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Special Education Teachers' Readiness for Inclusive Digital Education: A Qualitative Exploration of Competencies, Challenges, and Professional Development Needs

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Abstract

The success of inclusive digital education depends on teachers' readiness and their ability to employ digital technologies effectively within inclusive educational settings. However, the experiences of special education teachers in navigating the demands of this transformation remain insufficiently understood, particularly given the diversity of individual differences among learners with disabilities. This qualitative study aimed to explore special education teachers' readiness to implement inclusive digital education in Saudi Arabia through semi-structured interviews with female special education teachers working in inclusive schools. The thematic analysis revealed three main themes: teachers possessed a sound conceptual understanding of inclusive digital education but faced difficulties translating this understanding into actual classroom practices; several structural barriers limited implementation, including inadequate technical support, unclear policies, and limited resources; and teachers expressed a need for continuous professional development. The findings confirm that the knowledge–practice gap is more closely associated with organizational constraints than with teacher deficiencies. They also suggest that strengthening inclusive digital education requires coordinated development across digital platforms, infrastructure, policies, and professional development programs.

Keywords: inclusive digital education, special education teachers, teacher professional development, digital competencies, qualitative research, teacher readiness, systemic barriers.

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جاهزية معلمي التربية الخاصة لتطبيق التعليم الرقمي الشامل: دراسة نوعية للكشف عن الكفايات والتحديات واحتياجات التطوير المهني

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ملخص

يعتمد نجاح التعليم الرقمي الشامل على جاهزية المعلمين وقدرتهم على توظيف التقنيات الرقمية بفاعلية في بيئات التعليم الشامل. ومع ذلك، لا تزال خبرات معلمي التربية الخاصة في التعامل مع متطلبات هذا التحول بحاجة إلى مزيد من الفهم، خصوصًا في ظل الاختلاف في الفروق الفردية بين المتعلمين من ذوي الاعاقة. هدفت هذه الدراسة النوعية إلى استكشاف جاهزية معلمي التربية الخاصة لتطبيق التعليم الرقمي الشامل في المملكة العربية السعودية، من خلال مقابلات شبه منظمة مع معلمات التربية الخاصة العاملين في مدارس التعليم الشامل .وقد كشف التحليل الموضوعي عن ثلاثة موضوعات رئيسة: امتلاك المعلمين فهمًا مفاهيميًا جيدًا للتعليم الرقمي الشامل مع صعوبات في تحويله إلى ممارسات صفية فعلية؛ ووجود عوائق بنيوية تحد من التطبيق، مثل ضعف الدعم الفني، وغموض السياسات، ومحدودية الموارد؛ وحاجة المعلمين إلى تطوير مهني مستمر. وتؤكد النتائج أن الفجوة بين المعرفة والممارسة ترتبط بالقيود التنظيمية أكثر من ارتباطها بقصور المعلمين. كما تشير إلى أن تعزيز التعليم الرقمي الشامل يتطلب تطويرًا منسقًا يشمل المنصات، والبنية التحتية، والسياسات، وبرامج التطوير المهني.

الكلمات المفتاحية: التعليم الرقمي الشامل، معلمو التربية الخاصة، التطوير المهني، الكفايات الرقمية، البحث النوعي، جاهزية المعلم، المعوقات النظامية.

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Introduction

The rapid integration of digital technologies in education has fundamentally reshaped the learning landscape, offering unprecedented opportunities for flexibility, personalisation, and accessibility (Daniela, 2022; Luik et al., 2025; Zou et al., 2025). E-learning platforms have become an integral part of education delivery at all levels, transforming how knowledge is created, shared, and assessed in contemporary educational systems (Al-Shehri, 2010; Almaiah et al., 2022). This digital transformation holds the promise of creating more inclusive and equitable learning environments, particularly for students with disabilities (Gogiberidze et al., 2019; Navas-Bonilla /et al., 2025; Samaniego López et al., 2025). However, the full potential of these technologies can only be realised if they are designed, implemented, and supported in a truly inclusive manner (Starcic, 2010). The key element in this endeavour is the professional preparedness of teachers, who are at the forefront of implementing these digital tools in their daily practice (Caena & Redecker, 2019; Shi et al., 2025).

Despite the proliferation of digital tools, a significant gap often exists between their availability and their effective and inclusive use. Many educators, including those working in special education, lack the specific training needed to leverage these technologies to meet the diverse needs of all learners (Starks & Reich, 2023). This challenge is exacerbated by systemic issues, such as a shortage of available digital resources and curricula not designed with inclusivity in mind (Abu-Alghayth, 2020). Consequently, without targeted and sustained professional development, even the most advanced digital platforms may perpetuate educational inequalities rather than dismantle them. The importance of teacher competence and self-efficacy in the use of digital pedagogy for inclusive education is well documented, with effective training programmes demonstrating significant positive impacts on both teacher well-being and student outcomes (Shi et al., 2025).

In Saudi Arabia, the education system is making significant progress toward greater inclusion for students with disabilities, particularly through the integration of digital technologies into educational practices. However, the focus on inclusive digital education has highlighted the critical need to adequately prepare teachers to integrate digital and assistive technologies to support diverse learners. Research in the Saudi context has shown that teachers often face significant barriers, including a lack of training in inclusive digital pedagogy and a scarcity of appropriate assistive technology devices, which hinders their ability to create truly inclusive digital learning environments (Abu-Alghayth, 2020; Aldehami, 2022). While there is a growing body of literature on inclusive

education and e-learning in Saudi Arabia, a deeper qualitative understanding of the specific training needs of special education teachers for implementing inclusive digital education remains essential.

Inclusive Digital Education

Inclusive digital education is a pedagogical approach that leverages technology to ensure all learners, irrespective of their abilities, disabilities, or backgrounds, can access educational content, participate meaningfully in learning activities, and achieve successful outcomes. It represents a paradigm shift from merely incorporating technology into the classroom to strategically using it as a tool to dismantle barriers to learning (Starks & Reich, 2023; Gogiberidze et al., 2019). This approach is not solely about providing access to digital tools but about the thoughtful design of the entire digital learning experience so that it is inherently flexible and accommodating (Daniela, 2022).

Effective implementation of inclusive digital education rests on several core principles. The first is technical accessibility, which ensures that digital platforms and content adhere to established standards, such as the Web Content Accessibility Guidelines, making them usable for individuals with sensory or motor disabilities (Mancilla & Frey, 2023; W3C, 2023). The second principle is the adoption of a Universal Design for Learning (UDL) framework, which involves proactively designing curricula and learning activities to meet the needs of diverse learners from the outset (Rose & Meyer, 2002). The third principle is a focus on equity and participation, using technology to bridge digital divides and ensure that all students have an equal opportunity to engage and collaborate (CAST, 2018; Daniela, 2022). Finally,

and most critically for this study, is the professional readiness of educators as their competencies ultimately determine whether the potential of inclusive digital education is realised in practice.

Universal Design for Learning (UDL)

UDL provides the foundational pedagogical framework for achieving inclusive digital education. Developed by the Center for Applied Special Technology (CAST) (2018), UDL is a set of principles for curriculum development

that give all individuals equal opportunities to learn. Rather than a one-size-fits-all approach, UDL emphasises flexibility and the provision of multiple pathways for learners. The framework is structured around three primary principles, including (a) multiple means of engagement, which

include providing various ways to motivate learners and sustain their interest; (b) multiple means of representation, or presenting information and content in different formats; and (c) multiple means of action and expression, or offering learners alternative ways to demonstrate what they know (Rose & Meyer, 2002; CAST, 2018).

In the context of digital education, the UDL framework guides educators in using technology to create flexible learning environments. For instance, technology can be used to display text in various sizes, provide text-to-speech functions, incorporate video with captions, or allow students to respond via text, audio, or video (Novak & Marlow, 2024)

The goal is to move away from retrofitting accommodations for specific students and instead create a learning environment that is inherently accessible and supportive for everyone (Novak & Marlow, 2024; Meyer et al., 2014).

Teacher Competencies for Inclusive Digital Education

For teachers to effectively implement inclusive digital education, they must possess a specific set of competencies that go beyond basic technological skills (Falloon, 2020; Navas-Bonilla et al., 2025). Frameworks such as the Technological Pedagogical Content Knowledge (TPACK) model are crucial in this regard as they emphasise the need for teachers to integrate knowledge of technology, pedagogy, and content (Mishra & Koehler, 2006). For inclusive education, this means teachers must not only know how to use a digital tool but also understand how to use it pedagogically to support a specific learning goal for a student with a particular need (Caena & Redecker, 2019; Starcic, 2010).

Research indicates a direct correlation between teachers' digital pedagogy competence, their self-efficacy, and their ability to create inclusive learning environments while maintaining their own well-being (Shi et al., 2025). Therefore, professional development must focus on building this integrated knowledge base, equipping teachers with the skills to select appropriate digital tools, adapt curricula, and use technology to assess and support diverse learning needs effectively (Darling-Hammond et al., 2017).

Global Perspectives on Professional Development for Inclusive Digital Education

The transition to inclusive digital education is a global phenomenon, and so are the challenges associated with preparing teachers for this paradigm. Various studies report that teachers feeling ill-

prepared to handle the demands of digital learning environments and express a need for training that is practical, context-specific, and continuous (Bergmark, 2023; Klusmann et al., 2022; Scherer et al., 2021).

A significant body of international literature highlights that the most common barrier to the effective use of technology for inclusion is not the lack of technology itself, but the lack of adequate and ongoing professional development for educators (Samaniego López et al., 2025). Samaniego López et al systematic review identified 'a widespread lack of awareness and inadequate specific training in the use of technologies and aids for inclusive education' as a major challenge.

Indeed, research has consistently pointed to several key challenges. First, many professional development programmes are generic and fail to address the specific pedagogical skills needed to use technology to support diverse learners (Zou et al., 2025; Samaniego López et al., 2025). Another systematic literature review by Bong and Chen (2024) found that while many institutions offer some form of accessibility training, this training often lacks depth and fails to translate into practical classroom application. Second, there is often a disconnect between the training provided and the daily realities of the classroom, including a lack of reliable digital infrastructure and technical support (Starks & Reich, 2023; Zou et al., 2025). Finally, professional development is often delivered in a one-off workshop format, which is widely considered ineffective for creating lasting change in teaching practices (Bergmark, 2023; Darling-Hammond et al., 2017; Timperley, 2011). Instead, the literature advocates for models of professional development that are collaborative, job-embedded, and sustained over time (Amemasor et al., 2025; Zou et al., 2025; Samaniego López et al., 2025).

Professional Development for Inclusive Digital Education in the Context of Saudi Arabia

Within Saudi Arabia, the drive towards digital transformation in education has been rapid, particularly following the establishment of the national e-learning platform 'Madrasati' (Ministry of Education, 2020). This platform was initially created in response to the COVID-19 pandemic to ensure educational continuity, and its use has since been sustained as a strategic option for distance learning during circumstances that necessitate the suspension of in-person classes, such as severe weather conditions (Almaiah et al., 2022). The official adoption of a centralised digital learning system underscores the urgency of preparing all teachers to operate effectively within this new paradigm

(Hodges et al., 2020). However, research specific to the professional development of special education teachers for inclusive digital education within this context reveals significant gaps (Aldehami, 2022). Studies within the Saudi context have predominantly focused on the general challenges of e-learning adoption or the use of assistive technology in isolation. However, there is a notable gap in research examining teachers' competencies, abilities, and readiness to implement these technologies inclusively to serve all students, especially those with disabilities.

For instance, the work of Abu-Alghayth (2020) was pivotal in highlighting that special education teachers in Saudi Arabia identified a lack of training as a primary barrier to using assistive technology. Abu-Alghayth (2020) revealed that even when technology was available, teachers lacked the skills and pedagogical knowledge to integrate it effectively, often due to a curriculum that was not designed for such integration. Similarly, Al-Harbi (2011) pointed to broader challenges in e-learning adoption in Saudi tertiary education, including issues of access and teacher readiness. While these studies are crucial, they also underscore the need for research that moves beyond identifying general barriers to exploring the specific content and format of professional development that special education teachers perceive as most effective for building their capacity in inclusive digital education.

This review of the literature reveals a clear gap. While the importance of professional development is well-established globally, and specific challenges in the Saudi context have been identified, there is a lack of in-depth qualitative research that explores the perspectives of Saudi special education teachers themselves on their training needs for creating inclusive digital learning environments. This study seeks to fill this gap by providing a voice to educators, aiming to inform the development of more effective, targeted, and sustainable professional development programmes.

To this end, this study explores the perceptions of special education teachers in Saudi Arabia regarding the training and professional development needed to effectively implement inclusive digital education. By focusing on the experiences of these teachers, the study aims to provide accurate insights into the challenges they face and the specific competencies they need to develop to create and sustain inclusive digital learning environments for all students. To achieve this objective, the study was guided by the following research questions:

How do special education teachers in Saudi Arabia describe their current training and professional development status for implementing inclusive digital education, and what professional development do they need to strengthen their practices?

These points were further explored through the following sub-questions:

- What digital competencies do special education teachers currently possess to integrate technology into inclusive learning environments?

- What challenges do special education teachers face when attempting to implement inclusive digital education?

- From teachers' perspective, what components of effective professional development programmes would enable them to use digital technology to support the learning of all students?

By answering these research questions, the study is expected to provide evidence-based insights into what special education teachers consider to be effective components of professional development in inclusive digital education. These findings will guide the Ministry of Education, teacher training institutions, and professional development providers in designing practical, contextual, and ongoing programmes that are aligned with teachers' actual needs and preferences, thereby increasing the likelihood of producing a meaningful and lasting impact on teaching practices.

Methodology

This study adopted a qualitative approach using semi-structured interviews to explore the experiences of special education teachers in implementing inclusive digital education in Saudi Arabia. While a significant body of research in the Saudi context has employed quantitative methods to examine e-learning adoption, technology integration, and teacher attitudes (Alenezi, 2023; Alkhateeb et al., 2023; Almaiah et al., 2022), these studies have primarily focused on measuring the prevalence of challenges or determining competency levels. However, the aim of this study was not to generalise findings to a broader population, but rather to develop a deeper and more nuanced understanding of teachers' lived experiences, the specific nature of the challenges they face, and the contextual factors shaping their practices in Abha City.

Qualitative research, particularly through in-depth interviews, allows researchers to move beyond superficial descriptions and uncover the complexities, inconsistencies, and contextual differences that quantitative surveys might overlook (Creswell, 2015; Merriam and Tisdell, 2016). Through close engagement with teachers' narratives, this study sought to illuminate the 'how' and 'why' behind the patterns identified by quantitative research, providing rich, contextual insights that can inform more targeted and effective professional development interventions. This approach is particularly valuable in an emerging field like inclusive digital education, where teachers' practical

knowledge and field experience are essential for understanding the gap between policy intentions and classroom realities.

Participants

This study employed a purposive sampling approach to attract participants with extensive experience and direct involvement in the phenomenon under investigation, in accordance with established qualitative research principles (Creswell, 2015; Patton, 2015). Participants were selected based on three eligibility criteria: (a) formal certification in special education, (b) current employment in an inclusive school environment in Saudi Arabia, and (c) at least three years of professional experience in the field. These criteria ensured that participants possessed the necessary professional qualifications and practical experience to provide valuable insights into inclusive digital education practices.

Participants were selected through a two-stage process. First, potential participants were identified through publicly available information on school websites and contacted via email invitations explaining the study's purpose and participation requirements. Teachers who expressed interest and met the eligibility criteria were enrolled. Second, a cascade sampling method was used, whereby participating teachers were asked to nominate colleagues who met the inclusion criteria (Noy, 2008). This dual approach facilitated the recruitment of nine special education teachers whose diverse institutional contexts and professional backgrounds contributed to enriching the study's findings.

Data Collection

Following ethical approval and participant selection, data collection commenced after obtaining informed consent from all participants and scheduling interviews at times convenient for each teacher. Interviews were conducted remotely via telephone with four of the teachers and via Zoom video conferencing with five of the teachers to accommodate participants' preferences and geographical locations. Each interview lasted approximately 45–60 minutes and was audio-recorded with the participants' explicit consent. To ensure accuracy and facilitate thorough analysis, all audio recordings were manually transcribed.

The interview protocol was developed to directly address the study's main research question: *How do special education teachers in Saudi Arabia describe the current state of their training and*

professional development in inclusive digital education, and what professional development do they need to strengthen their practices? This question was explored through three focused sub-questions addressing teachers' digital competencies, implementation challenges, and professional development needs.

While the protocol provided a structured framework, the semi-structured nature of the interviews allowed for flexibility in the order of questions and the inclusion of follow-up questions based on participants' responses. This approach enabled the researcher to pursue unexpected but relevant themes that emerged during the conversations while also ensuring that all key topics were addressed (Rubin & Rubin, 2012). Not all questions were asked in every interview; rather, the protocol served as a guide to ensure comprehensive coverage of the research questions, taking into account each participant's unique experiences and perspectives. **Appendix 1**

Data Analysis and Trustworthiness

To analyse the data, a thematic approach was used following the systematic procedures outlined by Braun & Clarke (2006). The analysis began with a thorough and repeated reading of all interview transcripts to gain a comprehensive understanding of the dataset and identify initial patterns (Patton, 2015). Following this identification phase, initial codes were systematically generated from the data, paying attention to the semantic and underlying meanings in the participants' narratives.

These initial codes were then reviewed and organised into broader categories through an iterative process of comparison and refinement. The categories were then grouped into main and sub-themes, which were further refined through multiple rounds of analysis to ensure they accurately represented participants' experiences and perspectives. Throughout the coding process, detailed analytical diaries were maintained to document coding decisions, emerging patterns, and interpretive insights (Saldaña, 2016).

To ensure the reliability and validity of the study, several validation strategies were implemented, following the framework proposed by Lincoln and Guba (1985). First, participants were screened by sending transcripts of their interviews, allowing them to verify the accuracy of their data and provide clarifications or corrections. Second, after the initial data analysis, follow-up explanatory interviews were conducted with three participants to validate emerging interpretations and resolve any ambiguities in the data. Third, peer review sessions were held with experienced qualitative

researchers who reviewed the coding scheme, subject structure, and interpretations to provide critical feedback and enhance analytical rigor. Finally, a reflective journal was maintained throughout the research process to document methodological decisions, acknowledge potential biases, and ensure that all inferences were logically drawn from the data (Tracy, 2010). These multiple validation strategies strengthened the overall credibility and reliability of the results.

Ethical Considerations

Strict adherence to ethical principles was maintained throughout the study. Before each interview, participants were provided with a detailed protocol outlining their rights based on the suggestions of Miles and Huberman (1994). This included information on the study's purpose, the voluntary nature of their participation, the estimated time commitment, the methods of data collection, and the steps taken to ensure confidentiality and privacy. Informed consent was obtained from every participant before any recording took place. All data was anonymised to protect the identity of the participants and their institutions.

Results

The findings of this study reveal deep and multifaceted perceptions among special education teachers in Saudi Arabia regarding the current state of their training and professional development for implementing inclusive digital education. The results were organised into three main themes: (1) advanced conceptual awareness of inclusive digital education versus the gap in applied competencies, (2) structural challenges hindering the translation of this awareness into practical application, and (3) the essential components of effective professional development programmes from the teachers' perspective. In this study participant were referred to by numbers instead of names.

Theme 1: Conceptual Awareness and the Digital Competency Gap

The results indicated a deep theoretical understanding of inclusive digital education among the participants, which was simultaneously met with a clear deficiency in the applied skills necessary to translate this understanding into effective classroom practices.

Advanced Understanding of Inclusive Digital Education

Participants agreed that inclusive digital education involves not only the use of technology but also a proactive and equitable design approach. This understanding was linked to modern educational concepts such as UDL and digital equality. One teacher (Teacher 1) summarised this

understanding as follows: '*Inclusive digital education means I think of each student from the outlook; I don't add accessibility later. I design the lesson with multiple options for access, participation, and demonstrating learning.*' Another participant (Teacher 2) connected this concept to equality in achieving learning objectives, stating, '*It's digital equity before it's technology: one goal for everyone, but with different pathways to suit their different needs.'*

A direct link was found between inclusive digital education and the three principles of UDL. One teacher (Teacher 3) pointed out that digital inclusion is *'practical UDL: using different types of representation, different ways to participate, and assessment that allows students to choose how their understanding'.*

A Gap in Applied Digital Competencies

In contrast to this theoretical awareness, the findings revealed that teachers' current digital competencies are largely focused on basic operational aspects. While teachers are adept at using platforms to manage daily tasks, they struggle with advanced pedagogical skills. This deficiency manifests in several areas. First, there is (a) a weak connection between data and individual plans and progress. One teacher (Teacher 4) clearly expressed this challenge, sharing, *'On the Madrasati platform I can send the assessment links for students to answer the questions, but to be honest I am never sure if it is actually the student who is the one responding and not someone else.'* Additionally, teachers described (b) difficulty enabling accessibility features. Teacher 9 pointed out, *'I use text comments, but enabling captions, screen readers, and speech-to-text for students with writing difficulties is still challenging.'* Teachers also highlighted (c) limitations in implementing digital differentiation, despite mastery of simple activities. Implementing digital differentiation across multiple levels within the same lesson presents a significant challenge. One teacher (Teacher 6) stated, '*I do well at short activities, but when I need to differentiate between three different educational levels within the same digital lesson, I struggle. The breakout room feature is available, but managing three different activities simultaneously is overwhelming.*'

Awareness of Modern Technologies But Limited Usage

While teachers demonstrated an awareness of modern technologies such as artificial intelligence (AI), augmented reality (AR), and virtual reality (VR), they identified a gap between their conceptual knowledge and their ability to implement these tools effectively in the classroom. For

example, teachers understood the potential of AI but felt unequipped to adapt it for their students' specific needs. As one teacher (Teacher 7) noted, '*I have a good understanding of how AI can be used to generate questions, but I don't have the skill to adjust the language level to suit a student with a mild intellectual disability.*' This reveals that the barrier is not a lack of awareness but a lack of specialised training to harness the technology for inclusive purposes.

Likewise, technologies like AR and VR remained theoretical for most teachers—not because they were unaware of them, but because of a lack of resources. As Teacher 8 explained, *'I heard about AR and VR in a workshop, but I haven't used them practically.'* Others, however, had gone further and actively explored these tools, only to be blocked by systemic barriers. As Teacher 6 shared, *'I have tried virtual reality, and it was great to use for students with disabilities. I have many ideas for using it, but we don't have this technologies here at the school, and I don't think the place [school] is suitable for using it. Also, it [technologies] doesn't fully support Arabic language.'*

Theme 2: Structural Challenges Impeding Practice

The study revealed a set of interconnected challenges that constitute a structural barrier to the implementation of inclusive digital education, explaining why advanced understanding remains theoretical and has not translated into established practices.

Pedagogical Challenges

The most significant pedagogical challenges did not stem from a lack of knowledge but rather from the constant need to compromise ideal educational practices due to practical constraints. Participants demonstrated a clear understanding of what is pedagogically appropriate, particularly the individualised nature of special education, but reported that the available digital tools often fall short of meeting these essential requirements. One teacher (Teacher 2) articulated this core conflict as follows: '*In special education, we definitely mainly rely on individualised instruction and try to use all the senses to convey information, and this is difficult for us on digital platforms.'* This difficulty was most apparent in the loss of immediate, physical feedback, which is critical for many students. The same teacher explained, '*When I train a student on the sounds of letters, I need to monitor the movement of the mouth and use light tactile cues. On the digital medium, the sound is delayed and the image breaks up, so the immediate feedback is lost.'*

Teacher 8 echoed this idea, explaining that while technology helped her prepare lessons and follow up with students, it could not replace the direct, in-person connection she needed to establish with students with disabilities.This environment of forced compromises means that tool selection is often dictated by infrastructure limitations. Teacher 9 confirmed this reality: *'Sometimes we choose the tool based on what works for us ... if the internet is weak, we go back to a static presentation, even if the objective requires an interactive simulation.'* This forces teachers to make pragmatic choices, often settling for what is technically feasible rather than what is pedagogically ideal.

Technical and Linguistic Challenges

Participants noted that the fragile technical infrastructure in some schools and the lack of immediate technical support constitute major obstacles. One teacher (Teacher 2) commented, *'When my school has a technical problem during a live lesson, the class is disrupted. We often have to abandon the digital part of the lesson.'*

Poor support for Arabic language in many applications also emerged as a major obstacle. Teacher 3 remarked, *'Arabic language in some applications is weak, and the interfaces do not support font enlargement easily; this is a major obstacle for students with visual difficulties.'* Likewise, Teacher 5 lamented, *'There are amazing virtual reality apps, but all the content is in English.'*

Organisational Challenges: Lack of Systematic Institutional Support

Participants often underlined that although they were willing to integrate technology into inclusive classrooms, their efforts were constrained by the absence of coordinated institutional support. This included a lack of clear policies, follow-up systems (Teacher 4), and ongoing professional guidance from the Ministry of Education or school leadership (Teacher 8). Teachers also described a situation in which digital inclusion initiatives were often individual initiatives rather than part of an organised plan. For example, Teacher 3 reflected, *'Everything we do with technology is an individual effort. I might find a great tool and use it, and the teacher in the next classroom might be doing something completely different. It's not an organised plan; it's just us trying our best on our own.'*

Theme 3: Teachers' Perspectives on Effective Professional Development Programmes

The participants expressed a clear and consistent vision for professional development that would truly empower them. This vision represents a radical shift from isolated theoretical workshops to a practical, ongoing model deeply embedded in their daily work.

A recurring theme was the need for training that could be directly applied in the classroom. As one teacher (Teacher 7) stated, '*We had enough workshops that simply introduce us to the same theoretical information over and over again. We need someone to teach us practically how to apply it in a real lesson on the Madrasati platform with our actual students.*' Likewise, participants expressed a desire to move from general courses to specialised, competitive training tracks. They felt the current programmes did not meet their specific needs. Teacher 9 noted, *'The annual training plan is too general and lacks specialisation in special education. We need more courses specifically designed to teach us how to use modern technologies in ways that meet the specific needs of students with disabilities, especially with the shift to the Madrasati platform.'*

To address this shortcoming in current training, they envisioned a more integrated and multifaceted approach. As Teacher 1 suggested, *'Instead of one long, general course, offer us specialised tracks: one for digital accessibility, one for designing Universal Design for Learning lessons, and one for using AI safely. Each track should culminate in a tangible product, such as a fully accessible lesson plan and a meaningful mini-certificate.'*

This desire for practical, hands-on learning was clearly demonstrated by the participants' call for continuous in-class coaching. Teachers mainly require a collaborative, non-evaluative relationship with a mentor who can provide regular guidance. As Teacher 8 explained, *'I need in-class coaching with regular visits. A one-day workshop is really pointless.'* Teacher 9 echoed this point, distinguishing it from administrative supervision: *'I need a coach who trains me, observes my lesson and provides immediate, personalised feedback, not a supervisor who evaluates me.'*

Finally, beyond formal training, teachers expressed a need for a system that keeps them up-to-date with the latest effective digital tools. For example, Teacher 7 asserted that *'It would be very helpful to have regular updates for tools that support the Arabic language or that integrate well with the Madrasati platform for students with disabilities.'* This indicates that effective professional development is not just about building skills but also about providing a continuous flow of reliable, context-specific knowledge about the tools themselves.

Discussion

This study explored how special education teachers in Saudi Arabia view their current training and professional development in implementing inclusive digital education, revealing a complex landscape of awareness, challenges, and needs. The findings highlight a key paradox: while teachers possess a sophisticated conceptual understanding of inclusive digital education, they struggle to translate this knowledge into effective classroom practices due to gaps in applied competencies and systemic barriers. This discussion situates these findings within the broader international literature on teachers' digital competencies and professional development, highlighting the unique contextual factors shaping inclusive digital education in Saudi Arabia.

The Knowledge–Practice Gap

Perhaps the most significant finding of this study is the gap between teachers' advanced conceptual awareness of inclusive digital education and their limited applied competencies. Participants demonstrated a sophisticated understanding of principles such as UDL and digital equity but struggled with the practical application of accessibility features, data-driven personalisation, and differentiated digital instruction. This pattern aligns with the TPACK framework's assertion that effective technology integration requires not only technical knowledge and pedagogical knowledge in isolation but also a complex interplay between technology, pedagogy, and content knowledge (Mishra & Kohler, 2006). The teachers in this study appear to possess strong content pedagogical knowledge, but they lack the technological pedagogical knowledge necessary to effectively implement their holistic vision through digital tools.

This finding aligns with Caena and Redecker (2019) observation that teachers' digital competence should extend beyond basic technical proficiency to encompass advanced educational innovation and professional engagement. The DigCompEdu framework identifies six competency areas, and the current study reveals a pattern of uneven development in these areas among Saudi special education teachers. While teachers have developed a solid theoretical understanding and recognise the importance of professional engagement with digital technologies, they face significant challenges in the practical application of these competencies, particularly in empowering learners and facilitating their digital competence through technology.

This gap is not unique to Saudi Arabia. Shi et al. (2025) found similar patterns in their study of digital pedagogy competence for inclusive education, noting that teachers' self-efficacy in using technology for inclusion was closely linked to their actual competence, suggesting that confidence

gaps may prevent teachers from fully leveraging their theoretical knowledge. However, what distinguishes the Saudi context is the specific manifestation of this gap within the Madrasati platform system. Although teachers recognise the platform's potential for inclusive education, they have faced practical challenges, such as verifying student identities during assessments, enabling accessibility features, and managing multiple activities simultaneously. This suggests that professional development should go beyond simply introducing teachers to platforms and instead focus on developing specific competencies within the digital environments they use daily.

Structural Barriers

The second key finding demonstrates that teachers' struggles are not limited to individual skill gaps but are rooted in structural challenges that extend across pedagogical, technical, and organisational dimensions. This finding strongly supports the argument made by Samaniego López et al. (2025) and Zou et al. (2025) that the primary barrier to the effective use of technology in inclusion is not a lack of technology itself but rather a lack of adequate and ongoing professional development and systematic support for teachers.

The pedagogical challenges revealed by this study, particularly the lack of immediate, multi-sensory feedback—which is essential for special education—highlight a fundamental tension between the individualised and embodied nature of special education practices and the limitations of digital platforms. Teachers described being forced to make continuous pedagogical compromises and to choose tools based on what is technically feasible rather than what is pedagogically ideal. This echoes Starcic's (2010) observation that the potential of educational technology for inclusion can only be realised if technologies are designed, implemented, and supported in truly inclusive ways. The current study indicates that many digital platforms, including Madrasati, have not yet achieved this level of inclusive design, particularly for students with disabilities who require multi-sensory, individualised instruction.

Despite the significant and rapid efforts undertaken by Saudi Arabia in digital transformation, especially through the launch of the Madrasati platform (Almaiah et al., 2022; Ministry of Education, 2020), the organisational challenges participants highlighted point to a gap between the pace of digital transformation and the development of the institutional support structures necessary to achieve inclusive digital education. Teachers indicated a need for more systematic institutional support and clearer policies. It appears that inclusive digital education efforts are still in a transitional

phase, relying heavily on individual teacher initiatives rather than being part of an integrated institutional system. This suggests that the next phase requires a focus on translating ambitious policies into clear implementation mechanisms and sustainable institutional support, which is in line with international research emphasising the importance of bridging the gap between policy design and implementation in the context of educational digital transformation (2025; Rienties et al., 2012).

Reimagining Professional Development

The third finding relates to teachers' clear vision of what they need in effective professional development—a vision that offers practical solutions to the challenges they face. Teachers expressed a clear and evolving vision that differs significantly from the short, general workshop model that still prevails in many contexts. They called for practical, specialised, continuous training that is relevant to their work. Teachers' emphasis on practical, applied training that can be directly implemented in their classrooms aligns perfectly with the findings of Darling-Hammond et al. (2017), which state that effective professional development should be continuous, provide opportunities for active learning, and focus on content relevant to teachers' daily work.

The desire for specialised pathways focusing on digital accessibility, universal learning design, and the safe use of AI reflects an understanding that general technology training is insufficient for the complex work of inclusive digital education. This finding supports the argument of Navas-Bonilla et al. (2025) that teachers need specialised competencies in inclusive digital education that go beyond general digital literacy. It is particularly noteworthy that teachers are encouraged to participate in ongoing classroom training rather than one-off workshops. This preference is strongly supported by research by Luik et al. (2025), who determined that mentoring in educational technology was the most influential element for a successful professional development programme in Estonia.

It is also worth noting that the teachers in this study clearly distinguished between coaching and administrative supervision, underscoring their need for a collaborative, non-evaluative relationship focused on growth rather than assessment. The teachers' emphasis on the non-evaluative nature of coaching reflects a deep understanding that meaningful professional growth requires psychological safety—a space where teachers can take risks, experiment with new practices, and discuss challenges openly without fear of judgment or negative consequences (Trundle et al., 2025).

These findings have important implications for how we understand teacher readiness for inclusive digital education. Theoretically, the study demonstrates that teacher readiness cannot be

understood as simply an individual competency but rather is the product of the interaction of several interconnected dimensions, including teachers' knowledge and skills, organisational support structures, and systemic policy environments. The knowledge–practice gap documented here reveals that teachers may possess a theoretical understanding but remain unable to implement inclusive digital practices due to structural constraints. This points to the need for theoretical models that explain how institutional contexts enable or constrain teacher practice, rather than focusing exclusively on individual competencies.

Practically, the findings present several priorities. First, professional development should shift from awareness-raising to competency-building through sustained, context-specific, practical training that empowers teachers to develop their applied skills in digital environments. Second, addressing structural barriers requires coordinated action at multiple levels: improving platform accessibility and Arabic language support, strengthening the technological infrastructure, and establishing clear institutional policies and support systems for inclusive digital education. Third, teachers should be considered knowledge partners in designing professional development and formulating inclusive digital education policies, rather than passive recipients of top-down initiatives.

Conclusion

This study revealed that special education teachers in Saudi Arabia face significant challenges. They possess the necessary conceptual understanding of inclusive digital education, but they need targeted support to translate this knowledge into practical applications. Bridging this gap requires a systemic shift. First, digital learning platforms must be radically redesigned, prioritising accessibility as a core principle. Second, schools need dedicated technical support staff and reliable infrastructure. Third, professional development must move from individual workshops to sustainable, practice-based models that include ongoing mentoring, collaborative lesson planning, peer-monitoring sessions, and access to communities of practice where teachers can share strategies for using digital tools comprehensively. These concrete measures will enable teachers to move from conceptual understanding to the effective implementation of inclusive digital education.

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Appendices

Appendix 1: Interview Protocol

Special Education Teachers' Readiness for Inclusive Digital Education: A Qualitative Study of Competencies, Challenges, and Professional Development Needs

Dear Teacher,

Thank you very much for agreeing to participate in this study.

My name is Basmah and I am conducting research on how special education teachers in Saudi Arabia experience the use of inclusive digital education for students with disabilities, and what professional development they believe would best support their teaching practice. The interview will take approximately 45 to 60 minutes. There are no right or wrong answers — I am simply interested in hearing about your personal experience and understanding your perspectives on the research topic.

I kindly ask for your consent and participation in this research by taking part in an interview aimed at exploring your opinions and perceptions regarding the study topic.

You are free to choose the time and platform most convenient for you to conduct the interview.

The average interview duration is expected to be approximately 40 minutes, and the interviews will be audio-recorded for scientific analysis purposes.

Please be assured that your participation and data are strictly confidential and will be used solely for scientific research purposes. All data will be destroyed upon completion of analysis, and no real names will be used. You also have the right to withdraw at any time.

If you have any questions about this research, please do not hesitate to contact the researcher by phone or via the email address provided below. Please also keep a copy of this consent form for your records.

Thank you sincerely for your kind consent and for taking the time to participate in this research.

Basmah Fahad Alshahrani

bsmh@kku.edu.sa

- I am happy to participate / Signature .....
- I don't prefer to participate.

Opening questions

- Could you briefly describe your current role and the school setting you work in?
- How many years of experience do you have as a special education teacher, and what age groups or disability categories do you primarily work with?
- How would you describe the general level of digital technology use in your school?

Theme One: Current Digital Competencies and Classroom Practice

This theme explores teachers' current skills, knowledge, and day-to-day use of digital technology to achieve inclusive education.

- How familiar are you with the concept of inclusive digital education? How would you define it in your own words?
- How would you describe your current level of digital competence in supporting students with disabilities within your classroom?
- Could you describe a recent lesson in which you used digital technology to support a student with a disability?
- What tools did you use and how did you employ them? What worked well? What did not go as expected?
- How did you adapt the technology to suit the student's specific disability?
- Are you familiar with the Universal Design for Learning (UDL) framework? If so, how do you apply its principles when designing your digital lessons?
- How do you currently use the Madrasati platform to support students with disabilities? Which features do you find most useful and which least useful?

- To what extent does the platform help achieve inclusivity? Are there features you wish it had? Have you found any workarounds to overcome its limitations?
- How comfortable are you with enabling accessibility features — such as captions, screen readers, and text-to-speech — within the digital tools you use?
- What is your experience with modern technologies such as artificial intelligence, augmented reality, and virtual reality in the context of inclusive education for students with disabilities? Have you been able to use any of these in practice? What barriers prevented you from doing so? What would need to change for you to use them regularly?

Theme Two: Structural Challenges Impeding Implementation

This theme explores the pedagogical, technical, and organisational barriers that prevent teachers from translating their theoretical knowledge into actual classroom practice.

- What are the most significant challenges you face when attempting to implement inclusive digital education in your classroom? Are these challenges primarily pedagogical, technical, or organisational in nature? Which challenge has the greatest impact on student outcomes?
- How does the design of the digital platforms you use — including the Madrasati platform — support or hinder your ability to meet the needs of students with disabilities?
- How reliable is the technical infrastructure at your school? How does poor connectivity or equipment failure affect your digital lessons?
- What technical support is available to you when problems arise during a lesson? How would you assess the adequacy of this support?
- How well does the Arabic language interface function in the digital tools you use? What specific limitations have you encountered with regard to students with disabilities? Have you found any tools that handle Arabic well? How does poor Arabic language support affect students with disabilities?
- How would you describe the level of institutional support — such as school leadership — for your efforts in the area of inclusive digital education?

Theme Three: Professional Development Needs and Teachers' Visions

This theme captures teachers' evaluations of existing training and their visions for effective, sustained, practice-based professional development.

- How would you describe the professional development and training you have received to date in the area of inclusive digital education? How adequate has it been? Were the programmes you attended theoretical or practical in nature? Were they specific to special education or general in scope?
- What specific skills or knowledge do you feel you are most lacking when it comes to implementing inclusive digital education effectively?

- If you had the opportunity to design your ideal professional development programme for inclusive digital education, what would it include?
- How important is it to you that professional development is practical and directly applicable in your classroom, rather than theoretical? Could you give an example of training that was — or was not — sufficiently practical?
- What are your thoughts on specialised training tracks — for example, one track focused on digital accessibility, one on designing UDL-aligned lessons, and one on the safe use of artificial intelligence with students with disabilities?
- What role do you think communities of practice and peer collaboration could play in your professional development for inclusive digital education? Do you currently have any informal peer support networks? What would a formal community of practice need to offer in order to be valuable?
- Is there anything else you would like to share about your experiences, challenges, or professional development needs in the area of inclusive digital education?
- Thank you for your time.