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Enhancing EFL Instruction in Special Needs Education: Integrating Multimodal Digital Tools and Deep Learning Strategies

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Abstract

Special Needs Education (SNE) faces persistent challenges, particularly in teaching English as a Foreign Language (EFL) to students with disabilities. Limited teacher preparedness, insufficient professional development, and underutilized digital resources contribute to these difficulties, calling for more inclusive instructional approaches. This study explores how multimodal digital tools and deep learning pedagogical strategies—emphasizing higher-order thinking and critical reflection—can support teacher competence and instructional quality in EFL classrooms within the SNE context. Employing a mixed-methods design, the study involved 50 teachers from integrated schools for students with special needs in Indonesia, spanning primary to high school levels. These teachers participated in a professional development program focused on designing interactive digital books using the Book Creator platform. The findings of this study reveal that integrating multimodal digital tools contributed to increased engagement, accessibility, and differentiated instruction for students. At the same time, deep learning strategies encouraged more reflective and adaptive teaching practices. Nevertheless, challenges such as limited access to technology and the need for ongoing training continue to affect implementation. The study recommends sustained institutional support and targeted professional development to promote more inclusive and responsive EFL instruction in special education settings.

Keywords: special needs education, multimodal tools, deep learning approach, inclusive education

INTRODUCTION

The implementation of Special Needs Education (SNE), particularly in the context of English as a Foreign Language (EFL) instruction, continues to encounter a range of pedagogical and institutional challenges (Ochoa, 2017; Puspitasari, 2019; Utami et al., 2021; Lu et al., 2022; Prasetya et al., 2023). Students with disabilities often face difficulties stemming from both linguistic and cognitive demands, which are further intensified by the absence of differentiated content, limited support systems, and restricted access to

alternative modes of communication (Kauts, 2021; Strogilos et al., 2021). Learners in SNE settings also demonstrate varied learning paces, attention spans, and expressive abilities, requiring teachers to adapt instructional materials and strategies to suit individual needs frequently. In addition, EFL learning involves the development of multiple skills—such as grammar comprehension, vocabulary acquisition, pronunciation, and communicative competence—which can be particularly demanding for students with cognitive or speech-related impairments (Kontra et al., 2014; García-Pastor & Miller, 2019; Lintangsari & Emaliana, 2020). As a result, EFL instruction for students with special needs must be inclusive, adaptive, and grounded in a comprehensive understanding of language acquisition processes and special education principles.

In response to learners' diverse and complex needs in inclusive classrooms, multimodal digital tools have emerged as a promising instructional approach, particularly in language learning contexts. These tools refer to digital platforms or resources that integrate multiple modes of communication—such as text, images, audio, video, and interactivity—to present and reinforce information in varied and engaging formats (Algrni, 2020; Kasch, 2019; Rohi & Nurhayati, 2024). Their pedagogical value lies in their capacity to support differentiated instruction and enhance learning accessibility by delivering content through diverse modalities that accommodate a wide range of learning preferences—visual, auditory, and kinesthetic—thereby fostering improved comprehension and retention (Anis & Khan, 2023; Khasawneh, 2024).

A notable example of a user-friendly and accessible multimodal platform is BookCreator, a web-based tool that enables teachers and students to design interactive, multimedia-rich digital books (Fitria, 2024). The platform supports the integration of various input modes, including text, images, audio, video, hyperlinks, and hand-drawn illustrations, allowing users to create personalized and engaging learning materials with ease (Agasi & Desyandri, 2022; Navila et al., 2023). In the Special Needs Education (SNE) context, tools like BookCreator empower educators to develop instructional content that aligns with students' abilities, interests, and learning profiles. This practice is consistent with the Universal Design for Learning (UDL) principles, which emphasize the importance of providing multiple means of representation, engagement, and expression to ensure meaningful and equitable learning opportunities for all students (Hartmann, 2015; Katz & Sokal, 2016).

This emphasis on flexible, student-centered tools aligns with broader pedagogical shifts toward deep learning, strengthening inclusive instructional practices—especially in Special Needs Education. Deep learning is an educational approach that promotes meaningful, long-lasting understanding through higher-order thinking, critical reflection, and personalized learning experiences (Quinn et al., 2019; Mystakidis, 2021). In Special Needs Education (SNE), deep learning is particularly relevant, as it allows teachers to design instruction that is adaptive to individual needs while promoting student autonomy (Levin, 2024). Through reflective activities, scaffolded tasks, and opportunities for self-paced exploration, teachers can help students develop academic skills, critical thinking, and self-awareness (Klefbeck, 2023). Deep learning also enables teachers to respond to students' progress in real-time, adjusting instruction based on individual strengths, challenges, and interests (Quinn et al., 2019). This responsiveness creates a more inclusive and empowering

learning environment where students with disabilities are supported in developing cognitive resilience, ownership of learning, and a deeper engagement with content.

Several studies have explored the challenges of inclusive English language teaching and the use of multimodal and deep learning approaches to support students with special needs. Teaching English in inclusive classrooms presents ongoing challenges, particularly when addressing the diverse needs of students with disabilities. Puspitasari (2019) highlights that English teachers often face difficulties adapting instruction for students with special needs and emphasizes the importance of identifying and addressing these challenges through reflective teaching strategies. This concern is echoed in Prasetya et al. (2023), who investigated the specific difficulties of teaching English vocabulary to deaf students. Their study revealed problems such as misinterpretation of lip movements, limited articulation, and low vocabulary retention. The teacher addressed these through visual media, sign language, and frequent repetition, demonstrating the importance of multimodal communication in inclusive EFL instruction. Researchers have increasingly advocated for multisensory and multimodal approaches to enhance learning outcomes. Algrni (2020) found that the multisensory approach significantly improved vocabulary achievement and retention among EFL learners with learning disabilities.

Similarly, Khasawneh (2024) reported that multimodal instruction positively impacted dyslexic learners, especially when adapted to their initial competence levels and used consistently. These findings affirm the importance of differentiated, sensory-rich instruction in inclusive language classrooms. Technology-enhanced strategies aligned with Universal Design for Learning (UDL) further strengthen inclusive teaching. Kasch (2019) showed that UDL-based ebook prototypes supported vocabulary development and self-regulation, allowing learners to interact with content through multiple modes. Such scaffolding is essential for ensuring equitable access to language learning. Complementing this, Quinn et al. (2019) introduced the deep learning pedagogy, which promotes critical thinking, creativity, and collaboration through meaningful, student-centered learning experiences. Their framework highlights how personalized, reflective learning environments—supported by digital tools—can help all students, including those with special needs, engage more deeply and purposefully with content.

Furthermore, previous studies have explored inclusive English language teaching and highlighted the potential of multimodal and multisensory approaches. However, much of the focus has been on student outcomes, with limited attention to how teachers in Special Needs Education (SNE) perceive and apply digital tools such as BookCreator, particularly in alignment with deep learning pedagogy. This study extends current discussions by examining teacher competence, instructional experiences, and the influence of training programs on adopting multimodal tools in inclusive EFL settings. Through this perspective, the research offers insights into how digital innovation and reflective pedagogy support inclusive practices in SNE classrooms.

METHOD

This study employed a mixed-method approach to comprehensively evaluate the effectiveness of multimodal digital tools in Special Needs Education (SNE), particularly for teaching English as a Foreign Language (EFL). The integration of qualitative and quantitative methods was selected to capture the measurable outcomes and the contextual nuances of

the instructional intervention. Qualitative insights offered depth and understanding of perceptions and experiences (Fischer et al., 2023), while quantitative data provided precision in assessing changes and outcomes. This methodological design enabled triangulation, enhancing the validity of the findings through cross-verification from multiple data sources (Creswell & Clark, 2017). Considering the complex nature of EFL instruction for students with disabilities—including varied language acquisition needs and individual learning profiles, this approach allowed for a well-rounded and rigorous evaluation.

The study included 50 teachers from integrated schools serving students with special needs in Indonesia. These participants worked with learners who had various disabilities, including visual and hearing impairments, physical disabilities, and Down syndrome, across elementary, junior high, and senior high school levels. Each teacher was responsible for a small group of four to five students and employed specialized instructional strategies to meet linguistic and individualized educational needs. The participants were recruited for a seven-day training program organized by a university in Indonesia. They represented a diverse demographic background, varying in age, gender, teaching experience, and educational level.

Table 1. Demographic table of participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	38	76%
	Male	12	24%
Age	20 years	2	4%
	21-35 years	40	80%
	>35 years	8	16%
Teaching Experience	<5 years	15	30%
	5-10 years	25	50%
	>10 years	10	20%
Teaching Level	Primary School (SD)	20	40%
	Junior High School (SMP)	15	30%
	High School (SMA)	15	30%

The training program was conducted over seven days, beginning with foundational sessions on using the BookCreator platform to design interactive and accessible digital books. Participants were introduced to techniques for integrating text, visuals, and audio to address their students' diverse sensory and learning needs. Teachers applied these tools in their classrooms in the following days, tailoring the digital books to meet individual student needs. For example, audio features were used to support visually impaired students. At the same time, visual aids were incorporated for those with hearing impairments alongside tasks that targeted language acquisition goals in line with EFL instruction. The program concluded with a reflective session where participants shared their experiences, discussed implementation challenges, and provided feedback on integrating multimodal tools into their teaching practices.

This study's data collection employed qualitative and quantitative methods to comprehensively address the research objectives. Qualitative data were obtained through structured interviews and focus group discussions (FGDs), which explored participants' perceptions, experiences, and readiness to adopt multimodal tools (Akyildiz & Ahmed, 2021). Interviews were conducted in the participants' native language to ensure clarity and

comfort and were later translated into English for thematic analysis. As Catalano (2016) noted, conducting interviews in the mother tongue enhances the quality and intimacy of responses. The FGDs, conducted in three separate groups, promoted collaborative discussion and captured a range of perspectives across different school contexts. Quantitative data were collected using a standardized evaluation rubric to assess the digital books produced during the training. The rubric measured five key dimensions: content quality, visual design, creativity, multimodality, and curriculum alignment, each rated on a five-point Likert scale. The total scores were used to categorize the books into quality tiers, offering an objective measure of output quality and highlighting areas for improvement. Blitz and Schulman (2016) emphasize that such rubrics are well-suited for assessing the performance and outcomes of professional learning communities.

Furthermore, the collected data were analyzed using methods appropriate to their qualitative or quantitative nature. Quantitative data were examined using descriptive statistics to identify trends, specifically to assess the quality of the digital books produced during the training (Ghanad, 2023). In parallel, qualitative data were analyzed using thematic analysis, a method that supports the development of sensitive, insightful, and trustworthy research findings (Nowell et al., 2017). This process revealed key themes such as inclusivity, student engagement, and implementation challenges, offering a deeper understanding of participants' experiences.

FINDING AND DISCUSSION

The findings address teacher perceptions of multimodal tools, the quality of digital books produced during the training, student engagement and inclusivity, and challenges encountered in implementing these tools within Special Needs Education (SNE). The results offer a comprehensive overview of how multimodal tools function in inclusive EFL instruction by drawing from both quantitative data—collected through rubric-based evaluations and participant feedback—and qualitative data from interviews and focus group discussions. The analysis highlights these tools' practical benefits and limitations in supporting effective and inclusive teaching practices.

Teacher perceptions of multimodal tools

The integration of multimodal tools, mainly through the BookCreator platform, was generally well-received by teachers in Special Needs Education (SNE) settings. Perceptions gathered through structured interviews, focus group discussions, and post-training evaluations reflected a range of positive responses, with some neutral and a few critical perspectives. Teaching experience, student profiles, and school-level infrastructure shaped these views. A significant number of teachers described BookCreator as *"accessible," "engaging,"* and *"student-friendly."* Many highlighted how the platform enabled the creation of customized, sensory-rich learning materials that directly supported English language learning, particularly for students with disabilities. Several participants reported that integrating images, audio, and simplified text helped students better understand vocabulary, improve pronunciation, and stay engaged with the lesson. One teacher explained, *"Multimodal books make learning accessible to all students, particularly those with visual and hearing impairments. It helps them follow along more confidently"* (T7). Another stated, *"For my students with Down syndrome, the combination of pictures, voice recordings, and short text*

made comprehension easier and more enjoyable" (T12). These materials also supported vocabulary retention through repetition and context-based cues.

Teachers working with students with autism also observed increased focus and participation when using interactive books. One shared, *"My student usually struggles to stay focused, but when we used the book with audio and simple visuals, he stayed with the task much longer"* (T15). In addition, several teachers noted that English vocabulary development, mainly nouns, and basic sentence structures, was more effective when presented in a multisensory format. For example, *"When I paired words with clear images and voice narration, my students remembered them better, even after a few days"* (T9). Participants appreciated the platform's flexibility and creative potential, with many reporting that it encouraged more thoughtful instructional design tailored to both language and accessibility needs. One teacher remarked, *"I never thought I could make digital books on my own. This training helped me create materials that finally match my students' real needs"* (T3). Another added, *"I can now design vocabulary books with voice input for speaking practice. My students love hearing my voice read the words"* (T18). This suggests that the platform enhanced content creation and boosted teachers' motivation to integrate technology into EFL instruction.

While most responses were positive, some participants disagreed, citing time constraints as challenging practical implementation. One teacher noted, *"The platform is helpful, but adapting it to each student's needs takes much time, especially with limited prep hours"* (T19). These views reflected the need for ongoing support, particularly in managing planning time for differentiated instruction. A few teachers shared critical feedback, though this was often linked to external constraints such as lack of infrastructure and training rather than dissatisfaction with the platform. For instance, *"The tools are promising, but without proper infrastructure and technical help, we can't use them effectively"* (T25). Another teacher commented, *"We only have one device in the classroom—it's impossible to implement digital books properly"* (T41). Some also mentioned limited internet access as a barrier to fully utilizing the platform's online features.

Evaluating the quality of digital books

The digital books created by teachers during the training were evaluated using a rubric assessing five key dimensions: content quality, visual design, creativity, multimodality, and curriculum alignment. Most books were rated in the "excellent" category, with a strong performance in areas directly supporting English language learning for students with special needs.

Table 2. Evaluation of digital books

Quality Category	Score Range	Percentage (%)	Key Characteristics
Excellent	21–25	80%	Clear and accurate EFL content; strong integration of visuals, audio, and text; culturally relevant themes; adapted sentence structures; accessible to diverse student needs
Good	16–20	20%	Relevant topics; basic multimodal features; engaging layout; partial adaptation for special

			needs; some support for vocabulary development
Needs Improvement	≤15	0%	Limited linkage to EFL objectives; weak or inconsistent multimodal elements; minimal adaptation for students with disabilities; unclear instructional purpose

Teachers demonstrated an apparent ability to develop materials with accurate content and meaningful vocabulary, often adapted to suit different learning profiles. Many books included simplified sentence structures and theme-based vocabulary relevant to students' daily experiences, promoting language accessibility and retention. One teacher shared, *"I used only three-word sentences and repeated them throughout the story. This helped my students with intellectual disabilities remember and say them aloud"* (T10). Another explained, *"I added local cultural elements so the vocabulary felt familiar. My students responded better to words they could relate to"* (T4).

Creativity and multimodality were among the most highly rated aspects. Teachers effectively integrated audio narration, visual cues, and interactive design elements to create engaging resources. Several books were tailored for specific disabilities, such as visual impairment or autism. One participant explained, *"My book included large icons with voice labels so that my blind student could listen and identify each object. He even repeated some of the words after hearing them"* (T21). Another remarked, *"Using images and matching games inside the book helped my hearing-impaired students grasp vocabulary without depending on my spoken instruction"* (T6). However, some books received slightly lower ratings in curriculum alignment. Although the materials were engaging and inclusive, a few lacked clear connections to EFL learning objectives, such as grammar focus, skill progression, or alignment with the national syllabus. One teacher reflected, *"While we aimed to make the materials interactive, ensuring alignment with curriculum goals required additional effort"* (T19). Another mentioned, *"I focused on storytelling but didn't include specific vocabulary targets or grammar points that students were supposed to learn"* (T15).

Student engagement and inclusivity

Integrating multimodal tools through the BookCreator platform significantly improved student engagement and inclusive participation in Special Needs Education (SNE), particularly in English language learning contexts. Based on teacher reports, approximately 85% of students showed increased motivation and participation during lessons involving digital books. Combining audio narration, animated visuals, clickable elements, and simple quizzes encouraged students to interact with the content more actively than with traditional print materials.

Teachers noted that the interactive features supported attention and task persistence, especially among students with cognitive and attention-related challenges. One teacher observed, *"The animations and quizzes embedded in the books keep students engaged for longer periods. Even students who usually lose focus stayed with the task"* (T8). Another added, *"Students are more eager to complete tasks when the content is enjoyable and interactive. They feel like they're playing, not just learning"* (T13). The tools also played a pivotal role in fostering inclusivity. Teachers emphasized how the platform allowed them to personalize content to suit diverse student needs, ensuring equal access to English instruction. Audio narration and enlarged text enabled visually impaired learners to have

independent access to reading materials. One participant shared, *"My student with low vision followed the story using audio and could finally complete the task without waiting for constant assistance"* (T19); for students with hearing impairments, visual prompts, captioning, and image-supported vocabulary made the content more accessible. *"Adding images with keywords helped my hearing-impaired students make meaning without relying on oral explanation,"* noted another teacher (T5).

Beyond sensory support, several teachers observed improvements in language skill development, particularly vocabulary acquisition and oral repetition. The digital books' audio-text synchronization helped reinforce word recognition and pronunciation, while the repetitive use of key phrases supported retention. *"When students hear and see the words simultaneously, they remember them better,"* one teacher explained (T11). Another stated, *"My students repeated after the audio and started to say the words independently after a few sessions"* (T23). In classrooms where learners had autism or developmental delays, teachers reported a notable increase in on-task behavior and positive emotional responses. For example, *"My student usually avoids reading activities, but he smiled and pointed at the pictures, then repeated some of the words. That rarely happens with paper books,"* said one participant (T4).

Challenges in implementing multimodal tools in English language learning

Although using multimodal tools—particularly the BookCreator platform—proved beneficial in enhancing English instruction for students with special needs, teachers encountered several implementation challenges that affected consistent classroom integration.

One of the most commonly cited barriers was limited access to technology, including insufficient devices and unstable internet connections. Several teachers reported that classrooms lacked the resources to support simultaneous digital learning. One participant noted, *"We have to share a single device among multiple students, which limits the potential of these tools. Not all students can interact with the material directly"* (T6). This lack of access reduced student engagement and disrupted the continuity of English language exposure, particularly for learners who required repeated practice. Another significant issue was the limited scope and duration of professional development. While teachers appreciated the initial training, many felt it was too brief to build mastery in using the platform for language instruction. *"The training was a good start, but we need more time and guidance to fully understand how to use these tools effectively in our classrooms,"* said one teacher (T15). Others echoed the need for follow-up sessions focused on designing English language tasks for diverse learners. *"It would help to see examples of vocabulary-building activities or grammar tasks using the platform,"* remarked another participant (T24).

Several teachers also mentioned difficulty aligning multimodal materials with curriculum standards, especially for English as a Foreign Language (EFL). Some expressed uncertainty about integrating grammar or speaking goals into the digital books. *"I know how to make the content engaging, but I'm not sure it always meets the syllabus requirements,"* one participant explained (T9). This indicates a need for pedagogical support that bridges creativity with formal EFL learning outcomes. Systemic and institutional challenges further hindered implementation. These included a lack of administrative support, insufficient funding for digital tools, and rigid schedules that left little time for lesson planning or material development. One teacher shared, *"There's no funding for additional devices, and we*

don't get extra planning time. It's hard to sustain this kind of innovation" (T12). Another added, *"We're expected to teach traditionally, and using digital books is still seen as an extra—not a necessity"* (T27). In addition, some participants expressed hesitation or lack of confidence in using digital tools independently. *"I worry I'll make a mistake with the app during class, and it will confuse the students,"* said one teacher (T3). This points to the importance of technical training, ongoing mentoring, and peer collaboration to build teacher confidence in integrating technology into inclusive EFL instruction.

DISCUSSION

This study examined multimodal digital tools—specifically the BookCreator platform—in enhancing English as a Foreign Language (EFL) instruction for students with special needs. Grounded in principles of inclusive education and deep learning pedagogy, the findings suggest that multimodal tools are promising to improve teacher competence, foster student engagement, and support differentiated instruction in SNE settings. The digital books produced during the training demonstrated high pedagogical creativity and accessibility. Teachers effectively integrated audio narration, visual supports, and simplified language structures, aligning with Mayer's (2022) Cognitive Theory of Multimedia Learning, emphasizing the importance of dual-channel processing and coherence in instructional design. These multimodal features supported the development of foundational EFL skills—particularly vocabulary recognition and oral repetition—by allowing learners to engage with content through multiple sensory pathways (Kaplan-Rakowski & Loranc, 2019; Pu et al., 2024). This echoes the findings of Algrni (2020), who noted that multisensory approaches significantly improve vocabulary achievement and retention among students with learning disabilities.

Moreover, teachers' ability to contextualize content—e.g., through culturally relevant stories, image-supported definitions, and voiceovers—enhanced accessibility and language acquisition. These findings reinforce the work of Khasawneh (2024), who found that multimodal strategies improved English proficiency among dyslexic learners, particularly when content was adapted to their competence levels and preferences. Besides, the training program not only equipped teachers with technical skills but also improved their confidence in designing materials tailored to the needs of students with diverse disabilities (Hayes & Bulat, 2017; Kryszewska, 2017; Crispel & Kasperski, 2019; Arribas et al., 2020). Many reported feelings of being empowered to create more inclusive and responsive learning experiences, reflecting a shift toward more learner-centered, reflective teaching—core principles of deep learning pedagogy (Quinn et al., 2019). Teachers also demonstrated increased awareness of how multimodal features could be used intentionally to scaffold English learning, especially for students with visual, hearing, or cognitive impairments.

Multimodal tools significantly improved student participation, motivation, and attention span (Yaari, 2013; El-Koumy, 2020). Teachers observed higher engagement levels, especially among students with autism, ADHD, or developmental delays—populations that typically experience challenges with sustained attention in traditional language instruction. Synchronized text and audio, interactive quizzes, and culturally relevant images resonated with students and made learning more enjoyable and meaningful (Yaari, 2013; Kasch, 2019; Prasetya et al., 2023). These findings support research by Anis & Khan (2023), who emphasized that multimodal content improves student focus and emotional engagement,

particularly in inclusive settings. Importantly, teachers noted that the platform facilitated more equitable participation by allowing students with sensory impairments to access content independently. Audio narration supported students with visual impairments, while visual prompts and symbols benefited those with hearing difficulties—findings consistent with the inclusive instructional goals outlined by the Universal Design for Learning framework (Katz & Sokal, 2016; Hartmann, 2015). This suggests that multimodal tools can bridge gaps in access and participation when thoughtfully implemented in EFL instruction for SNE learners.

CONCLUSION

The study highlights the importance of sustained, hands-on professional development that builds technical proficiency and deepens pedagogical understanding. Training programs should use multimodal resources to emphasize curriculum alignment, formative assessment, and targeted language skill development. Moreover, schools must invest in basic infrastructure and ensure equitable device access to support inclusive, tech-enhanced instruction. Peer collaboration and mentoring could further enhance teacher capacity and promote the long-term adoption of these tools. When supported by thoughtful pedagogy and institutional infrastructure, Multimodal tools can transform EFL instruction in SNE contexts. They foster inclusivity, enable differentiation, and enhance student engagement—core goals of both inclusive education and deep learning. However, for these innovations to be sustainable, teachers must be supported with structured training, planning time, and a clear framework that links digital design with EFL curriculum outcomes.

While the study offers insight into how teachers implement multimodal tools in inclusive EFL settings, the findings are based solely on teacher perspectives. Including students with special needs in future research could provide a more comprehensive understanding of how these tools influence engagement and language development. Some participants also reported challenges in aligning digital content with formal EFL objectives, suggesting a need to explore pedagogical strategies that better support curriculum integration. A further point is the importance of investigating how multimodal tools can be applied in resource-constrained environments. Future studies may benefit from longer-term, system-level approaches to examine these tools' sustainability and practical integration in inclusive language classrooms.

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