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Teachers' digital text competencies in inclusive education: a scoping review

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Digital technology has become an integral part of education, influencing how people read, write, and learn, as well as shaping efforts to create inclusive education for all students. There is a growing need to understand how teachers address the diverse needs and abilities of students in digitally mediated classrooms, and what teacher competencies this work demands. This scoping review synthesizes research on general education teachers' practices and competencies related to the use of digital tools in text activities within inclusive education. Fourteen empirical studies published between 2008 and 2024 were identified across four databases and analyzed through reflexive thematic analysis. The findings indicate that digital tools have the potential to enhance variation in texts, foster student engagement, improve task structure, and support individualization in inclusive settings. To realize this potential, teachers require digital text competencies encompassing the ability to vary textual modalities, scaffold both teaching content and the use of digital tools and undertake additional planning and preparation necessary for digital tool integration.

KEYWORDS

digital competency, digital literacy, inclusive education, scaffolding, teacher competency

1 Introduction

It is important to understand what it means to be a teacher in the contemporary classroom, where the demands of the interrelated developments of inclusion and digitalization shape everyday teaching practices. More than 30 years after the Salamanca Statement (UNESCO, 1994) established the global goal of education for all, inclusive education remains a contested and unevenly realized ideal rather than a coherent pedagogical practice; a fragmented concept (Magnússon, 2022; Nilholm, 2021). As research continues to show limited insights into how general education teachers enact inclusive education in their daily classroom practices (Nilholm, 2021; Paulsrud and Nilholm, 2023), education systems worldwide have undergone rapid digital transformation, accompanied by an increasing integration of digital technologies and digital texts in classroom activities (e.g., Kalantzis and Cope, 2025; Selwyn, 2022). Teaching reading and writing today involves engagement with digital texts and tools that require new forms of professional knowledge and pedagogical skill (Godhe et al., 2020; Starkey, 2020). Previous research suggests that teachers often use digital tools to support students on an individual basis (e.g., Svensson and Lindeblad, 2019) and that digital texts can enhance variation and representation, thereby providing academic support for diverse learners (Bray et al., 2024). However, despite the parallel prominence of inclusion and digitalization in educational policy,

their intersection, particularly in relation to general teachers' professional competencies, remains insufficiently theorized and synthesized. The aim of this study is to scope and synthesize empirical research on teacher competencies in the intersection of text activities, digital tools and inclusive education.

1.1 Inclusive education

The concept of inclusive education is defined in diverse ways across contexts and by different researchers, but generally refers to the inclusion of students with varying needs and abilities within the same educational system, schools, and classrooms. According to the Salamanca Statement (UNESCO, 1994), education was to shift from a segregation of students based on abilities or disabilities, to inclusion in classrooms and schools (Florian, 2019; Göransson and Nilholm, 2014; Magnússon, 2022; Nilholm, 2021; Paulsrud and Nilholm, 2023). The statement marked a breakthrough for inclusive education as global goal, meaning that as many students as possible should participate as much as possible in general education setting. However, researchers have argued that, even three decades later, the development of inclusive education has been sporadic and uneven both within and between countries (e.g., Magnússon, 2022; Nilholm, 2021). This unevenness is reflected in the persistent ambiguity surrounding the concept of inclusion in educational policy (Magnússon, 2022) and in research across both general and special education (Florian, 2019). In their research review, Göransson and Nilholm (2014) identified four different definitions of inclusion used in research. The first definition regards inclusion as a placement issue, meaning that if students are placed in the same physical environment they are regarded as included. In the second definition, inclusion is seen as physical placement with the addition of special academic and social support for students with disabilities. In the third definition there is shift in the focus of academic support to include all students rather than only giving additional support to students with disabilities. The fourth and final definition builds on the third but also incorporates social support to create a social community for all students. This last definition of inclusion, adding social practice, means that schools in inclusive education function as meaningful and participatory academic and social environments that integrate students' interests, experiences, and ideas into teaching (Nilholm, 2021).

For this study, inclusion is understood as both providing academic support for all students based on their individual needs and fostering a social community in which every student can participate. This definition is central because earlier conceptualizations reduce inclusion to placement, compensatory support, or broadened instruction, without addressing the relational and community-based conditions through which students' interests, experiences, and agency are integrated into everyday educational practice. Inclusive education within the general classroom therefore entails ensuring both academic and social accessibility for as many students as possible (Persson et al., 2015). Several teaching models for creating academically accessible inclusive education exist (G. Coogle et al., 2022), such as the use of scaffolding (Morcom and MacCallum, 2012), universal design for learning or UDL (Bray et al., 2024) and differentiated instruction (Tomlinson, 2014). Scaffolding refers to the temporary support provided by a teacher or a peer that enables learners to perform tasks beyond their independent ability, gradually transferring responsibility as competency develops

within the proximal zone of development (Verenikina, 2003). It emphasizes dialogue, shared understanding and support both guided learning and enables student participation. Viewed together scaffolding and engagement are closely connected, while scaffolding provides the structure for progression engagement captures the learners behavioral, emotional and cognitive involvement (Li and Xue, 2023). Together, they highlight that inclusive teaching involves balancing guidance with opportunities for belonging, agency and active participation. Building on the fourth definition of inclusive education, Nilholm (2021) concluded in a recent research review that there is limited research on how existing theories of inclusion contribute practically to successful inclusion in the general education setting, explained by a lack of studies about general education teachers realizing inclusion (Magnússon, 2022; Nilholm, 2021). Similarly, a recent review on teacher self-efficacy in inclusive education points to a fragmented and predominantly quantitative approaches leaving limited insight into how competencies are developed and enacted in classrooms (Wray et al., 2022). Together, these findings highlight a gap and the need for further synthesis of research that examines teaching in relation to inclusive education, especially in literacy education, a core domain of schooling where academic participation, engagement, and differentiation are continuously negotiated by general education teachers in ordinary classroom settings.

1.2 Literacy in a digital educational environment

What it means, and demands, to be able to read, write and develop literacy, constantly needs redefining due to societal and technological changes and development (Barton, 2007; Bloome and Green, 2015; Kalantzis and Cope, 2025). This study takes its standpoint from New Literacy studies (e.g., Barton, 2007; Gee, 2015) where literacy is viewed as a contextually bound ability to communicate in different text activities. The communicative activity can consist of both speaking, reading, writing, and/or designing texts (Jewitt, 2008; Kress, 2003), where text is defined as a holistic entity composed of various modalities and forms of expression, such as words, letters, images and sounds (Domingo et al., 2015; Kress, 2003). Thus, texts can include communication through both printed verbal texts, multimodal texts (Domingo et al., 2015) and in various media, so called media-convergent texts (Kress, 2003). The contextualized view of literacy has resulted in a fragmentation and multitude of defined variations of literacy (Jewitt, 2008). Digital literacy is one such variation, first defined by Gilster (1997, p. 1) as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers". Digital literacy has often been used interchangeably with digital competency in research, further fragmenting the terminology (Pangrazio et al., 2020; Spante et al., 2018). As classroom texts increasingly become digital, multimodal, and media-convergent, literacy teaching necessarily involves digital tools and environments. These developments expand the pedagogical possibilities for supporting diverse learners, for example, through variation in representation and expression, but they also introduce new demands on teachers' professional knowledge and judgement (Godhe et al., 2020; Starkey, 2020). Thus, literacy education constitutes a critical site where inclusion and digitalization intersect in practice.

To analyze this intersection, this review adopts the concept of Teachers' Digital Text Competencies (TDTC) as an analytical lens. TDTC refers to teachers' professionally situated competencies to select, design, interpret, and use digital and multimodal texts for

Abbreviations: TDTC, Teachers Digital Text Competencies.

pedagogical purposes in literacy education (Sofkova Hashemi et al., 2020; Sofkova Hashemi et al., forthcoming). Framing teachers' work in terms of TDTC allows for an examination of how digital text practices can function in relation to support, participation, and engagement in inclusive classrooms. In this review we use *competencies* to point to teacher professional aspects that can be detected and possibly measured¹. However, the concepts competences and competencies are being used interchangeably without clear separation in existing research.

Compared to skill and ability, competency is a more comprehensive concept including the two priors but also knowledge, understanding and judgement. Demonstrating competency involves using one's skills and abilities effectively and appropriately in different contexts, applying learning in practice, and adapting it to new situations. Consequently, competencies are highly context-dependent (Illeris, 2012). When the context is digital, however, digital competence (or digital competency) is seen as a concept with a vague conceptual core (Godhe et al., 2020). Its meaning ranges from a technical skills-centered view towards including critical and responsible knowledge and use, and understanding (Skantz-Åberg et al., 2022; Spante et al., 2018). Researchers call for a clearer definition (e.g., Pagani et al., 2016) and point to the fact that the concept of digital competence is used differently in different contexts (Skantz-Åberg et al., 2022). In a global policy context digital competence is used for fostering, measuring, and comparing development in different countries (i.e., OECD, 2023). It also informs national education policy and teacher professional development initiatives. TDTC (Sofkova Hashemi et al., 2020) specifically focuses on the teacher practices of working with multimodal texts using digital tools, and for literacy teaching in a digital environment, combining the textual focus of digital literacy and with the technical skills and abilities of digital competency. TDTC includes both receptive, productive, and communicative skills and abilities, requiring knowledge and understanding of the mediums and modalities used. TDTC requires both basic digital skills, general and/or subject-specific literacy and specific digital text competencies that arise at the intersection of these abilities. Teachers must therefore not only possess these abilities themselves but also understand them theoretically and be able to translate this understanding into classroom practices that support all students' engagement and development in text-based digital activities.

Although previous reviews have addressed teachers' digital competences, digital literacy, or the use of digital tools for learning support, they rarely connect these bodies of research explicitly to inclusive education (e.g., Bray et al., 2024; Skantz-Åberg et al., 2022). Consequently, there is limited synthesized knowledge about how teachers' digital text competencies contribute to inclusive literacy practices or what specific competencies are required to support diverse learners in digitally mediated text activities. Addressing this gap is particularly timely given the increasing expectations placed on teachers to align literacy instruction with both inclusive principles and a rapidly evolving communicative landscape.

In addition, earlier reviews conclude the need for professional development connected to multimodal and digital teaching, assessment and learning (Anderson and Kachorsky, 2019; Tan et al., 2020; Tronsmo and Gilje, 2025).

Against this backdrop, the present review sets out to synthesize research on teachers' use of digital technologies for reading and writing in inclusive educational contexts. By examining this research through the lens of TDTC, the review seeks to contribute to a more integrated understanding of how inclusive education, literacy, and digitalization are enacted in classroom practice, and to clarify the professional competencies required of teachers working at this intersection.

1.3 Aim and research questions

Previous reviews indicate that, while research on inclusive education and digitalization is expanding, there remains limited clarity regarding how general education teachers' digital text competencies are conceptualized and operationalized in relation to inclusive education. There is a need to better understand TDTC in the context of how general education teachers provide academic support and promote student engagement. The previously stated aim, to scope and synthesize empirical research on general education teacher competencies in the intersection of text activities, digital tools and inclusive education, is realized in two research questions:

RQ1: How do general education teachers use digital tools in relation to text activities and inclusive education?

RQ2: What aspects of TDTC are required to support inclusive education in the general education classroom?

2 Materials and methods

To synthesize existing empirical research on general education teachers' usage and digital text competencies in relation to inclusive education, a scoping review was conducted. The reason for conducting a scoping review, rather than a full systematic review, is that scoping reviews are suitable for examining topics that have not yet been comprehensively reviewed (Arksey and O'Malley, 2005; Munn et al., 2018). Given the limited and heterogeneous nature of studies addressing teachers' digital text competencies (TDTC) in inclusive educational contexts, a scoping review enables the mapping of key concepts and research gaps. Following a systematic and transparent process (Arksey and O'Malley, 2005; Grant and Booth, 2009; Page et al., 2021; Tricco et al., 2018), this approach was chosen to allow for the inclusion of diverse study designs and to be able to provide an overview of how digital tools are used by teachers in relation to text activities and inclusive education and what aspects of TDTC are required by teachers in this process.

2.1 Search process

The initial database search was conducted on May 8, 2023, and a supplementary search was performed on August 14, 2025, to ensure the review's comprehensiveness and currency. Both searches were conducted in four databases: ERIC, Education Source (previously Education Research Complete), PsycInfo, and Scopus. These databases were selected for their extensive coverage of empirical research in education and psychology, aligning with the study's focus on teachers' digital competencies in inclusive education. To reflect the aim of

¹ The term competency is used to emphasize the contextual, performative, and integrative aspects of teachers' professional knowledge and practice. However, when referring to previous studies or policy frameworks that explicitly use the term competence, their original terminology is retained.

the study, the three intersecting areas of teacher competency were constructed as three thematic search blocks, targeting (1) inclusive education, (2) multimodal text activities, and (3) teacher competencies. Each search block was constructed to include a wide range of studies, combining multiple free-text terms and subject headings, employing truncation and, in one case, a near-clause operator. To identify a range of studies reflecting the broad conceptualization of inclusion adopted in this review, the inclusive education block was constructed with the broadest range, consisting of 18 free-text queries related to scaffolding, classroom adaptations, assistive technology, and differentiation. The multimodal text activities block comprised five broad free-text queries concerning literacy terms appearing within 20 words of the phrasings digital, electronic, or multimodal to ensure the inclusion of studies addressing diverse digitally mediated text practices across educational contexts. The teacher competencies block included 11 free-text queries relating to competency, skills, abilities, and teaching design to capture the variations in which teacher competencies are conceptualized and operationalized across research traditions. While each search block yielded a substantial number of records independently, combining the three blocks using AND operators substantially narrowed the results to studies situated at the intersection. All search strings and an overview of search results by database are provided in [Appendix A](#).

2.2 Selection procedure

The screening and inclusion of studies followed the guidelines for the PRISMA extension for scoping reviews, PRISMA-ScR ([Tricco et al., 2018](#)), to ensure transparency and systematic documentation of the review process. No review protocol was registered prior to the scoping review. However, the search strategy, inclusion criteria, and screening procedures were defined in advance and applied consistently throughout the review process. After database searches, all records were imported into EndNote 20 and Rayyan, where 34 duplicate records were identified and removed prior to screening. The 140 remaining studies were evaluated against seven inclusion criteria. Studies were required to:

- (1) be peer reviewed,
- (2) employ empirical data,
- (3) contain data collected within general education classroom settings,
- (4) focus on school years 1–10,
- (5) include teachers who differentiated, scaffolded, or used additional adaptations to support students,
- (6) involve the use of digital tools, and
- (7) include text activities.

Limiting included studies to peer-reviewed empirical studies ensured methodological rigor and relevance, while focusing on general education classrooms and school years 1–10 aligned the material with teachers' everyday instructional practices in compulsory schooling. Requiring the inclusion of differentiated, scaffolded, or adaptive teaching practices ensured relevance to inclusive education, while the criteria specifying digital tool use and text-based activities reflected the study's focus on digitally mediated text activities. Together, these criteria enabled a screening of studies situated at the intersection of inclusive education, digital text activities, and teacher competencies.

The 140 studies were screened in two stages. First, titles and abstracts were screened against the predefined inclusion criteria to assess relevance to inclusive education, digital tool use, text-based activities, and teacher competencies within general education settings. At this stage, 103 records were excluded. Second, 37 full-text screenings were conducted independently by two researchers to assess eligibility in relation to the inclusion criteria. Inter-rater agreement at the full-text screening stage was high (84%), with remaining disagreements resolved through discussion with a third researcher. Reasons for exclusion at the full-text stage were documented and are reported in the PRISMA flowchart. The overall process of study identification, screening, and inclusion is summarized in [Figure 1](#).

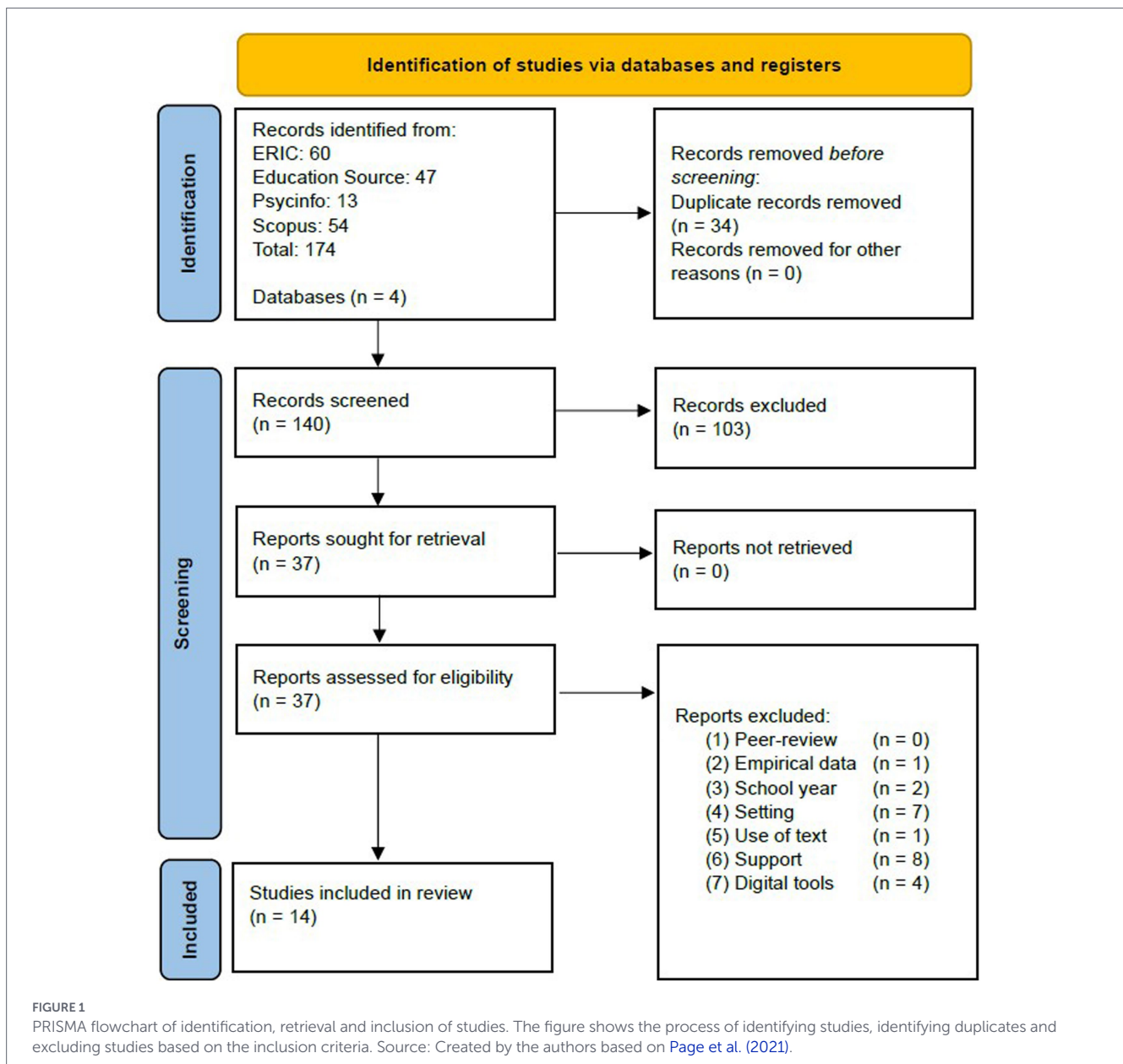
2.3 Review and data analysis

The 14 included studies were analyzed using [Braun and Clarke \(2022\)](#) reflexive thematic analysis. The analysis followed the steps familiarization, coding, code grouping, initial theme generation, and theme revision. Given the review's focus on understanding how general education teachers' digital text competencies are conceptualized and enacted in inclusive education, reflexive thematic analysis was deemed appropriate for capturing both explicit findings and underlying conceptual patterns across the included studies. The researchers first familiarized themselves with the studies through thorough reading and by developing an initial synthesis, which was discussed in relation to their prior understanding of the topic. The studies were then coded in accordance with the research questions, resulting in 39 distinct codes. These codes were subsequently grouped based on shared meanings, forming the basis for the initial themes. The initial themes were then reviewed and refined through comparison with the preliminary synthesis, leading to the final two themes and 7 sub-themes presented in the results. The themes, sub-themes and codes are described in detail and exemplified in [Supplementary File 2](#).

3 Results

The 14 studies included were published between 2008 and 2024. Six studies were conducted in schools in the United States, three in Australia, and one each in China, Guatemala, Finland, New Zealand, and Sweden. The studies vary considerably in their theoretical foundations and stated purposes, as well as in whether their aims focus primarily on literacy and textual aspects, academic support, or the use of digital tools. Ten studies employed a case study methodology, two used mixed methods, one adopted a design-based research approach, and one was based on an intervention study. Classroom observations and interviews are the most common methods for gathering data ($n = 11$), followed by interventions ($n = 6$) including pre- and post-tests. All six interventions addressed technical skills and implementation of digital hardware/software. Although detailed contextual information (e.g., educational level, data collection methods, and participant characteristics) is presented in [Table 1](#), these variables were not used as analytical categories in the thematic analysis. Given the limited number of included studies ($N = 14$) and the heterogeneity of contexts, the analysis focused on identifying patterns across studies rather than comparing findings by context, methodology, or participant characteristics.

Across the studies, teachers' use of digital tools in relation to inclusive education was shown to offer potential for increased textual and



content variation, enhanced student engagement, improved task structure, and more individualized assignments. TDTC in relation to inclusion was evident through demonstrated abilities, and knowledges, specifically the ability to create variation in text activities, the ability to scaffold to meet varying student needs and knowledge to make additional digital teaching preparations. A summary of the studies population, aim, data types and main findings can be found in Table 1.

3.1 Theme 1: the potential of using digital tools related to inclusive education

All studies indicate that the use of digital tools in text-based activities creates opportunities for academic support for students. Digital infrastructure, hardware and software, is put forward as an important part of the implementation (e.g., Barone and Wright, 2008; Hall et al., 2015; Molin and Lantz-Andersson, 2016; Wiebe et al., 2022), while teachers' use of such tools is often constrained by the resources available.

Five studies report that the additional support benefits the lowest achieving students the most (Daley et al., 2020; Hall et al., 2015; Hitchcock et al., 2016; Jesson et al., 2018; McDermott and Gormley, 2016). Across the studies, four main sub-themes of potential for academic and social support emerge: increased variation, increased student engagement, potential for additional structure and individualized learning support.

3.1.1 Increased variation

All studies report that the use of digital tools create opportunities for teachers to support students learning and scaffold text activities by creating a greater variation and representation of content. The most frequently reported form of variation is modality, which appears in 12 of the studies. This is exemplified by Fulton et al. (2018, p. 47):

students generated ideas of how to record observations, data, and thoughts using many types of representations, such as: pictures, labels, sentences, photographs, tables, charts, and

TABLE 1 Summary of studies included.

Publication	Population (Location)	Aim	Data	Main findings
Barone and Wright (2008)	One teacher and one class in elementary school (USA)	Illustrate how digital and media literacies can be integrated into classroom literacy instruction.	Classroom observations, interviews, photographs and teaching material	Laptops complement and extend literacy learning, increasing student engagement. Implementation requires new planning and support. Traditional assessment does not fully capture gains in new literacies.
Baroutsis (2020)	One teacher and one class in year two (Australia)	Map a teacher's pedagogic practices when teaching young children to produce texts using digital technologies.	Classroom observation recorded via time-lapse photographs and field-notes	Teaching involves shifts between teacher- and student-centered practices. Classroom materialities and spatial dynamics shape how texts are produced. Students exercise agency through material and spatial relations.
Daley et al. (2020)	315 students in year 6–8 (USA)	Report on how middle-school readers identified as having reading difficulties engaged with literacy activities.	Pre- and post- reading test and data logs of program usage.	Behavioral engagement is not significantly linked to improved reading comprehension on a general level. Students with lower initial reading skills benefit more from engagement and text-to-speech features.
Fulton et al. (2018)	One teacher and class in year two, one teacher and class in year five (USA)	Investigates how a mnemonic strategy can be used to support students' scientific writing in their science notebooks.	Classroom observations, student texts and teaching material.	The mnemonic strategy can scaffold students' scientific writing. Students with high-incidence disabilities benefit from the structure. Digital and analogue notebook integration is possible.
Hall et al. (2015)	Ten middle-school teachers, 284 students divided in four schools and 14 classes. (USA)	Explores the synergy between Universal Design for Learning and Curriculum-Based Measurement using a digital tool called Strategic Reader.	Pre- and post- reading tests, reading progress monitoring, teacher and student surveys and interviews.	Teachers using digital tool interacted more with student work more frequently. Students, especially with learning disabilities, using the online version of Strategic Reader showed significant growth in comprehension. Students with learning disabilities report higher engagement than other students.
Hitchcock et al. (2016)	Two teachers and two classes from two schools. One class (26 students) had mixed grades 5–8, the other class (20 students) was in grade 7. (USA)	Examines student outcomes, teacher implementation, and social validity of an intervention for expository writing with multimedia tools and scaffolding in science.	Pre- and post- writing tests, teacher and student surveys and focus groups.	Students showed significant gains in writing fluency and writing samples, but not in editing. Teachers and students reported that the intervention made the writing process more transparent, accessible, and engaging. Students showed increased engagement.
Jesson et al. (2018)	25 teachers in six primary and one secondary school. (New Zealand)	Identify pedagogical practices that are effective for teaching writing in schools with diverse student backgrounds.	Repeated standardized writing measures, classroom observations, teaching material and teacher interviews	Digital tools are most effective when used to encourage extended writing, revising, multimodal composition, peer review, and critical thinking. Teachers scaffolding and metacognitive support are important to implementation.
Maher (2011)	Two teachers, one class in year three, one class in year four. (Australia)	Explore ways in which an interactive whiteboard can support students' understanding of a narrative text.	Classroom observations, teacher interviews, student surveys and teaching material.	Teachers and students could draw on a range of knowledge representations from the IWB. The medium supports catering to diverse student needs and mediates dialogue and co-construction of meaning. The usefulness of the tool depends on teacher preparation and teaching strategies.
McDermott and Gormley (2016)	Four teacher and five classes in year 1, 2, 4–6. (USA)	Examine the uses of technology during classroom reading lessons.	Classroom observations, teacher interviews, teacher and student conversations.	Digital technology has multiple purposes in reading lessons, supporting more multimodal and participatory lessons in early grades. Technology supported teachers to differentiate and individualize for individual children. Supportive usability is determined by teacher choices.

(Continued)

TABLE 1 (Continued)

Publication	Population (Location)	Aim	Data	Main findings
Molin and Lantz-Andersson (2016)	One class in year seven. (Sweden)	Scrutinize how literacy events evolve in a classroom where each student has a personal digital device.	Classroom observations and video recorded classroom observations.	Students engage in multiple and shifting reading practices, but traditional schooling tasks remain the dominant structuring resource. Teacher scaffolding is a primary structuring resource, but the specific digital affordances were under-utilized.
Nikula et al. (2024)	Two teachers and one class in year seven (Finland)	Explores how subject-specific knowledge is constructed within content and language integrated learning through multimodal resources.	Video and audio recorded classroom observations.	Teachers employ a rich set of multimodal translanguaging practices to unpack and repack subject-specific knowledge. Semantic waves are more complex when multimodal resources are in use by either aligning or diverging in their function.
Tai (2024)	One teacher and one class in year 10 (China, Hong Kong)	Explore how a mathematics teacher in an English Medium Instruction classroom can use technology together with multilingual and multimodal resources to mediate student learning of both content and language.	Video recorded classroom observations; Teacher interviews	Digital tools expand the teacher's multimodal repertoire. Mobilization of the semiotic repertoires supports content and language learning. The implementation is supported by the teacher's moment-by-moment decision about which language, gesture, visual, or tool to deploy.
Wiebe et al. (2022)	512 students in grades 6–7 (200 students in experiment group) in 20 schools. (Guatemala)	Examines the comparative advantages of digital technology in 10 intervention schools in Indigenous communities.	Pre- and post-tests in Spanish and Mathematics, classroom observations, student focus-group interviews and teacher and principal interviews.	There was limited evidence of statistically significant gains, except in grade 7 reading. The technology enhanced student engagement, access to high-quality learning materials, and teachers' professional growth. The impact depends on teacher training and sustained integration into pedagogy.
Yelland (2018)	459 children from age 2–12 years, 17 teachers and 10 educators. (Australia)	Explore the potential for new learning with new technologies, and to support teachers to use tablets to transform their pedagogies and practices in the early years.	Classroom participating observations, teaching material, teacher interviews.	Digital tools can increase learning as a variation access to modalities support emergent literacy. Integrating digital tools into multimodal pedagogies can help counter inequities in access to digital literacies. Teachers play a key role in designing multimodal tasks, scaffolding how different modes interact, prompting children to shift modes.

recording sheets. In both classrooms, the teacher recorded all of the ideas in the class notebook. ... The class notebook could be a composition book that the teacher projects using a document camera, a chart pad, or a digital document.

The modal variations include having visual or auditive support when reading written texts (e.g., [Maher, 2011](#); [Tai, 2024](#)) and using pictures, movie-clips or interactive elements when creating texts (e.g., [Hitchcock et al., 2016](#); [Jesson et al., 2018](#); [McDermott and Gormley, 2016](#)). Three studies suggest explicitly that working with digital tools also offered new choices of content for teachers ([Hitchcock et al., 2016](#); [Molin and Lantz-Andersson, 2016](#); [Wiebe et al., 2022](#)). This increased choice of lesson content is most notable in the study by [Wiebe et al. \(2022\)](#) where digital tools were introduced for the first time in a previously entirely analogue educational environment.

3.1.2 Increased student engagement

Using digital tools for text activities are shown to increase students' engagement in the task in all studies except [Fulton et al. \(2018\)](#). Increased engagement was demonstrated in various ways, most commonly through greater opportunities for collaboration, reported in the same 13 studies. [Baroutsis \(2020, p. 733\)](#) describes this as follows:

children experienced opportunities to not only produce texts, but also develop critical thinking skills and engage in problem-solving using digital technologies. The children operated within the classroom as engaged, autonomous learners exercising their agency (James, 2009) and demonstrating their capacity to be active agents in their learning (Fielding, 2007; Freire, 1996), while also working collaboratively and creatively to produce print and digital texts and developing twenty-first century skills.

Eight studies report that the use of digital tools fostered greater student agency and more student-centered learning environments (Baroutsis, 2020; Daley et al., 2020; Jesson et al., 2018; McDermott and Gormley, 2016; Molin and Lantz-Andersson, 2016; Tai, 2024; Wiebe et al., 2022; Yelland, 2018). Five studies further indicate that digital assignments and tasks were perceived by students as more authentic and relevant (Jesson et al., 2018; Maher, 2011; Molin and Lantz-Andersson, 2016; Tai, 2024; Yelland, 2018). In the studies by McDermott and Gormley (2016), Yelland (2018) and Jesson et al. (2018) increased creativity was observed to contribute to higher engagement levels. However, some studies also highlight variation within student groups in how actively they engaged with digital tools and tasks (Daley et al., 2020; Hall et al., 2015; Jesson et al., 2018). Moreover, Daley et al. (2020) and McDermott and Gormley (2016) argue that while engagement increased, this was not necessarily accompanied by measurable improvements in learning outcomes.

3.1.3 Potential for additional structure

In 10 of the studies, the use of digital tools was reported to offer opportunities for creating additional structure in lessons and tasks related to text activities. Barone and Wright (2008) and Jesson et al. (2018) note the classes use learning platforms to find and turn in assignments. McDermott and Gormley (2016) describe how teachers made notes and documentation readily available to students by sharing them digitally. Hitchcock et al. (2016, p. 18) illustrate how teachers used PowerPoint to pre-design templates that scaffolded students' writing processes:

The process of developing their writing slide-by-slide and using the photos on each slide to generate writing in PowerPoint was helpful for those students who were often overwhelmed by the writing process when presented with a blank piece of paper.

In eight studies, teachers were also shown to use digital tools to structure assessment and text-editing processes (Barone and Wright, 2008; Baroutsis, 2020; Hall et al., 2015; Hitchcock et al., 2016; Jesson et al., 2018; Nikula et al., 2024; Tai, 2024; Yelland, 2018). The tools were used to facilitate formative peer feedback, and in two studies (Barone and Wright, 2008; Hall et al., 2015) teachers additionally employed automated features for quick assessments.

3.1.4 Creating opportunities for individualized support

In six studies, the use of digital tools was shown to provide opportunities for individualized support during text activities. Digital tools appeared to make it easier for teachers to employ differentiated strategies such as offering individualized feedback on texts produced by students' (Jesson et al., 2018), providing access to a variety of learning resources (Wiebe et al., 2022) and supplying vocabulary explanations (McDermott and Gormley, 2016; Molin and Lantz-Andersson, 2016). This is partly done by assistive technology, including translation functions that support both receptive and productive language skills (Daley et al., 2020). However, five of these studies emphasize that the use of digital tools must itself be scaffolded, as not all students possess the technical skills required to use them effectively (e.g., McDermott and Gormley, 2016; Molin and Lantz-Andersson, 2016).

3.2 Theme 2: teacher competencies required

To use digital tools in text-based activities for providing additional support or scaffolding, teachers require a range of digital competencies encompassing skills, abilities, attitudes, and knowledge. Across all the studies examined, teachers used technology to scaffold and support student learning through various digital tools and platforms. The studies reveal substantial variation in teachers' technical proficiency with both digital hardware and software. Three central aspects of TDTC in relation to inclusion emerge as sub-themes from the material: the ability to create variation in text activities, the ability to scaffold content and tools, and knowledge for making additional preparations in relation to digital technology.

3.2.1 Ability to create variation in text activities

Teachers in all studies demonstrated the ability to vary aspects of their classroom work using digital tools. The most common form of variation involved the use of multiple modalities, reported across all studies. Yelland (2018, p. 854) describes this as a rethinking of pedagogical practice when incorporating iPad applications:

it required understanding ways of encouraging playful explorations (Yelland, 2011) and in the school contexts it was made possible with particular consideration about how to best scaffold the learning with relevant questions, not only about content, but also about how the learning was connected in the various modalities of expression of ideas.

However, nine studies (e.g., McDermott and Gormley, 2016; Wiebe et al., 2022) report that digital tools were primarily used for traditional literacy activities centered on written verbal text. Molin and Lantz-Andersson (2016, p. 141) illustrate this tendency:

the students adjust their actions in accordance with traditional schooling activities conducted using paper and pen. The several options related to cloud sharing of documentation (on Google Drive, Dropbox, etc.) are not utilized; instead, the group chose to send around one iPad and then e-mail the document.

As this example shows, screens were often used merely as digital versions of paper or books, without utilizing the multimodal affordances offered by the technology. Five studies (Barone and Wright, 2008; McDermott and Gormley, 2016; Molin and Lantz-Andersson, 2016; Wiebe et al., 2022; Yelland, 2018) also note that assessment criteria and curricula related to literacy were not adapted for digital practices, continuing to emphasize the decoding and production of written verbal text rather than multimodal expression.

In five studies (e.g., Baroutsis, 2020; Fulton et al., 2018) teachers used digital tools to vary participation structures, alternating between whole-class, group, and individual work depending on lesson goals. In three studies (Fulton et al., 2018; Hall et al., 2015; Jesson et al., 2018) digital technology was used to diversify formative assessment practices. Despite the different forms of variation reported, only six studies explicitly referred to these approaches as differentiation or differentiated instruction (Barone and Wright, 2008; Hall et al., 2015; Hitchcock et al., 2016; Jesson et al., 2018; Nikula et al., 2024; Wiebe et al., 2022).

3.2.2 The ability to scaffold

In 10 studies, teachers were reported to scaffold reading and writing activities using digital tools to accommodate students' diverse needs. Hall et al. (2015) and Tai (2024) describe scaffolding aimed at supporting reading activities through digital tools designed to enhance students' comprehension of texts. Baroutsis (2020) and Fulton et al. (2018) report on scaffolding writing activities, where digital tools helped students develop specific text structures. The remaining six studies (Barone and Wright, 2008; Hitchcock et al., 2016; McDermott and Gormley, 2016; Molin and Lantz-Andersson, 2016; Nikula et al., 2024; Yelland, 2018) describe scaffolding practices supporting both reading and writing. In four studies, teachers modelled the use of digital tools as part of their scaffolding practice. These studies highlight that, in order to provide effective technical scaffolds, teachers themselves needed sufficient technical proficiency to navigate the software. For example, McDermott and Gormley (2016) describe a teacher modelling the use of a Smartboard to demonstrate specific functions in writing software, with the goal of helping students use these features independently. Similarly, Molin and Lantz-Andersson (2016, p. 142) explain that:

the teacher's scaffolding serves as a structuring resource for the students to break the code of the text. By instructing the students in how to read and use the specific app and its features, they get tools for how to read similar apps when doing this work independently. In their discovering of other similar apps, the culture of sharing, which is common in relation to digital technologies becomes another structuring resource.

Together, the studies show that scaffolding in digital contexts extends beyond pedagogy, requiring teachers to merge technical expertise with adaptive instructional strategies to support diverse learners.

3.2.3 Knowledge to make additional preparations

In all studies, teachers use digital tools to develop student literacy within inclusive classroom settings. In six studies, teachers were observed to create their own digital material to use in teaching. Teachers were also observed to use digital platforms where they distributed the material. Barone and Wright (2008) observed a teacher creating a webpage to distribute material; Molin and Lantz-Andersson (2016) describe the creation and use of a private Facebook page; and Jesson et al. (2018) report on teachers using class Google Site and blog:

In all the classes, teachers used a class Google-site for planning, resource dissemination and lesson management. Teachers also reported that the design of the site allowed students to efficiently access support, such as templates, models, resource links and 'rewindability' (the ability to access previous work and resources) and without having to wait for teachers or other students. (p. 21)

In two studies, teachers created guides to help students navigate and use digital materials, although it was not explicitly stated how these guides were distributed (Fulton et al., 2018; Hitchcock et al., 2016). In addition, teachers were observed establishing new classroom routines to manage and support the use of digital tools (Baroutsis, 2020; Maher, 2011; McDermott and Gormley, 2016).

4 Discussion

This review was conducted to better the understanding of general education teachers' competencies and their use of digital tools in relation to text activities within an inclusive education setting. It was guided by two research questions: How do general education teachers use digital tools in relation to text activities and inclusive education? What aspects of TDTC are required to support inclusive education in the general education classroom? The themes identified in this review should be understood as enacted within diverse educational contexts. Variations in educational systems, digital infrastructure, student populations, and institutional support have likely shaped how teachers realize the potential of digital tools for inclusive text-based practices. The approach to focus on identifying patterns across studies rather than comparing findings by context aligns with the purpose of the study, which prioritizes mapping key concepts and practices that cut across diverse educational contexts rather than assessing context-specific effects. Contextual information was instead used to ensure that all included studies met the selection criteria and to support the interpretation and transferability of the findings. Nevertheless, the identified themes across heterogeneous contexts suggest that the reported practices and competencies reflect broadly relevant aspects of teachers' work in digitally mediated inclusive education.

The results show that the teachers in the studies use digital tools to enhance the potential for inclusive education regarding both social and academic support. Digital tools connected to text activities were used to create variation in content and modality, to increase student engagement through collaboration, and to provide scaffolding by modelling and enhancing the structure of reading and writing tasks. To use digital tools in these ways, teachers required TDTC, which were visible in the studies as competencies in managing multimodal texts in digital classrooms to create variation in text use, and in scaffolding both content and tools through productive and communicative skills. Teachers also needed knowledge of how digital tools could be used to structure subject content, which demands subject specific knowledge. Although the ability to vary textual modalities appears to be an important scaffolding strategy, written verbal text seems to continuously hold a strong hierarchical position in school settings through central assessment criteria. As a result, digital tools were frequently used to reinforce traditional literacy practices focused on reading and writing, rather than expanding multimodal approaches.

That only 14 relevant studies were identified in this review supports previous claims (c.f. Magnússon, 2022; Nilholm, 2021) that empirical research on inclusive education in general classroom settings remains limited, at least in relation to text-based activities and teacher competencies.

4.1 How digital tools are used in relation to text activities and inclusive education

Teachers in the identified studies used digital tools connected to text activities to provide students with both academic and social support. Academic support was offered through increased variation, enhanced structure in lessons and assignments, and individualized learning support. The studies show that academic support tends to be more strongly emphasized than social support or community-building, a pattern also identified by Göransson and Nilholm (2014) and Nilholm (2021).

Accessibility for students with different abilities was most frequently enhanced through variations in modality and content,

allowing for a wider range of representations. Similarly, [Bray et al. \(2024\)](#), in a review of technology implementation within Universal Design for Learning (UDL) research, reported a significant emphasis on variation in content representation. Teachers also used digital tools in text-based activities to strengthen the structural support of assignments for all students and to scaffold both traditional and digital literacy. Six studies reported the use of individualized learning support and assistive technologies, such as software that translated texts into another language (c.f. [Daley et al., 2020](#)). Although such individualization offers important academic benefits, it has also been problematized by scholars such as [Selwyn \(2022\)](#), who warn that excessive focus on individualized technological support may reduce opportunities for collaboration and weaken students' sense of community. However, the studies included in this review describe digital tools as increasing student engagement, primarily through collaborative tasks. Shared digital spaces for writing and text design can function as an equalizing factor that enhances accessibility (cf. [Morcom and MacCallum, 2012](#); [Persson et al., 2015](#)) and provides scaffolding that enables students to work together, potentially strengthening their sense of belonging within the classroom community. These results indicate that it is not the digital tools themselves, but rather how teachers use them, that influences the social dimensions of inclusion.

4.2 Aspects of TDTC required to support inclusive education

The results highlight certain aspects of TDTC, suggesting that teachers need the ability to create variation in how texts are used both productively and receptively by students, the ability to scaffold content using digital tools and scaffold the digital tools themselves, and knowledge about digital software and how to use it within the given subject. To realize these abilities and knowledges as competencies teachers appear to need the technical skills to use specific software, which is the focus of the interventions conducted in included studies ($n = 6$). Teachers used digital tools to vary textual modalities both receptively and productively, for example shifting between analogue and digital formats or between written and oral modes. This presupposes an ability to analyze the aims and content of lessons in order to design tasks that allow students to read or produce texts through different modalities, an ability central to TDTC. It is noteworthy, however, that verbal text appears to remain as the dominant modality across the studies. For example, [Molin and Lantz-Andersson \(2016\)](#) describe a teacher that do not fully utilize the affordances of digital tools, as screens were treated as digitized paper. This tendency may be influenced by central assessment criteria that continue to prioritize traditional literacy skills (e.g., [Wiebe et al., 2022](#); [Yelland, 2018](#)), as also reported in earlier research (e.g., [Insulander et al., 2022](#)). Such assessment frameworks may shape teachers' attitudes toward digital and multimodal texts. As [Starkey \(2020\)](#) notes, teachers' personal characteristics are a frequently examined feature of digital competency, and [Skantz-Åberg et al. \(2022\)](#) identify teacher attitudes toward technology as an essential component of professional digital competence. Consequently, when assessment criteria privilege traditional literacy, and teacher attitudes influence technology use, it is unsurprising that some teachers continue to use screens as digitised paper ([Molin and Lantz-Andersson, 2016](#)) or interactive smartboards as expensive chalkboards ([McDermott and Gormley, 2016](#)).

Conceptually, TDTC functions in this review as a relational construct that captures how teachers' digital, pedagogical, and

subject-specific skills, abilities, attitudes and knowledge intersect in practice. Framing teachers' work through TDTC makes visible how decisions about text design, modality, scaffolding, and tool use are simultaneously pedagogical and supportive, as they shape students' access to content, opportunities for participation, and modes of expression. In this sense, TDTC operates as a mediating construct between digital tools, literacy and inclusive education, highlighting that inclusive education and student support is not an inherent property of technology, but one that may emerge through teacher competencies.

The teachers in the studies show TDTC as they are reported to use digital tools to scaffold content and scaffold the use of the digital tools themselves (e.g., [McDermott and Gormley, 2016](#)). For students, digital tools can function as both supportive and scaffolding resources and as obstacles that require technical skill to overcome. As a response, teachers scaffolded both using the tool and scaffolded the use of the tools themselves. They created digital materials and used platforms to enhance task structure, for example, by sharing collective notes or providing access to texts in multiple formats. As noted in previous reviews (e.g., [Skantz-Åberg et al., 2022](#); [Starkey, 2020](#)), teachers combine technical skills and general digital competencies with content knowledge in their classroom practice. Scaffolding through digital tools in text-based activities therefore requires TDTC, that is, understanding both how a tool can support learning and how it can be mastered for classroom use, as well as making informed decisions about which tools to use and how their use should be scaffolded. How teachers make these decisions and how TDTC are enacted in practice are not discussed in the analyzed studies, pointing to a need for further research.

4.3 Limitations

During the search process, the concept of inclusive education was operationalized using 19 free-text queries search terms. This approach was necessary because the term "inclusion" resulted in a substantial number of studies not pertinent to the research questions. The review is limited by the inclusion criteria of English as publication language, which may have led to the exclusion of relevant research conducted and published in other languages. The application of specific inclusion criteria, while ensuring focus and comparability among the selected studies, may also have excluded research with alternative but relevant perspectives on inclusive digital teaching. The variations in educational context are likely to influence inclusive digital practices, but these variations are not systematically compared in this study which may have influenced the results. Despite these limitations, the review provides a viable and valuable synthesis of research at the intersection of inclusive education, digital tools, and literacy. By systematically combining studies across diverse educational contexts, it offers insights into general education teachers' competencies that remain highly relevant for understanding inclusive practices in increasingly digitalized classrooms.

5 Conclusion

The findings of this study show that teachers' use of digital tools connected to text activities creates opportunities for both social and academic support in inclusive education. Social support was primarily realized through increased student engagement, while academic support

was fostered through greater variation, enhanced structure, and individualized learning opportunities. The results also indicate that the competencies teachers require to achieve these outcomes in the general education classroom text activities are linked to both general pedagogical competencies and knowledge and skills related to digital technology, as aspects of TDTC. General teacher competencies, such as the ability to decide when and for what tasks digital tools should be used, and by whom, appear at least as important as technical skills even though the latter were the focus of the interventions analyzed. Across the studies, TDTC also encompassed teachers' attitudes toward digital texts and tools. Some teachers chose to use digital technologies without fully utilizing the affordances offered by the medium. Although the reasons for this are not explicitly addressed in the studies, one possible explanation is that the tools themselves require scaffolding before students can use them. Furthermore, the availability and quality of digital infrastructure continue to play an important role in shaping how digital tools are used in classrooms, a finding consistent with previous research (c.f. Starkey, 2020). Taken together, these findings highlight the need for further research on TDTC: particularly on how, when, and why teachers choose to use digital tools for text activities to enhance inclusive education with the associated work required to structure, and potentially scaffold, both the content and utilization of the digital tools.

Author contributions

KB: Writing – review & editing, Software, Investigation, Writing – original draft, Methodology, Conceptualization, Visualization, Validation, Resources, Data curation, Project administration, Formal analysis. PM: Supervision, Writing – review & editing, Methodology, Conceptualization, Investigation, Validation. DÖ: Conceptualization, Writing – review & editing, Investigation, Validation, Supervision, Methodology.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author(s) declared that Generative AI was used in the creation of this manuscript. The authors used ChatGPT-5 EDU by OpenAI for text editing and translation. The authors have reviewed and edited the output and take full responsibility for the content of this publication.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2026.1742636/full#supplementary-material>

SUPPLEMENTARY FILE 1

Appendix A: Search strings

SUPPLEMENTARY FILE 2

Code book - reflexive thematic analysis

Braun, V., and Clarke, V. (2022). *Thematic analysis: a practical guide*. Los Angeles: SAGE Publications.

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