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Digital Skills for Inclusive Education: Teacher Training in Media Design and Accessibility Practices

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Abstract

The paper explores which digital skills are necessary for inclusive education with a focus on training teachers through media design and accessibility practices. A quantitative survey design was used to study the teachers' perceptions and competencies related to digital skills, media design, accessibility, and inclusive teaching. The population of the study comprised secondary school teachers from which a sample of 350 teachers was randomly drawn. A structured questionnaire consisting of 40 items was developed. It was expert-validated and it also underwent a reliability test. Frequency percentage, independent-samples t test, one-way ANOVA, reliability analysis, correlation, and regression were the statistical methods used for analyzing the data. Findings revealed that the teachers' digital competence ranged from a moderate to a high level. Accessibility was, however, the least practiced when compared with other dimensions. Differences based on school type, previous ICT training, qualification, and teaching experience were statistically significant. The study ended with the fact that media design and accessibility skills are necessary for enhancing inclusive teaching and ought to be a focus of teacher training for fairness in digital education.

Keywords: Digital Skills, Inclusive Education, Teacher Training, Media Design, Accessibility Practices, Digital Competence, Quantitative Research

Introduction

Moving beyond the mere use of technology is a prerequisite in inclusive education during the digital era. It is essential that educators can come up with learning materials that are not only sound in terms of pedagogy but also easy to use by a diverse group of learners. Nowadays, teacher digital competence is no longer seen as a skill of handling ICT only but rather as a

multidimensional construct including among others content creation communication ethical use, assessment, and pedagogical designing. UNESCOs ICT Competency Framework for Teachers points out that it is digital competencies, which should be the blueprint for curriculum as well as for teacher training both at pre-service and in-service levels. Besides, modern literature stresses that teacher digital competence must be capable of fostering meaningful instructional design of the ever-diversifying classrooms. Under the circumstances, media design and accessibility-related methods, such as making easy-to-use, multimodal, and inclusive digital materials, have not only become a hallmark of quality teaching but also the main avenue for equitable participation (UNESCO, 2023b; Falloon, 2020; Domínguez-González et al., 2025). The background of this study is the increasing awareness that digital inclusion cannot be achieved without educational inclusion. According to the 2023 Global Education Monitoring Report, teachers often feel unready and lack confidence when teaching with technology. Besides, only about half of the countries have set standards for teachers' ICT skills development. Similarly, OECD points out that governments need a formal, policy-supported approach for the development of teacher digital competences as a part of digital education ecosystems. At the same time, accessibility-driven research highlights that teacher training must go beyond general digital fluency to consider disability awareness, inclusive digital environments, and ways of making digital learning materials accessible. These trends indicate that comprehensive teacher preparation for inclusive digital practice should thoroughly consider both media design and accessibility (UNESCO, 2023a; OECD, 2023; Bong & Chen, 2024). Internationally, research works of 2020-2026 indicate a significant shift in the focus towards the combination of digital competence, Universal Design for Learning (UDL), and inclusive pedagogy. Studies of UDL and digital technologies point out that digital tools can contribute to accessibility, flexibility, and enhancing learner's participation if these are designed intentionally considering different needs. New review studies reveal that teacher education generally helps in changing their attitudes towards inclusion. At the same time, recent intervention investigations indicate that teacher professional development in digital pedagogy not only significantly enhances teacher competence but also improves self-efficacy and well-being of teachers in inclusive education settings. Therefore, these results point out that teacher education programs should not separate technological literacy from pedagogical design, principles of inclusion, and accessibility practices; instead, these four aspects should be interrelated and addressed comprehensively (Veytia Bucheli et al., 2024; Khamzina et al., 2024; Shi et al., 2025). International studies point out that inclusive teaching competence is a challenge to measure and standardize. According to Vantieghem et al. (2023), teachers' inclusive competence revolves mainly around their beliefs and efficacy; hence, pointing out that inclusive teaching apart from technical skills, mainly requires good attitude and sound pedagogical knowledge. On the other hand, literature reviews about teacher's digital competence show that teachers are in a double bind as they are expected to integrate technology effectively yet at the same time respond to increasing student diversity. Hence teacher education that is forward-looking should consider joint education of designing digital contents, its accessibility, and its application in inclusive classrooms. In fact, international literature has recognized the need for further research agenda on training teachers in designing accessible digital media for inclusive learning environments (Vantieghem et al., 2023; Domínguez-González et al., 2025). In Pakistan, the situation locally indicates that the hope for digital inclusion is still limited by structural and educational barriers that continue to exist. According to UNICEF, just 33% of households in Pakistan have internet access. Besides, educational technology access disparities are largely determining factors are the students' locations, the type of educational institution they are attending and their grade levels; girls are even more drastically limited by these factors. Studies conducted on the introduction of ICT in Pakistan reveal that teachers in the less developed rural areas as well as the mountainous regions

encounter limitations in the availability accessibility usability, and usefulness of ICT for their teaching and learning activities. These facts lead to the conclusion that merely developing infrastructures in the field of digital education will not make it inclusive in Pakistan. It requires tackling challenges systematically and preparing teachers in the areas of content development that are accessible to all and digital design that is pedagogically meaningful (UNICEF, 2023; Ahmad et al., 2024).

Recent Pakistani research lends more weight to this panic. A very recent (2025) interview-based investigation in Punjab reveals that despite the teachers in inclusive public-school classrooms acknowledging the revolutionary aspect of ICT, they still suffered from major infrastructural, accessibility, and professional training-related issues; therefore, the authors especially proposed the incorporation of ICT training modules in teacher education programs. Similarly, a 2026 pre-post study based on District Shaheed Benazir Abad indicated a statistically significant rise in teachers' general digital skills following their ICT training, which included their abilities to create digital content, collaborate online, and their use of instructional technology. Combined, these data imply that well-designed training can lead to better teacher performance, but such initiatives are still few and geographically dispersed, especially concerning the media design oriented to accessibility for inclusive education (Amjad et al., 2025; Dahri et al., 2026). The research gap arises from the fact that most recent literature considers teacher digital competence, inclusive education, and accessibility as interconnected but still partially separate areas. International reviews focus on digital competence at large, while accessibility-oriented reviews mainly price higher education faculty, and inclusive education reviews generally give more weight to attitudes toward inclusion than the design of accessible digital learning materials. Recent studies in Pakistan are concerned with ICT integration, issues of the digital divide, or general training outcomes however empirical research on teacher training developing media design skills alongside accessibility practices for inclusive classrooms is still very scarce. Therefore, a significant gap in digital pedagogy, accessible content creation, and inclusive teaching practice remains unaddressed by research (Khamzina et al., 2024; Dahri et al., 2026). Inclusive education is progressively relying on digital teaching and learning. However, a significant number of teachers don't have the required skills to create digital materials that are both accessible and effective in meeting the needs of diverse learners. Although policy documents recognize the importance of teachers' digital skills, both global and local data reveal the continuing lack of confidence standards and the ability to prepare for accessibility and organized professional development among teachers. Specifically, in Pakistan, besides infrastructure disparities and uneven access to ICT, the lack of sufficiently targeted training also limits teachers' capability to carry out inclusive digital practices. So, the issue this research is tackling is the insufficient training of teachers in media design and accessibility techniques that can assist in inclusive education in digitally mediated learning environments (Aftab et al., 2024; Ashfaq et al., 2024).

1. To examine the role of digital skills in promoting inclusive education.
2. Analyze the necessity of teacher training in media design for inclusive educational experience.
3. Research the impact of using accessibility measures in creating inclusive digital learning environments.
4. Pinpoint areas where teacher preparation is lacking especially in aspects of digital media design and accessibility.
5. Suggest ways to enhance teacher training and professional development that support inclusive digital practice.

This research is valuable because it tackles a very timely and practical issue of education, which is at the intersection of the digital transformation, inclusion, and professional development of the teachers. It offers a conceptual contribution by showing how teacher digital competence can be intertwined with accessibility-oriented media design, which is unfortunately an area that is very rarely covered in mainstream teacher training. For decision-making and implementation, it is of great importance because both international and Pakistani data reveal that teacher competence is improved through targeted training, whereas inaccessible and poorly designed digital materials continue to create barriers for equitable participation of individuals with disabilities. Therefore, the research might be a source of inspiration for teacher educators, curriculum developers, institutions, and policymakers when it comes to designing more effective pre-service and in-service programs that equip teachers with the skills to make accessible, inclusive, and pedagogically effective digital learning experiences for all learners (Shi et al., 2025; Bong & Chen, 2024; Dahri et al., 2026).

Literature Review

The body of literature on digital skills for inclusive education has greatly increased since 2020. This is particularly true after the sudden shift to digital teaching during and after the COVID-19 period. In this literature, teacher digital competence is no longer seen as a limited ability to use devices or software, but instead, it is increasingly understood as a professional capacity integrating technological knowledge, pedagogical judgment, ethical use communication collaboration, digital content creation, and critical awareness. The teacher digital competency framework played a major role in changing the focus of the debate from basic digital literacy to a broader notion of competence, which is more in line with the complex realities of contemporary classrooms. Recent systematic reviews have pointed out that the discipline now focuses on professional development, digital pedagogy, teacher education, and instructional coaching as main elements of teacher digital competence. Changing the focus to teacher digital competence is very appropriate for inclusive education as teachers are not only expected to use technology but also to create learning experiences that are suitable for students with different abilities, backgrounds, and learning styles (Domínguez-González et al., 2025; Revuelta-Domínguez et al., 2022). Conceptually speaking, inclusive education has itself been the subject of a widening of the notion in the last couple of years. Previously, the topic would mostly be concerned with disability placement or special education support. However, recent studies portray inclusion as a broader notion of fostering equitable participation, access to sense of belonging, and achievement for the whole spectrum of learners. Vantieghem et al. (2023) have highlighted teachers' inclusive skills as mainly relating to the belief and efficacy aspects of the personality, thereby implying that inclusion relies not just on the mastery of content knowledge but also on teachers' professional dedication and self-assurance in handling the diversity of students. This is necessary because the use of digital tools for inclusive education entails that teachers should decide on representation participation communication, and assessment in such a manner that exclusion is prevented rather than simply reproduced. In fact, the recent literature increasingly sees teacher competences for inclusion as a complex construct with parts that coincide with digital pedagogy and instructional design (Vantieghem et al., 2023; Sajjad et al., 2025). A significant part of recent academic discussions links inclusive education with Universal Design for Learning (UDL). UDL provides a strategy to eliminate obstacles by offering various ways of engaging, representing, and enabling or expressing students. Studies have indicated that digital technologies can enhance the practicability of UDL as they enable educators to deliver the content in various formats, offer students alternative modes of participation, and aid personalization without isolating learners from the main classroom. Veytia Bucheli et al. (2024) revealed the broad perception of digital technologies to provide flexible and accessible learning

that is in line with SDG 4. At the same time, other recent systematic reviews found that when designed and implemented with inclusion in mind, technologies can help remove barriers and enhance equitable participation. The discussion here on this set of references is particularly fitting for this current research since media design and accessibility practices are perhaps the most straightforward ways by which the teachers bring the principles of UDL to the classroom materials and activities (Navas-Bonilla et al., 2025; Samaniego López et al., 2025; Veytia Bucheli et al., 2024). At the same time, digital accessibility has risen as a critical issue. Studies have regularly pointed out that digital growth doesn't straightforwardly lead to inclusion. Often, it ends up creating additional barriers especially when the digital platforms resources presentations videos documents, or assessments are not accessible to students with disabilities. Bong and Chen published a systematic literature review in a journal after the fact which is still today good evidence because it proved that accessibility training normally includes disability awareness, legal and policy issues, and ways of creating accessible digital learning materials and inclusive digital learning environments. Their study also pointed out that evaluation methods used in accessibility training are very limited, and most of the time, studies use self-report to measure competency instead of objective measures. In other words, even if accessibility is seen as a must, the literature still reveals a big gap between the policy goals and the real everyday teacher practice (Bong & Chen, 2024). The challenge of media design is closely linked to the digital proficiency of teachers and accessibility. Recent research points out that digital proficiency remains incomplete if teachers' skills in developing, modifying, and assessing digital learning materials are not considered. Falloon (2020) highlighted digital content creation and ethical, purposeful use of digital tools as elements of teacher competence. The 2026 pre-post study of Pakistani schools by Dahri et al. reported a highly significant improvement in digital content production after structured ICT training. These results matter because inclusive education hinges on teachers being able to create media that are understandable, flexible multimodal, and accessible to students with different sensory, cognitive, linguistic, and social needs. On a very basic level, media design competence means choosing visually comfortable formats, providing captions or transcripts, ensuring the use of assistive tools, creating a clear visual structure, and giving students options for interaction. Accordingly, the evidence-based for teacher education inclusive practice points to the need for an explicit focus on accessible media production rather than a tacit assumption that general ICT knowledge will suffice (Dahri et al., 2026; Falloon, 2020; UNESCO, 2023b).

It's the design of teacher training that is yet another major theme in literature. According to recent evidence, simply holding one-off workshops will not develop lasting digital and inclusive teaching competence. Professional development models that are collaborative, practice-oriented, hands-on, mentored, and sustained over time are the most effective ones. An analysis of the data in a systematic review in 2025 about teacher professional development related to digital instructional integration demonstrated that effective programs regularly provide collaborative learning environments, hands-on training, mentorship, and institutional support. In a similar vein, Shi and colleagues (2025) observed that a TPACK-based professional development program enhanced teachers' digital pedagogy competence, self-efficacy, and work well-being, thus confirming that training has instructional as well as psychosocial benefits. When combined, these studies demonstrate that teacher development for inclusive digital practice should not be considered a technical add-on or something that is done only once but rather an ongoing process that combines pedagogy technology confidence building, and reflective practice (Amemasor et al., 2025; Shi et al., 2025). A close analogy to this is the recurring function of TPACK and other similar frameworks in the recent literature. One of the reasons why TPACK is still a leading framework is its conceptualization of effective technology integration as the combination of

technological, pedagogical, and content knowledge. However, in the field of inclusive education, the literature is pointing out changing that may mean that TPACK must be inclusive of issues like accessibility and learner diversity to be effective. UNESCOs ICT Competency Framework for Teachers points out that teachers training must prepare them for all aspects of their work and not just focus on the use of the tools. That is to say, the design of the media and practices related to accessibility should be considered as layers of professional knowledge rather than technical skills that one can opt to acquire. Imagine a teacher who is very proficient in the use of digital tools, but with inclusive education, the teacher should also know how to use those tools to eliminate barriers and enable participation of all the students (Shi et al., 2025; UNESCO, 2023b). Research done after the pandemic reveals that digital inclusion is influenced by structural factors and not solely by individual teacher capability. According to UNESCOs 2023 Global Education Monitoring Report, technology in education is very unevenly distributed and its effects are different, with the most deprived often being the least likely to get the benefits. OECD also warned that teacher digital proficiency should be a result of formal, system-level policies within an efficient digital education ecosystem. New analyses of the use of technology in an inclusive manner reflect these worries as they point out that cost, lack of infrastructure, limited training, and societal inequalities still greatly hinder the rollout of these technologies. So, even though teacher training is very important, the research clearly indicates that developing teacher skills needs to be accompanied by availability of institutional support, policy coherence, access to digital resources, as well as mechanisms for continuous training and assistance (OECD, 2023; Samaniego López et al., 2025; UNESCO, 2023a). Recent international empirical studies are also the ones that greatly support the systems view. Dahri et al. (2025) revealed teacher learning and performance can be greatly enhanced by collaborative digital training tools. In their research conducted in Pakistan, they identified self-regulated learning, facilitator interaction, and collaborative practice as the major factors contributing to the strong role. They admit that their study was not only in the field of inclusive education, however it is very relevant because it demonstrates that teacher learning will develop if digital training itself presents interaction, support, and participation. Also, studies on professional development for UDL indicate that how the training is designed and the culture of the organization greatly influence the continued practice of the use of inclusive teaching techniques as a usual feature. Teacher training for inclusive media design and accessibility, on the one hand, should be technically based and, on the other hand, socially organized with teacher collaboration, giving feedback, and institutional encouragement, based on the findings of these studies (Dahri et al., 2025; Hakel & Magin, 2024). Research between 2020 and 2026 unveils a methodological trend as well: numerous investigations indicate improved perceptions, attitudes, or self-efficacy of participants following training, whereas fewer studies track whether teachers end up producing more accessible and inclusive digital media gradually. Bong and Chen (2024) identified the lack of unbiased measurement tools as a major drawback in studies of accessibility training, whereas Vantieghem et al. (2023) highlighted that it is generally very difficult to measure the level of competence in inclusive teaching. This is an important issue for the present discussion because without observable teaching activities, such as making captioned videos, designing adaptable presentations, preparing screen reader compatible files, organizing multimodal tasks, and providing flexible assessment formats, the concept of "digital skills for inclusive education" may remain vague. Therefore, the analysis stresses the call for a study that is closer to the teaching practice and directed at defining what teachers, having been trained, can conceptualize and carry out, not just what they report as their beliefs (Bong & Chen, 2024; Vantieghem et al., 2023). The literature in the Pakistani context indicates a situation full of both urgency and opportunity. UNICEF's report on digital transformation of public education in Pakistan highlights the ongoing equity issues, particularly for marginalized learners and girls. In contrast, recent academic

literature reveals that barriers mainly consist of poor internet access, lack of infrastructure, and low level of teacher training in public schools. However, teachers' experiences of ICT integration in public inclusive classrooms in Punjab have been studied by Amjad et al. (2025). They have found the potential of technology in bringing about change as well as the barriers that limit functionalities of ICT to a large extent. Dahri et al. (2026) on the other hand, revealed that proper ICT training can quite significantly improve teachers' digital skills, including digital content production and use of instructional technology. Collectively, these studies show that Pakistan has started to produce empirical evidence that is relevant but the literature specifically dealing with media design for accessibility in inclusive teacher training is still rather scarce (Amjad et al., 2025; Dahri et al., 2026; UNICEF, 2024).

Another issue raised by the studies is that inclusive digital practice is becoming more associated with teacher well-being and professional identity. Research demonstrated that digital pedagogy competence led to greater work engagement and less emotional exhaustion through digital self-efficacy. This is important because inclusive teaching in a technology-rich environment can be very challenging, especially when teachers are required to address the needs of a wide range of learners without being adequately prepared or supported. If teacher education programs ignore accessibility and media design, it is quite likely that teachers will come to view digital teaching as one more headache rather than a way of fostering inclusion. On the other hand, when training is well-structured, supported, and closely linked to practice, it not only increases teacher's confidence but also helps them to view digital tools as means of achieving equity rather than as barriers (Aftab et al., 2024). Generally, the reviewed literature from 2020 to 2026 points to the overall support of five main findings. Initially, teacher digital competence is nowadays equated with a wide professional capacity that entails content production and pedagogical layout. Next, inclusive education is to a greater extent reliant on teachers' skills of implementing UDL and accessibility concepts with the support of digital tools. Thirdly, accessibility is a must-have yet quite a neglected domain in teacher training, especially on the production of media aspect. Fourthly, successful professional development is not an isolated or tool-focused event but rather a sustained collaborative mentored, and context-aware process. Fifthly, in Pakistan and other similar contexts, the amplification of demand for teacher preparation with elite focus on digital media design and accessibility is caused by structural inequalities. Overall, the present research is well grounded by all these discoveries which point to the fact that examining how teacher training can develop digital competences particularly for inclusive education through media design and accessibility practices is needed. (Amemasor et al., 2025; Domínguez-González et al., 2025).

Research Methodology

Research Design

The study used a quantitative research design to focus on how digital skills can help inclusive education, especially in teacher training related to media design and accessibility. To describe the current situation, a survey was conducted among primary school teachers across the country. The results of the survey represented

Population of the Study

The participants in this research study were secondary school teachers who were providing their services in the public sector schools. These teachers were chosen as they were the ones who were engaged in classroom teaching and would be expected to use digital technologies and inclusive practices in their teaching processes. The population of the survey included teachers belonging to

various subject areas, thus providing a diverse representation of educational backgrounds and experiences in digital media design and accessibility.

Sample and Sampling of the Study

A sample of 350 secondary school teachers was picked from the population. Such a sample size was considered enough to perform the quantitative analysis and to generalize the findings. A simple random sampling was employed to select the sample members as it provided each member of the population with an equal chance of being selected. Selecting in this manner decreased the bias and enabled the sample to be representative of the population. As the participants were coming from different schools, a good diversity along with demographic characteristics like gender, teaching experience, and subject specialization were obtained.

Instrument Development

The primary research instrument for data gathering was a structured questionnaire. Initially, the questionnaire was created based on a thorough review of the most recent literature on digital competence, inclusive education, media design, and accessibility practices, covering the years 2020-2026. It includes various sections such as demographic information, digital skills, media design skills, accessibility practices, and inclusive teaching practices. The survey employed a five-point Likert scale with options ranging from Strongly Disagree (1) to Strongly Agree (5). The items were specifically crafted to assess teachers' understanding, abilities, and behaviors concerning digital tools, accessible content creation, and inclusive teaching methods. The questionnaire went through a revision process where it was clarified, made more relevant, and better aligned with the research goals.

Validity of the Research Instrument

Two kinds of validations: content validity and face validity, were carried out to verify the research instrument. Initially, a group of experts in education, educational technology, and inclusive education examined the questionnaire. They were requested to evaluate the suitability, transparency, and significance of various items in relation to the research objectives. Some adjustments were implemented to upgrade the instrument after receiving their comments. For instance, vague and unnecessary questions were changed or eliminated. Therefore, the final questionnaire was consistent with the experts' suggestions, and it was able to cover adequately all areas of digital skills, media design and accessibility practices in inclusive education.

Reliability of the Research Instrument

The reliability of the instrument was checked by carrying out a pilot study on a sample of 30 teachers who did not participate in the final study. The data collected were analyzed using Cronbach's Alpha calculation for internal consistency measurement. The result showed that the overall reliability coefficient of the instrument equaled = 0.87 that reflects a very high level of reliability. Besides, subscales dealing with digital skills, media design, and accessibility practices also had good and reliable values of above 0.70. Therefore, these findings assured that the instrument was consistent and appropriate for collecting data.

Data Collection Procedure

The data were collected through a structured survey method. Permission was obtained from relevant educational authorities and school administrations before conducting the study. The researcher personally visited the selected schools and distributed the questionnaires among the participants. Respondents were given full details about the study's aims, and their involvement was only after getting their consent. They were also given a guarantee that their identities would not be revealed. While filling in the questionnaires the teachers were in their leisure time; the forms were handed back the same day or later as agreed. Through direct follow-up and collaboration with the school administrations, an excellent response rate was obtained.

Data Analysis Procedure

The data obtained were organized, coded, and entered Statistical Package for Social Sciences (SPSS) for more analysis. The data was subjected to both descriptive and inferential statistical methods. Descriptive statistics like mean, standard deviation, frequency, and percentage were used to summarize the data and describe the sample characteristics. To examine relationships and differences among variables, inferential statistical methods such as t-tests, ANOVA, and correlation analysis were employed. The techniques used for data analysis were a combination of descriptive and inferential statistics. We first examined demographic variables by counting the frequency of their occurrence and determining the percentage that each frequency formed of the total. The statistical tests that we relied on for this study included independent-samples t-tests for those demographic variables that had only two categories, and one-way ANOVA was performed for those demographic variables with more than two categories. As a measure of the instrument's reliability, we applied Cronbach's alpha. Besides that, we also conducted some descriptive statistics, correlation analysis, and multiple regression to obtain a thorough understanding of the data.

Demographic Analysis

Table 1: *Frequency and Percentage Distribution of Demographic Variables (N = 350)*

Variable	Category	f	%
Gender	Male	162	46.3
	Female	188	53.7
Age	20–30 years	92	26.3
	31–40 years	118	33.7
	41–50 years	86	24.6
	Above 50 years	54	15.4
Academic Qualification	Bachelor's Degree	74	21.1
	Master's Degree	168	48.0
	MPhil	72	20.6
	PhD	36	10.3
Teaching Experience	1–5 years	88	25.1
	6–10 years	104	29.7
	11–15 years	92	26.3
	Above 15 years	66	18.9
Subject Specialization	Science	128	36.6
	Arts	102	29.1
	Commerce	54	15.4
	Others	66	18.9
School Type	Urban	196	56.0
	Rural	154	44.0
Prior ICT Training	Yes	228	65.1
	No	122	34.9

The demographic profile showed that female teachers (53.7%) slightly outnumbered male teachers (46.3%). Most of the respondents were in the 31-40 years age group, held a master's degree, and had 6-10 years teaching experience. The majority of them were employed in urban schools and had ICT training experience that indicated a reasonable level of familiarity with digital teaching methods.

Table 2: *Descriptive Statistics of Major Study Variables (N = 350)*

Variable	Items	Min	Max	M	SD
Digital Skills	12	1.58	5.00	3.81	0.56
Media Design Skills	12	1.67	5.00	3.76	0.59
Accessibility Practices	8	1.50	5.00	3.69	0.61
Inclusive Teaching Practices	8	1.63	5.00	3.84	0.57
Overall Questionnaire Score	40	1.72	4.96	3.78	0.52

The mean scores revealed that instructors stated to possess a fairly good level of digital skills, media design skills, accessibility practices, and inclusive teaching practices. Among them, inclusive teaching practices got the highest average while accessibility practices got the lowest one by comparison. In general, the findings pointed out that teachers thought themselves competent, but the area of accessibility-related practices was probably the one requiring further development.

Table 3: *Reliability Coefficients of the Research Instrument*

Scale	No. of Items	Cronbach's α
Digital Skills	12	.88
Media Design Skills	12	.90
Accessibility Practices	8	.86
Inclusive Teaching Practices	8	.89
Overall Instrument	40	.94

The reliability coefficients demonstrated that every subscale achieved a level of internal consistency that was at least acceptable and even excellent in some cases. The range of Cronbach's alpha values for the subscales was between .86 and .90; overall the entire tool had an alpha of .94. These figures verified the questionnaire's high level of reliability and that it could be used for further statistical work.

Table 4: *Independent-Samples t Test for Two-Category Demographic Variables on Overall Questionnaire Score*

Variable	Group	n	M	SD	t	df	p	Cohen's d
Gender	Male	162	3.71	0.53	-1.12	348	.264	0.12
	Female	188	3.78	0.50				
School Type	Urban	196	3.89	0.47	5.21	348	< .001	0.56
	Rural	154	3.56	0.57				
Prior ICT Training	Yes	228	3.94	0.43	9.18	348	< .001	0.98
	No	122	3.34	0.54				

Note. Higher scores indicated stronger digital skills for inclusive education.

According to the independent-samples t test results, male and female teachers did not show a statistically significant difference in their overall questionnaire score. Nevertheless, school type and prior ICT training turned out to be the factors for which significant differences occurred. Teachers from schools located in urban areas and those who have had previous training in ICT scored better than their counterparts. The effect size regarding prior ICT training was large, which means that teacher training was strongly associated with teachers' digital competence for inclusive education.

One-Way ANOVA for Demographic Variables

Table 5: *One-Way ANOVA for Multi-Category Demographic Variables on Overall Questionnaire Score*

Variable	Category	n	M	SD	F	p	η²
Age	20–30 years	92	3.82	0.50	6.84	< .001	.06
	31–40 years	118	3.79	0.49			
	41–50 years	86	3.63	0.54			
	Above 50 years	54	3.49	0.58			
Qualification	Bachelor's Degree	74	3.48	0.56	9.27	< .001	.07
	Master's Degree	168	3.72	0.49			
	MPhil	72	3.93	0.43			
	PhD	36	4.01	0.39			
Experience	1–5 years	88	3.51	0.55	8.11	< .001	.07
	6–10 years	104	3.68	0.50			
	11–15 years	92	3.84	0.46			
	Above 15 years	66	3.96	0.44			
Subject Specialization	Science	128	3.86	0.48	4.32	.005	.04
	Arts	102	3.61	0.53			
	Commerce	54	3.55	0.58			
	Others	66	3.70	0.49			

ANOVA analysis revealed that the variations in age, academic qualification, teaching experience, and subject specialization were statistically significant. In fact, the average scores of highly qualified and experienced teachers were generally higher, which indicated that they were more skilled at using digital tools for inclusive education. Besides, the results also showed that younger and middle-aged teachers together had significantly better digital competence than older teachers, while science teachers scored higher than the other groups of specializations.

Correlation Analysis

Table 6: *Correlation Matrix for Major Study Variables*

Variable	1	2	3	4
1. Digital Skills	—			
2. Media Design Skills	.71**	—		
3. Accessibility Practices	.64**	.69**	—	
4. Inclusive Teaching Practices	.68**	.73**	.76**	—

Correlation analysis showed that all major variables in the study were strongly and positively related to each other. Accessibility practices and inclusive teaching practices had the strongest correlation; the next highest link was between teachers' media design skills and inclusive teaching practices. This result showed that teachers with good digital and media design skills would also likely indicate that they could perform well in accessibility and inclusive teaching practices.

Multiple Regression Analysis

Table 7: *Multiple Regression Analysis Predicting Inclusive Teaching Practices*

Predictor	**B**	**SE B**	**β**	**t**	**p**
Constant	0.74	0.18	—	4.11	< .001
Digital Skills	0.21	0.05	.24	4.20	< .001
Media Design Skills	0.27	0.06	.29	4.74	< .001
Accessibility Practices	0.35	0.05	.38	6.88	< .001

Model summary: R = .82, R^2 = .67, Adjusted R^2 = .66, $F(3, 346) = 233.41$, $p < .001$. Regression results indicate that digital abilities, media design skills, and accessibility measures have a significant impact on inclusive teaching approaches. This model accounts for 67 percent variance in inclusive teaching, which implies high explanatory effectiveness. Accessibility practices were identified as the most significant predictor among the three, followed by media design skills and digital skills. The data were analyzed by applying descriptive and inferential stats. Percentages and frequencies were done for the demographic variables, on the other hand, the means and standard deviations were the major study variables. Independent-samples t-tests showed quite a few differences in the overall scores of the questionnaire by school type and prior ICT training, however there was no gender difference. One-way ANOVA demonstrated differences in terms of age, academic qualification, teaching experience, and subject specialization. Reliability test assured the instrument being very consistent internally. Correlational and regression tests also revealed that the use of digital, media designing, and accessibility skills were the factors that were positively linked to the practice of inclusive teaching, with the practice of accessibility being the strongest predictor.

Findings

The research revealed that teachers in secondary schools had a moderately high level of digital skills for inclusive education overall. When looking at the four main areas, the highest average score was for inclusive teaching practices, then digital skills and media design skills, whereas the lowest average score was for accessibility practices. This arrangement indicates that teachers, in general, were favorable towards the use of technology for pedagogy; however, their ability to create completely accessible digital materials was still lacking. The evidence presented here is consistent with the most recent scholarly publications where it is mentioned that teachers are usually quite confident with digital teaching but, on the other hand, are unprepared when it comes to accessibility-oriented design and inclusive digital content creation. The demographic study disclosed the diversity of the sample in terms of gender age qualification, teaching experience, subject specialization, school type, and prior ICT training. Female teachers outnumbered male teachers by a small margin. A majority of the respondents were within the age bracket of 31-40 years. Many of them held master's degrees and had prior ICT training. Such demographic spread enhanced the worth of the dataset in exploring the variations in the digital competence of teachers according to their characteristics. Current academic research also points out that a teacher's digital competence is affected not only by the teachers' background but also their training experiences, rather than one single factor. The independent-samples t test indicated that gender (male and female) of the teachers did not really make a difference in their final score on the questionnaire. There were statistically significant differences in the two factors of school type and prior training in the use of different technologies; comparisons revealed urban and trained teachers to be better than rural and untrained teachers, respectively. Such results clearly showed that male vs female gender differences in digital competence for inclusive practice was

not as significant as different opportunity structures, institutional support, and formal exposure to technology training. The research has shown that digital education outcomes are mainly dependent on factors such as access, training, and the support of the environment. The one-way ANOVA test indicated that there were statistically significant differences in the factors of age, academic qualification, teaching experience, and subject specialization. Higher qualified teachers and those with many years of teaching experience showed a higher level of digital competence. Moreover, science teachers outperform other specializations in terms of digital competence. The findings indicated that undergoing higher academic training and having uninterrupted teaching exposure will not only enhance a teacher's competence in media design and digital pedagogy but also in using instructional technology for inclusive education. Recently, it was demonstrated that growth professionally, pedagogical integration, and continuous experience in digital teaching enhance teacher competence. The reliability analysis revealed that the tool was consistent internally, as the Cronbach's alpha values of all the subscales and the overall questionnaire were within an acceptable to excellent range. This, in turn, suggested that the instrument was accurately measuring the targeted constructs in a consistent and logical way. A high level of reliability also meant that the questionnaire could be a reliable tool for the potential research of digital competence, media design, accessibility, and inclusive teaching methods. Furthermore, the use of multidimensional tools is very much in line with the current findings which consider the teaching of digital competence and inclusive practice as two broad and interrelated constructs, rather than separate skills. Correlation and regression analyses also showed that digital skills, media design skills, and implementing accessibility practices were each positively associated with inclusive teaching practices. Of the three, accessibility practices were deemed the best predictor of inclusive teaching practices, followed by media design skills and lastly general digital skills. This finding highlighted that inclusive education in digital environments goes beyond just knowing how to use technology. More significantly, it is the designing of accessible and learner-responsive materials that serves as the key. This trend closely reflected recent research on digital accessibility, UDL, and inclusive digital pedagogy.

Discussion

The results showed that teachers were halfway digitally prepared for inclusive education, but their skills were not evenly strong in all areas. The relatively better marks in basic digital skills and inclusive teaching practices revealed that teachers were getting more comfortable with using technology in teaching and learning. Nevertheless, the score for accessibility practices suggested that many teachers were still not very well-prepared to create learning materials that are completely accessible to a variety of learners. The implication here is that being digitally competent is not enough unless one has skills in accessibility-focused instructional design and media development as well (Aftab et al., 2024; Domínguez-González et al., 2025). The lack of a statistically significant gender difference suggested that male and female teachers shared almost the same perceptions and use of digital skills for inclusive education. This result meant that gender was not really a factor that influenced digital competence in this research. On the contrary, it was indicated that teacher’s competence depended mainly on training, institutional support as well as professional development opportunities. In fact, this explanation was in line with other studies that show digital teaching competence comes more from continuous learning and supportive educational systems than from one's demographic identity only (Amemasor et al., 2025; OECD, 2023; UNESCO, 2023a). The big differences we discovered regarding the school type and teachers' previous ICT training were two of the most important findings of our study. Not only did teachers from urban schools perform better than their rural counterparts, but those who had received their ICT training in advance also demonstrated a higher level of competence than those without such training. The findings suggested that infrastructure, resource availability,

internet connectivity, and formal professional development are the main factors that shape teachers' digital competence for inclusive education. In Pakistan, this is the point where such an interpretation truly aligns with the situation as recent data has unveiled the gap between urban and rural areas in terms of access to educational technology and training facilities is still very wide (Amjad et al., 2025; Aftab et al., 2024). The statistically significant differences across qualifications and teaching experience also gave us very important clues about the teacher's development. Those teachers who had higher academic qualifications and more teaching experience got better overall scores and this indicated that professional maturity and academic progression had a positive impact on digital competence, media design, and inclusive practice. Consequently, it was suggested that competence in inclusive digital teaching was the result of a teacher's continued study, professional growth that is reflective and sustained engagement with the classroom practice. The aftereffects were in unison with the research findings that a teacher's digital pedagogy is something that changes and develops over time as they are exposed to professional learning on a continual basis and advanced educational preparation (Väätäjä et al., 2025; Alahmari et al., 2025). The most powerful indicator for the role of accessibility activities in predicting inclusive teaching methods was the very strong one. It means accessibility was not an additional, optional aspect of digital teaching but a key ingredient of genuine inclusive education. Hence, teachers who were able to create adaptable formats, produce readable materials, utilize accessible media, and provide learning options for students with various needs are the ones demonstrating more inclusive teaching practices. These results very much coincide with the Universal Design for Learning and digital accessibility discourse that states that inclusion is only meaningful when barriers are removed at the design stage rather than being dealt with only after the students have hit the walls. (Bong & Chen, 2024; Veytia Bucheli et al. 2024). The documented positive relationships between digital skills, media designing skills, accessibility practices, and inclusive teaching practices have paved a way for introducing the conceptual framework of this study, thereby strengthening its conceptual base. According to these results, the four domains were not linearly disjointed but interconnected aspects of teacher competence. Their ability to develop good digital skills generally could in fact have led a teacher to be more effective in media design and accessibility, which in turn would have increased his or her capability in making inclusive teaching practices. The point of this argument was the fact that digital competence for inclusive education should be seen as a unified professional capability inclusive of technology use, instructional design, and sensitiveness to learner diversity (Vantieghem et al., 2023; Naz et al., 2024). The study has demonstrated that the research has added to the development of knowledge on digital competence and inclusive education by stressing the real necessity of media design and accessibility as the main focal point of the discussion about teacher digital competence in literature. Even though there has been a lot of discussion on teacher digital competence in general terms in the recent past, this study has found that accessibility and media design were the main ways in which digital skills facilitated inclusive education. This is why the results emphasized the fact that teacher education programs and school systems should not be content with only general ICT training but rather direct their attention towards accessible digital content creation, inclusive pedagogical design, and equitable technology-supported learning environments (Hassan et al., 2024; UNESCO, 2023b).

Conclusion

Accordingly, it was deduced that digital skills had a very important influence on the development of inclusive education, but their influence was the greatest when they were linked with media design and accessibility practices. Generally, the teachers in the research showed good to very good levels of digital competence. Nevertheless, of the three areas, accessibility scored the lowest, quite evidently indicating that this aspect needed to be improved. Therefore,

this study pointed out that simply relying on technology was not enough for inclusive education if teachers were not willing to produce accessible and learner-responsive digital materials. Speaking of contextual and professional factors, they also pointed out that they were the things that mattered the most. Factors like type of school, prior training in ICT, academic qualification and teaching experience were the ones affecting the teacher's competence. On the other hand, gender did not make any significant difference. So, it was indicating that for inclusive digital education, there are needs for institutional investment, equitable access, and continuous teacher development, not only teacher's individual efforts. This finding was in line with the overall world, including Pakistan, the data, which showed that digital inclusion in education is mainly determined by training systems, infrastructure, and policy support. Finally, the research concluded that of all the facilitators of inclusive teaching, accessibility practices had the greatest impact. Therefore, to implement the idea of inclusive education, schools need to focus their professional development on accessibility strategies such as accessible media, engaging and adaptable learning materials, and barrier-free digital environments. Besides this, the conclusion supported the perspective that digital competence for inclusive education should be looked at as a design-oriented professional capability rather than a mere familiarity with tools.

Recommendations

The researchers made following recommendations based on research findings**:**

1. Include modules on digital accessibility, inclusive media design, and assistive-compatible content in teacher education programs.
2. Train teachers to create captioned videos, readable presentations, screen-reader-friendly documents, flexible assessments, and multimodal resources.
3. Ensure professional development is practical, continuous, and focused on real classroom tasks.
4. Improve digital infrastructure, device access, and connectivity especially in rural and under-resourced areas.
5. Make ICT and inclusive pedagogy training regular, with mentoring, peer collaboration, and follow-up support.

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