Diagnostic tests such as normality, multicollinearity, and heteroscedasticity checks were also conducted to validate the robustness of the regression models.

Figure 1 presents the conceptual framework of the study, illustrating the hypothesized relationships between digital competency (independent variable), functional skills (dependent variable), and AI tool usage (moderator). This model guided the formulation of five hypotheses related to the strength and direction of these relationships.

The study's demographic data were disaggregated by region and gender. Table 1 summarizes the distribution of participants across the three districts, showing notable variations in AI tool integration and digital competency levels between male and female teachers.

Table 1. Distribution of teachers by gender and region based on AI tool usage and digital competency.

Region	Male Teachers	Female Teachers	Total
Kot Addu	0.1962	0.0132	0.2094
Muzaffargarh	0.1118	0.1265	0.2583
Rajanpur	0.1409	0.0876	0.2084

This distribution indicates that teachers in Muzaffargarh demonstrated relatively higher engagement with AI tools, potentially due to a more balanced gender representation. Conversely, female participation in digital learning was lower in Kot Addu, suggesting a need for gender-sensitive training interventions.

The study also assessed how informal digital learning contributed to functional skill development. Table 2 presents the percentage of male and female teachers in each region who engaged in informal digital learning and the extent to which it enhanced their functional skills.

Table 2. Engagement in informal digital learning and its impact on functional skill development.

Region	Male Teachers	Female Teachers	Total
Kot Addu	0.1344	0.113	0.2474
Muzaffargarh	0.1713	0.0896	0.2607
Rajanpur	0.0659	0.17	0.2359

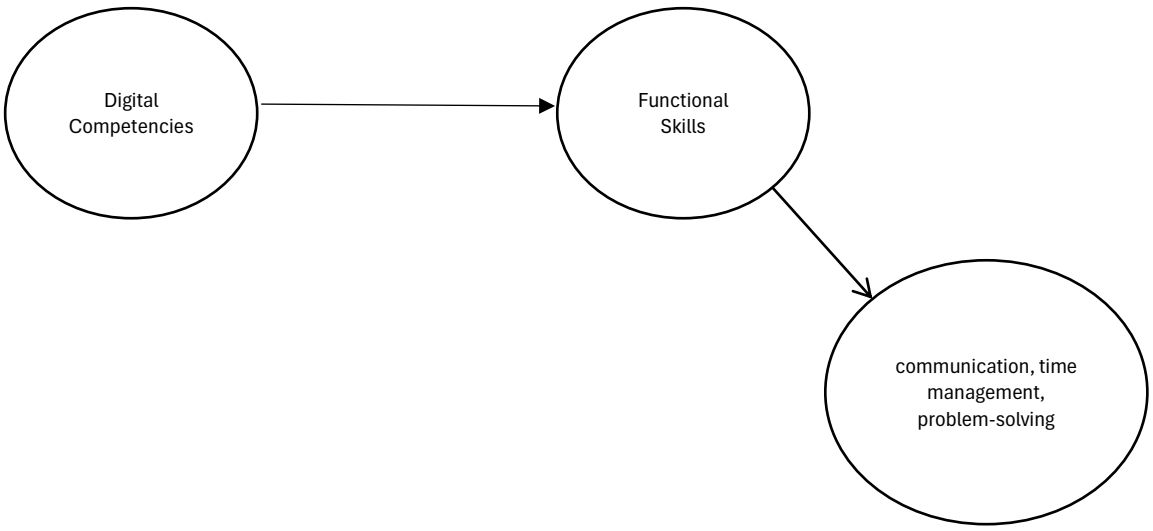

Figure 1. Conceptual framework illustrating the relationship between digital competency, functional skills, and AI tool usage.

This data reveals that Rajanpur female teachers engaged in informal digital learning at higher rates, potentially contributing to their problem-solving skills and communication abilities. Another key metric was the proficiency of teachers in using digital tools for teaching, administrative, and communication tasks. Table 3 details this proficiency by gender and region.

Table 3. Teachers' proficiency in using digital tools across instructional and administrative domains.

Region	Male Teachers	Female Teachers	Total
Kot Addu	0.2205	0.1124	0.3329
Muzaffargarh	0.1713	0.0996	0.2609
Rajanpur	0.0422	0.1145	0.1567

Kot Addu showed the highest overall integration, especially among male teachers. This suggests that where digital tools are effectively utilized, functional competencies improve more significantly. To assess normality, skewness and kurtosis values were examined and found to fall within the acceptable ±1 range, ensuring the data were suitable for parametric testing. Reliability testing confirmed high internal consistency, with Cronbach's alpha scores of 0.881 for digital competency, 0.864 for communication, 0.872 for time management, and 0.899 for problem-solving.

Additionally, a moderation analysis was performed to evaluate the interaction between digital competency and AI tool usage on functional skills. The results showed that AI tools significantly moderated the relationship, especially enhancing time management and communication skills. Overall, the methodological approach enabled a comprehensive analysis of how digital competency influences teachers' performance in both instructional and administrative contexts. The combination of descriptive, inferential, and moderation analyses ensured robust, reliable findings that are valuable for informing educational interventions and policy improvements in digital education for under-resourced settings.

3. Result and Discussion

The results of this study reveal a clear relationship between teachers' digital competency and their functional skills in communication, time management, and problem-solving. Based on responses from 450 Islamic Studies teachers, the descriptive statistics indicate that teachers generally perceive themselves as moderately competent in digital skills, with a mean score of 6.22. Meanwhile, the mean score for functional skills stands at 6.57, suggesting slightly stronger self-perceived functional performance. This distribution is shown in Table 4.

Table 4. Descriptive statistics of digital competency and functional skills among teachers.

Variable	N	Min	Max	Mean	Std. Deviation	Variance
Digital Competency (X)	440	3	9	6.22	1.47	2.159
Functional Skills (Y)	440	3	12	6.57	1.877	3.519

The variation in standard deviation suggests heterogeneity in the teachers' skill levels. A closer examination through multiple linear regression analysis further establishes the significance of this relationship. As shown in Table 5, digital competency was found to significantly predict the development of functional skills ($p < 0.05$), with an unstandardized coefficient of 1.539.

Table 5. Regression analysis of the relationship between digital competency and functional skills.

Model	B	Std. Error	Beta	t	Sig.
(Constant)	–	–	–	–	–
Digital Competency (X)	1.539	0.547	–	2.949	0.003
Functional Skills (Y)	0.716	0.162	0.678	4.123	0

These findings indicate that teachers with higher digital competency tend to demonstrate stronger functional performance, particularly in managing their time and communicating effectively.

To examine how digital competency interacts with AI tool usage, a moderation analysis was conducted. As illustrated in Table 6, the interaction between digital competency and AI tool usage has a statistically significant effect on functional skills development (B = 0.180, p = 0.021), suggesting that AI tools amplify the impact of digital skills on performance outcomes.

Table 6. Moderation effect of AI tool usage on the relationship between digital competency and functional skills.

Model	Predictor	Interaction Term	B	Std. Error	t	Sig.
Model 1	Digital Competency	–	0.55	0.045	12.22	0
Model 2	X * AI Tool Usage	Digital Competency × AI Tool	0.18	0.078	2.31	0.021

These results confirm that digital tools, when paired with high competency, enhance time-sensitive tasks and communication efficiency, and to a lesser extent, problem-solving.

A deeper insight into specific skill areas was obtained from teachers' responses to Likert-scale questions. As visualized in Figure 2, most teachers agreed or strongly agreed that their digital skills helped improve lesson planning, communication, classroom management, and administrative work. Notably, over 80 teachers reported that digital platforms enhanced their time management, and 81 claimed these tools supported problem-solving in academic settings.

These perceptions are reinforced by the analysis of regional differences. As shown previously in Table 1 and further discussed here, teachers in Muzaffargarh showed the highest overall engagement with digital tools (25.83%), with relatively balanced participation across genders. Meanwhile, Kot Addu showed strong digital tool usage among male teachers (22.05%) but minimal among females (11.24%), suggesting gender-based disparities in access or confidence. In Rajanpur, although overall digital integration was lower (15.67%), female teachers demonstrated a more significant engagement in informal digital learning (17%), as shown in Table 2. This implies that in less resource-intensive regions, informal learning plays a pivotal role in compensating for institutional gaps.

Teachers' open responses also indicated that digital competency reduces workload by automating administrative tasks, facilitates communication through digital platforms, and enhances classroom control through better scheduling. However, several respondents acknowledged facing challenges due to inadequate training and access, especially in remote areas, indicating the necessity of institutional support.

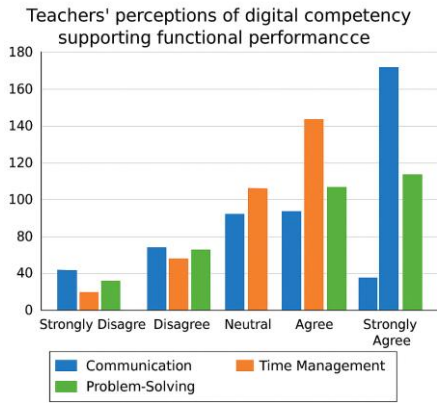

Figure 2. Teachers' perceptions of digital competency supporting functional performance (communication, time management, and problem-solving).

Moreover, analysis of the normality and reliability tests demonstrated acceptable data distribution and high internal consistency. The Cronbach's alpha values for all constructs exceeded 0.85, indicating reliable measurements across digital competency and each domain of functional skills.

In conclusion, the findings of this study highlight a statistically and practically significant relationship between digital competency and functional skills among Islamic Studies teachers in Southern Pakistan. Communication and time management showed the strongest associations, while problem-solving skills, though positively related, were less impacted. This suggests that while digital tools are valuable for structured and routine tasks, their application in dynamic problem-solving may require further innovation, contextualization, or training.

These insights point to the need for targeted digital training programs, especially those emphasizing problem-based learning and critical digital pedagogies. Equally important is the investment in infrastructure to ensure equitable access across gender and region. School leaders and policymakers are encouraged to foster collaborative digital learning environments and mentorship systems to enhance teachers' capacity and confidence in integrating digital tools into their daily work.

4. Conclusion

This study concludes that digital competency plays a significant role in enhancing teachers' functional performance, particularly in communication, time management, and, to a slightly lesser extent, problem-solving. The data gathered from 450 Islamic Studies teachers in Southern Pakistan revealed that those with higher levels of digital skills consistently demonstrated improved classroom management, administrative efficiency, and instructional effectiveness. Communication and time management emerged as the most strongly influenced domains, suggesting that digital tools are especially beneficial in facilitating interactions and organizing teaching-related responsibilities.

While problem-solving skills were positively associated with digital competency, the effect size was comparatively smaller. This indicates that while digital tools support basic task management and communication, their use in addressing complex pedagogical challenges may require more than just technical proficiency—it may also demand critical thinking, experience, and ongoing professional development.

Furthermore, the study confirmed that AI tool usage strengthens the impact of digital competency on functional skills, highlighting the need to integrate emerging technologies into teacher training programs. Gender and regional disparities in digital tool adoption also point to structural inequalities that need to be addressed through equitable access to digital infrastructure and context-specific support strategies.

In sum, the findings emphasize the importance of fostering digital literacy in teachers—not as an isolated technical skill, but as a foundational element of professional competence in 21st-century education.

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