The Language and Literacy Spectrum

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Strategic Considerations for Integrating Digital Technology and Literacy Learning

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I want to acknowledge the fantastic first-grade teacher who allowed me to participate in her classroom and shared her thoughts on digital technology and literacy learning.

As educational technology continues to progress rapidly, educators at all grade levels and in all content areas are working to integrate changing devices and platforms into their teaching. This study was guided by the following questions: How can educators make decisions about integrating digital technology into their literacy teaching? How can learning activities be effectively designed to support both literacy growth and experience with digital tools for young learners? This article presents four strategic considerations for developing learning experiences that support literacy skills through the effective use of digital technology. It will analyze examples from a case study in a first-grade classroom where digital technology was integral to literacy learning and consider what knowledge the teacher needed to have to make decisions regarding effective integration.

Background

Learning is a reflection of the social and cultural context in which we live and is continually evolving (Bruner, 1990; Street, 2005; Vygotsky, 1978). In the mid-1990s, the New London Group, an international group of researchers, convened to discuss the impact of the internet's development on social interactions and the field of education (New London Group, 1996). This work predicted the significant changes that progressing technologies would bring to learning and literacy. Digital literacy interactions support the integration of literacy, learning, and experiences to create meaning within one's social and cultural context (Lankshear & Knobel, 2011). Learning activities that integrate digital tools and literacy are a growing part of current lived experiences and are increasingly being incorporated into all levels of school settings.

Technological Advancements and Access

The use of educational technology in schools has increased significantly over the past decade and has become even more prominent since the COVID-19 pandemic in 2020. The efforts to provide one-to-one devices have expanded in schools across the United States. According to an EdWeek Research Center (2022) national survey conducted in June 2020, principals and teachers surveyed reported that 68% of high school and middle school students had access to one-to-one devices, while 44% of elementary students had access (p. 5). Additionally, the survey showed that 37% of respondents felt "Access to computing devices provides more options for instruction, lesson plans, and student assignments," and 22% indicated "Additional technology improves students' ability to access information and boosts learning" (EdWeek Research Center, 2022, p. 37).

Post-pandemic, the American Academy of Pediatrics (2025) reports that 90% of public schools now have a tablet or laptop for every student, representing a significant increase from the EdWeek statistic in just three years. These statistics indicate a growing presence of digital devices in educational spaces for use in teaching and learning, mirroring the increasing use of technology in society as a whole.

Young Children and Technology Use

While there has been an increase in school-based technology use, recent research has also shown that young children are spending more time on digital devices in general (Bohnert & Garcia, 2021) and that the age at which they access technology is becoming younger (Konok et al., 2020; Rideout & Robb, 2020). Following the pandemic, a body of research has raised concerns about the excessive use of technology, particularly among young children. In a literature review and meta-analysis of 51 international research studies, Harverson et al. (2025) found a significant negative correlation between the amount of time spent using technology and psychosocial health, social interactions, behavior, and relationships with parents for children ages four to six. These findings, drawn from the reported experiences of over 83,000 parents, highlight potential developmental risks associated with high levels of technology use in early childhood. While the authors acknowledge that contextual factors may influence these outcomes, the overall pattern underscores the importance of critical engagement with screen time during early developmental stages.

Further, in a literature review focused on screen technology and the impact on children and teens, researchers found that the overuse of screen-based technologies has been associated with adverse behavioral, cognitive, and physical effects in an integrative review of empirical articles (Liu et al., 2022). In another literature review, Liu (2022) reviewed nineteen empirical studies for the impacts of screen time on working memory. The review revealed that moderate screen time, particularly when engaged with educational content, had a positive effect on working memory in children and adolescents. However, prolonged screen use has been found to have detrimental effects on working memory, highlighting the potential cognitive risks associated with excessive screen time.

In 2016, the American Academy of Pediatrics (AAP) issued guidelines for the use of media with young children, which were reaffirmed in 2022. These guidelines highlight concerns about the potential developmental and health risks associated with excessive media consumption. Rather than recommending specific time limits, the AAP now emphasizes the importance of quality media content and its role in supporting overall child development, reflecting growing concerns about the broader impacts of prolonged digital technology use. This shift has sparked ongoing debate about the amount of time young children spend on digital devices and the potential consequences for various aspects of their development.

Benefits and Challenges of Technology Use in Classrooms

Despite the concerns regarding the negative impact of digital technology on young children, research has also shown that integrating digital tools in the classroom offers numerous benefits for teaching and learning (Christen, 2009; Higgins et al., 2019; U.S. Department of Education, 2017). In a review of 164 articles on the integration of technology into reading instruction, Yang et al. (2018) identified three significant purposes of technology use: increasing learner motivation and engagement, presenting content in a multimodal format, and supporting online reading activities that facilitate learner collaboration. Additionally, Christen (2009) found that students have more success with learning if their school experiences mirror their experiences outside of school, which are frequently connected to the use of technology. These findings support the increased benefit of integrating digital technology and literacy instruction to support student growth.

While technology can be beneficial for learning, the continued rapid development of digital platforms and tools has created both opportunities and challenges for teaching and learning (Kearney et al. 2017). It has placed new demands on teachers to integrate technology and to expand their knowledge and skills to do so. To prepare students for interactions within the current sociocultural context, schools often require educators to support student learning by integrating educational technology (Siddiq et al., 2016). Despite this expectation and the potential of digital tools for student learning, teachers may be reluctant to integrate these technologies into their teaching consistently (Fraillion et al., 2020). Teachers more ften incorporate digital technology if they see that it is relevant and supports teaching and learning (Ertmer et al., 2012; Ottenbreit-Leftwich et al., 2010; Polly et al., 2020). The integration of technology into early childhood classrooms presents both challenges and opportunities for classroom teachers.

Providing educators with guidelines to consider digital devices and platforms critically would support the increased relevance and effectiveness of literacy teaching and learning through strategic integration planning. This article proposes four strategic considerations for teachers to make decisions about developing literacy learning experiences that use digital tools to support young learners with rich reading, writing, listening, and speaking experiences.

Theoretical Framework

An understanding of Sociocultural Theory, New Literacy Studies (NLS), and the TPACK framework can support an understanding of the integration of digital technology and literacy. Each framework has a unique emphasis, but together, they provide a comprehensive lens through which digital technology and literacy instruction can be understood, planned, and implemented. The sections below describe these three important frameworks and how, when regarded concurrently, they can inform critical decisions that enable high levels of effectiveness in the teaching and learning of literacy with educational technology.

Sociocultural Theory

The sociocultural theory (SCT) posits that learning is an inherently social process through which knowledge is constructed through social and cultural experiences and interactions with others (Vygotsky, 1978, 1984). Given that digital technology use is part of our cultural experience in homes and at school, its use supports learning in many different ways. The connection between technology and learning, along with the social nature of literacy learning in schools, makes the SCT critical to understanding how digital technology experiences can support reading and writing growth in young children. A sociocultural framework supports the study of interactions and experiences through observation and analysis. A critical tenet of SCT is the *Zone of Proximal Development* (ZPD), which represents the space between what a person knows and what they can learn with the assistance of those who are more knowledgeable. Vygotsky (1978) held that this was where cognitive growth occurred. Rogoff (1991) refers to this as *guided participation*, where we begin to internalize social interactions and experiences into our understanding. An understanding of ZPD helps consider how adults and peers support young children’s learning through social interactions.

A second tenet is the concept of *scaffolding*. Scaffolding refers to supporting a learner at the level of their needs and gradually reducing support so independence grows. Wood et al. (1976) considered this a temporary support for learners as they acquire new knowledge or skills. Part of scaffolding is *modeling*, where someone more knowledgeable demonstrates a strategy, task, or behavior for the learner to observe and emulate. Working within the ZPD and providing scaffolding and modeling are important pedagogical techniques that support literacy learning and the learning to engage with digital devices and platforms (Vygotsky, 1978). The SCT aligns with learner-centered teaching approaches that value student knowledge, community understanding, and the use of authentic and meaningful activities. This theory will support an understanding of the decisions the classroom teacher makes and the literacy activities in which learners engage.

New Literacy Studies

The New Literacy Studies (NLS) facilitate the analysis of the complexities involved in integrating digital technology into the teaching and learning of literacy. These works aimed to discuss the social and cultural implications of rapidly progressing technology on teaching and learning (New London Group, 1996; Street, 2005). It extends the SCT into the contemporary era, influenced by digital technology. The NLS views literacy as a social practice shaped by the sociocultural context in which it occurs. Social and cultural factors influence literacy practices. This work also emphasizes the concept of multiple literacies, acknowledging various ways to engage with texts and multiple modes of communication. With the rise of digital technology, the NLS also considers digital literacies and multimodal forms of communication embedded in digital technology, such as images, sounds, videos, and interactivity within platforms (Kress, 2010; New London Group, 1996). New forms of technology enable instantaneous and global communication, transforming the way we interact socially. The consideration of digital technology use as a social and cultural practice influences our views on technology, and for educators, underscores the need to integrate technology as a pedagogical practice to align with out-of-school practices and expectations. Additionally, this work holds that we act as designers, designing and resigning by receiving, engaging in, and creating meaning through communication, texts, and practices (Kress, 2003; New London Group, 1996; Cope & Kalantzis, 2009). The concept of design in digital spaces supports the development of engaging and effective learning activities that move beyond skill practice. The NLS expands our understanding of communication and literacy in the digital age, as well as how the teacher makes choices for using technology and how it is used in the classroom.

TPACK

The SCT focuses on learning through our social and cultural experiences, and the NLS focuses on the social and cultural considerations of digital technology and its use. These theories provide a lens through which we can view literacy and literacy activities in the current lived experience. The TPACK (Technological Pedagogical Content Knowledge) framework helps teachers further consider the effective use of technology in the classroom through the lens of different types of knowledge (Koehler et al., 2013; Mishra & Koehler, 2006). This framework extends the Pedagogical Content Knowledge (PCK) model by Lee Shulman, incorporating the dimension of technology (Shulman, 1986). When applied to technology integration, the framework indicates that there are three dimensions of knowledge: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) (Koehler & Mishra, 2006). The acronyms will be utilized throughout the article.

The most effective teaching with digital technology occurs when all three of the TPACK domains intersect in practice, and the model helps educators to consider the different aspects of teaching with technology (Koehler et al., 2013; Mishra & Koehler, 2006). The framework also fosters ongoing reflective practice, considering the benefits and challenges of each device or platform used through focus on three domains (Niess, 2011). This lens will support the analysis of the teacher planning and student literacy activities in this study.

TPACK Dimension	Description

Technological Knowledge (**TK**)	Understanding how to use various technologies, such as digital tools, learning management systems, or educational platforms
Pedagogical Knowledge (**PK**)	Knowledge about the processes and practices of teaching and learning, such as management, lesson design, and assessment
Content Knowledge (**CK**)	Mastery of the subject matter that is being taught

Figure 1. TPACK dimensions of knowledge

Incorporating sociocultrual theory, the work of the New Literacy Studies, and TPACK offers a way to explore teaching decisions and practices, particularly in classrooms that integrate digital technology for multimodal and collaborative learning. Together, these frameworks provide educators with a lens to consider what is taught and how it is taught, thereby developing engaging, interactive, and authentic learning experiences. These frameworks not only illuminate *why* technology integration is necessary but also inform *how* it can be done to support authentic literacy development. The activities, designed by the teacher, can foster the growth of young learners in both literacy skills and navigating an increasingly complex digital society. The four strategic considerations outlined in this article demonstrate that educators can design effective literacy learning activities that integrate digital technology for young learners.

Methods

The goal of this study was to explore how a classroom teacher integrated technology into the literacy curriculum to support authentic engagements with platforms and literacy learning. Specifically, the purpose was to gain a deeper understanding of how teachers make decisions to design effective literacy activities that utilize technology. The following research questions guided this study:

- How can educators make decisions about integrating digital technology into their literacy teaching?
- How can learning activities be effectively designed to support both literacy growth and experience with digital tools for young learners?

At the time of data collection, the researcher was in her late thirties and had sixteen years of experience as an elementary school teacher, including six years in first grade, the same grade level as the class featured in this case study. This background provided a strong understanding of early childhood learning standards and the evolving role of digital technology in primary education. Although the researcher was not previously familiar with the specific tools used in the classroom (e.g., tablets and touchscreen TVs), her knowledge of curriculum expectations and developmental appropriateness allowed her to make informed connections between teacher planning and technology integration.

Acknowledging this positionality, the researcher recognized that her experiences could influence interactions and interpretations during the study. Creswell (2013) argues that transitioning from an outside observer to an immersed, insider role can allow for more authentic engagement with participants. To support reflexivity, the researcher maintained a reflexive journal throughout the study (Lincoln & Guba, 1985), allowing for continuous reflection on assumptions, interpretations, and potential biases during the study. Analytical memos served to process insights and ensure that personal background was used to inform understandings of the classroom dynamics. The use of member checking and the alignment of teacher interviews with classroom observations and artifacts further strengthened the credibility of the findings through triangulation and constant comparison.

This study employed qualitative methods, which facilitated rich engagement with students and their teacher in the naturalistic setting of the school, as well as through interview sessions (Marshall & Rossman, 2016). Anchored in an epistemological stance of social constructivism within a sociocultural framework, the research was informed by the understanding that participants' experiences are shaped through interaction and engagement in social and cultural spaces (Vygotsky, 1978).

The study was conducted as an ethnographic case study, which allowed for an in-depth exploration of technology integration with literacy learning in a single classroom setting (Creswell, 2013; Green, 2020; Marshall & Rossman, 2016). This study is best understood as an instrumental case study (Stake, 1995), as it highlights a particular classroom and teacher to generate broader insights into the decisions made about the integration of technology in early literacy instruction. Ethnographic methods support data collection from multiple sources, allowing researchers to view learning from a holistic perspective (Emerson, Fretz, & Shaw, 2011). This approach involved participant observation of daily literacy instruction, artifact collection, and semi-structured interviews with the classroom teacher. The use of participant observation provided insight into both the teacher's approach to technology use and the students' engagement with digital platforms and literacy tasks. As a participant observer, the researcher took on a dual role, engaging with classroom activities while also observing them, thus gaining an insider perspective (Charmaz, 2014; Marshall & Rossman, 2016). The data collection and analysis process is explained below.

Data Collection

Participant observation was conducted in a first-grade classroom located in a rural-suburban-school district, during the literacy block (Green, 2020). The site was selected through a purposeful sampling. As Palys (2008) notes, purposeful sampling involves selecting sites and participants strategically to align with the research objectives. The school was part of a district-wide technology initiative aimed at expanding access to digital tools, with an emphasis on early elementary grades, starting in kindergarten, and was accessible to the researcher. This particular classroom provided an opportunity to observe how technology was integrated into early literacy instruction, making it a suitable context for this case study and the research questions.

The classroom teacher was also selected purposefully due to her role as an early adopter of educational technology in the school. She had taught first grade for eleven of her seventeen years in the profession, piloting one-to-one tablet integration at the first-grade level. Her teaching practices were designed to incorporate the use of tablets and a touchscreen television display, which functioned as an interactive digital whiteboard remotely connected to her laptop. The students in the classroom had individual access to tablets and regularly used them during literacy instruction.

Observations took place once per week for sixteen weeks, with each session lasting approximately one hour. In total, the study included 16 hours of observation and generated approximately 50 pages of field notes. Convenience sampling was employed to recruit student participants, with parental consent serving as the basis for participation (Dörnyei, 2007). Seven students participated, comprising three males and four females. Students ranged in age from 6.0 to 7.2 years. The ethnic composition of these participants was five Caucasians, one Asian, and one student of unknown ethnicity. The school had a total enrollment of approximately 2,200 students, with demographic data indicating the following composition: 92% White, 2% Hispanic or Latino, 2% Asian or Native American/Other Pacific Islander, 2% Multiracial, 1% Black or African American, and 0% American Indian or Alaska Native. Additionally, 18% of students were identified as economically disadvantaged, and 11% were students with disabilities.

Field notes documented not only participant interactions but also environmental elements, including instructional materials, classroom layout, and digital devices and platforms used by participants. Participant observation, as outlined by Emerson, Fretz, and Shaw (2011), enabled the researcher to observe and interpret interactions holistically while being immersed in the learning environment. This immersion supported a deeper understanding of how technology was embedded in instructional practice in this classroom.

In addition to observations, approximately 30 physical and digital artifacts were collected, including student writing samples, digital projects (captured via screenshots and photographs), and classroom displays. As Emerson et al. (2011) highlight, ethnographic research aims to represent the observed setting holistically, encompassing the analysis of artifacts produced within that context. These artifacts offered further insight into how students applied both literacy skills and digital competencies in their learning.

The classroom teacher was interviewed three times using a semi-structured format at the beginning, middle, and end of the study. Each interview lasted approximately one hour. This method facilitated the collection of in-depth data on the teacher's pedagogical reasoning, particularly her decisions regarding the integration of technology in literacy instruction (Marshall & Rossman, 2016). Positioning the teacher as the expert, the interviews allowed the researcher to gain a nuanced understanding of the instructional planning and technology-related choices made within the classroom.

While interviews were also conducted with parents, the data from those interviews were not included in this analysis, as they did not directly address the research questions. The primary data sources informing the findings of this study were the field notes from classroom observations, artifacts, and teacher interviews.

It is important to acknowledge certain limitations in the data collection. The focus on a single classroom within a specific rural-suburban context limits the generalizability of the findings. Secondly, parentpermission was provided to work with a limited number of students, creating a small student sample. This limited the scope of observations and amount of artifacts that could be collected. Additionally, observations were conducted over a 16-week period at the beginning of the school year, which, although rich in data, did not span the entire academic year to encompass the development that occurs from the beginning to the end of the grade. However, the combination of methods, participant observation, artifact collection, and interviews yielded rich, in-depth data that supported the study's goal of understanding effective technology integration in early literacy instruction.

Data Analysis

Data from the case study were re-analyzed with a specific focus on the research questions guiding this article (Green, 2020). A grounded theory approach (Glaser & Strauss, 1967) was employed to explore how classroom teachers make decisions about integrating digital technology into literacy instruction. Grounded theory provides a systematic and iterative method for analyzing qualitative data to construct conceptual understandings and develop emergent theory (Charmaz, 2014).

The researcher followed Saldaña's (2013) coding and theming process for qualitative data reduction. Data sources, including observational field notes and transcribed interviews, were coded in multiple cycles. The analysis began with open coding, which involved identifying initial codes in the data. This was followed by focused coding, where the codes were organized into broader categories based on recurring patterns and conceptual relevance (Saldaña, 2013). The approach supported the development of overarching themes that addressed the central research questions.

Memos written throughout the study were also coded and analyzed. These memos served as reflective tools, allowing the researcher to record evolving interpretations, emergent questions, and insights from both observational and interview data (Emerson et al., 2011). Memos also acted as a bridge between field notes and formal analysis, facilitating the process of theme generation and aligning findings with theoretical constructs.

Throughout the analysis, the constant comparative method was used (Glaser & Strauss, 1967; Charmaz, 2014). This method involved systematically comparing data segments with one another to refine categories and clarify conceptual relationships. According to Fram (2013), constant comparison supports the identification of situated meaning, which is essential in grounded theory analysis. This process enabled the researcher to trace connections between the teacher's articulated strategies during interviews and the activities observed in the classroom, providing insight into how pedagogical intentions were translated into effective teaching and learning where digital technology was integrated.

Ultimately, the data analysis revealed four strategic considerations that the classroom teacher employed in her approach to technology integration during literacy instruction. The findings presented in the following section demonstrate intentional, pedagogically grounded uses of digital tools that support early literacy development in a real-world classroom context.

Results

This study sought to address the following research questions:

1. How can educators make informed decisions about integrating digital technology into their literacy teaching?
2. How can learning activities be effectively designed to support both literacy growth and digital tool use for young learners?

Data collected through participant observations, student artifacts, and semi-structured interviews with the classroom teacher yielded rich insights into how digital tools were purposefully integrated into literacy instruction. The analysis revealed four core strategic considerations that guided the teacher's decision-making and instructional practices. These considerations serve as thematic categories that illustrate effective approaches to digital integration in early literacy:

- Build Digital Connections that Complement Instructional Goals
- Add Digital Tools Strategically
- Allow Students to Lead
- Design Open-Ended, Multimodal Opportunities for Literacy

These themes emerged through an iterative process of open and focused coding, informed by a grounded theory approach to data analysis. They reflect the pedagogical reasoning and instructional strategies observed in the classroom, as well as the teacher's reflections on the role of digital tools in early learning.

Each theme is elaborated upon in the sections that follow, supported by detailed classroom observations, excerpts from teacher interviews, and descriptions of artifacts. The findings are further interpreted through the lens of the TPACK framework (Koehler et al., 2013; Mishra & Koehler, 2006), demonstrating how the teacher's content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) intersect in planning and delivering meaningful literacy instruction.

Together, the data illustrate that with thoughtful design and reflection, educators can create authentic, engaging, and developmentally appropriate learning experiences that support both literacy growth and digital fluency in young learners.

Consideration 1: Build Digital Connections that Complement Instructional Goals

The first strategic consideration, *Build Digital Connections that Complement Instructional Goals*, underscores the necessity of aligning digital technology with educational standards and curricular objectives. As Starkey (2020) notes, a core component of educators' digital competence is in their ability to evaluate and select appropriate digital platforms for classroom integration critically. This aligns with the work of Hutchison and Colwell (2014), who, through a review of empirical studies, examined how the affordances of digital platforms such as multimodality, collaborative potential, and expanded access to resources can effectively support literacy instruction aligned with the Common Core State Standards. These features reflect principles emphasized by the New Literacy Studies (New London Group, 1996; Street, 2005), which advocate for a broader view of literacy as situated, social, and multimodal. When digital tools are thoughtfully paired with literacy goals, they can play a pivotal role in enhancing student engagement and supporting standards-based learning outcomes.

To effectively integrate technology in the classroom, educators can draw upon the interrelated domains of knowledge outlined in the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler et al., 2013; Mishra & Koehler, 2006). First, content knowledge (CK) is crucial for comprehending the grade-level standards and learning objectives that inform instruction. Second, technological knowledge (TK) involves familiarity with available digital platforms, their functionalities across various devices, and the affordances these tools offer for student learning. Ultimately, pedagogical knowledge (PK) is crucial for designing learning experiences that enable students to engage meaningfully with content and demonstrate their understanding through the effective use of technology. The effective integration of these knowledge domains enables educators to design instructional activities that align with curricular goals and are supported by appropriate digital tools.

Educators can begin the integration of digital tools by first identifying the key literacy standards and skills they intend for students to develop, then considering how technology can enhance learning through opportunities for deeper engagement and skill mastery. Within the TPACK framework, this initial step reflects content knowledge (CK), as it involves a thorough understanding of grade-level standards and instructional objectives (Koehler et al., 2013; Mishra & Koehler, 2006). In the case study, the teacher participant consistently emphasized the importance of intentionally selecting digital platforms to support her first-grade students in both literacy development and the acquisition of technological skills. She described her decision-making process, stating, "Here's the lesson, and then I'll say…how would technology take this to the next level?" Her instructional planning began with clearly defined goals, followed by a purposeful alignment of technology to those goals. This process required a synthesis of content knowledge (CK) and technological knowledge (TK), as she needed to understand the available platforms, their compatibility with classroom devices, and the ways in which each platform could enable students to meet instructional objectives. Speaking further about her approach to technology integration, she added:

> I love integrating it in the way I have found to be most successful…I mean, there are times I will be teaching a lesson, and I'll think I can do this better with the [tablet]. I think they'll understand, and I'll just totally shift gears.

She also emphasized the importance of the platform in supporting learning goals. With the proper selection, "It's immersion. You're using all the reading, writing, listening, and speaking skills." The deliberate alignment between learning objectives and the selection of digital technology in this classroom illustrates a purposeful and effective integration of content knowledge (CK) and technological knowledge (TK) to support literacy development.

In one example of a literacy-focused activity early in the school year, the teacher designed a task to develop students' understanding of nonfiction text structures, specifically identifying main ideas and supporting details through the creation of a digital poster. The task also addressed social studies objectives related to fire safety and community. Students incorporated photos from a school assembly and screenshots from various sources to construct their posters, adding features such as a title and captions to communicate key information. This activity integrated nonfiction reading and writing with digital literacy skills, promoting engagement with multiple modalities and technological tools. Its thoughtful design supported students in demonstrating their understanding through product creation, exemplifying the teacher's pedagogical knowledge (PK) and her capacity to integrate technology effectively (Koehler et al., 2013; Mishra & Koehler, 2006).

The teacher noted that the digital platform's affordances contributed to both the task's complexity and student engagement. She explained:

> The thing is, it's so engaging…I think it's the ease of the technology that lets it happen because they're, like I said, they're so engaged, and it's so easy for them to use it that…there's not a second thought on it.

Figure 2 illustrates the instructional goals for literacy and technology that the teacher incorporated into the planning of this activity.

Curricular Goals	**Technology Goals**
1. Designing a non-fiction text with a main idea and details structure. 2. Identifying sources and locating information. 3. Adding non-fiction text features (title, captions, photos, etc.)	1. Use a basic creation platform. 2. Taking screenshots. 3. Importing and integrating photos. 4. Adding text boxes and typing ideas. 5. Navigating online and physical texts to locate information.

Figure 2. Curricular and technology goals for example literacy activity

The learning activity described enabled students to create a literacy artifact within a socially situated context, embedding technology use as a natural and integral component of the classroom culture, one that mirrors students' experiences with technology outside of school. Viewed through the lens of sociocultural theory (SCT), this activity positioned literacy and technology as social practices shaped by interaction and context (Vygotsky, 1978). In this context, the alignment of digital tools with educational standards and curricular objectives, as described in the strategic consideration, reflects the SCT principle that learning occurs within culturally meaningful activities. When teachers thoughtfully select digital platforms based on their affordances, such as multimodality, collaboration, and access to diverse resources, they are providing students with culturally and contextually relevant tools that scaffold their understanding of complex literacy skills.

The alignment of literacy standards with digital technologies reflects a commitment to developing 21st-century competencies identified by the New Literacy Studies, including communication, collaboration, critical thinking, and design (Kress, 2003; New London Group, 1996; Street, 2005). The alignment of digital tools with standards and objectives, as described in the consideration, reflects the sociocultural theory principle that learning occurs within culturally meaningful activities. When teachers thoughtfully select digital platforms based on their affordances, such as multimodality, collaboration, and access to diverse resources, they are providing students with culturally and contextually relevant tools that scaffold their understanding of complex literacy skills.

In this activity, the forms of knowledge emphasized in the Technological Pedagogical Content Knowledge (TPACK) framework offer insight into the teacher's instructional decision-making in aligning digital technology use with literacy standards and objectives (Koehler et al., 2013; Mishra & Koehler, 2006). Content Knowledge (CK) is evident in the teacher's understanding of grade-level literacy skills and learning goals, ensuring that instructional activities target essential concepts such as text structures and the composition of multimodal texts. Pedagogical Knowledge (PK) is demonstrated through the design of scaffolded, developmentally appropriate learning experiences that support student engagement and literacy development. These pedagogical choices reflect an understanding of how students learn and how instructional strategies can be adapted to support varying levels of skill and experience. Technological Knowledge (TK) is shown through the careful selection of digital platforms based on their affordances, such as multimodality, opportunities for collaboration, and access to diverse resources. This requires the teacher to not only understand the functional capabilities and functionsanility of digital tools but also how they can support student learning in a meaningful way.

By beginning with clearly defined literacy objectives and using them to guide both technology selection and activity design, the teacher ensures a strong alignment between content goals and the affordances of digital platforms. The integration of content, pedagogical, and technology knowledge is essential for designing engaging digital literacy experiences, particularly for young learners. This example illustrates how TPACK supports teachers in developing intentional and contextually grounded instructional practices that foster the development of literacy skills and curricular goals through the meaningful use of technology.

Consideration 2: Add Digital Tools Strategically

The second strategic consideration, *Add Digital Tools Strategically*, emphasizes not only the selection of appropriate digital tools but also their intentional integration to enhance literacy instruction through scaffolded learning experiences. This strategic use involves carefully considering how digital tools can support students' literacy development by providing opportunities for modeling, guided practice, and independent exploration. Kang (2018) found that modeling digital tools and allowing children time to explore and experiment with them supported scaffolding in a digital writing workshop, benefiting learners across varying levels of technological proficiency. This approach aligns with Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD), which underscores the importance of instructional strategies such as modeling, demonstration, and scaffolding to bridge the gap between what learners can do independently and what they can achieve with appropriate support. By embedding these strategies within digital contexts, educators can enhance both literacy learning and digital skills in developmentally responsive ways.

While the classroom teacher in the case study utilized multiple platforms for instruction, skill development, and home-school communication, she strategically employed a select number of platforms throughout the year to support integrated, scaffolded student literacy activities. Choosing a limited set of versatile, user-friendly platforms aligned with student learning needs allowed for consistent modeling and progressive development of both literacy and technology skills. The sequence in which these platforms were introduced was carefully considered to gradually increase the complexity of tasks, building on students' prior knowledge of platform features and digital interactions. As platform complexity increased, scaffolding enabled students to draw connections between familiar tools and new digital spaces, facilitating the development of more advanced technological and literacy competencies. This progression supported learners in engaging with increasingly sophisticated tasks, promoting both digital fluency and the production of higher-order literacy. Through this approach, the teacher demonstrated technological knowledge (TK) in selecting platforms that matched students' developmental needs and pedagogical knowledge (PK) by designing scaffolded instruction within students' Zone of Proximal Development (ZPD) (Vygotsky, 1978).

In the observed classroom, the strategic integration of digital tools throughout the year supported students in developing increasingly sophisticated literacy skills while deepening their understanding of how to navigate and effectively utilize digital devices and platforms. At the beginning of the year, the classroom teacher described a project in which students used their tablets and a poster creation platform. She shared:

> Today, the kids are being introduced to the [tablets]. We're talking about taking pictures and saving pictures. Tomorrow we'll go out into the garden. They'll be able to take pictures of the garden. They take those pictures and put them into a theme [digital poster platform] all about the garden. I teach them how to put labels on things…It's that early literacy using technology, and then what they can do is save them to their camera roll and send them home to mom and dad, so mom and dad can see exactly what they did today. It also has that sharing feature, which is important, and the speaking aspect as well. The kids will be recording their voices and telling their parents what they're doing.

This lesson and activity provided experience with basic skills for using digital platforms while engaging students in early literacy learning. This consideration of the elements students need to apply and how they apply them requires pedagogical knowledge (PK), while knowing what features exist in a given platform and how to use them requires technological knowledge (TK) to make instructional choices (Koehler et al., 2013; Mishra & Koehler, 2006).

In the subsequent activity, students were tasked with designing a fire prevention poster using the same digital platform, now with more advanced expectations for both literacy and technology use. The details of this activity were described within the previous consideration. As part of the task, students learned to take screenshots and move beyond simple labeling by composing captions for their images within the poster platform. This not only expanded their technological skill set but also increased the cognitive demands of the literacy task. By requiring full sentences and visual-linguistic integration, the activity supported a deeper engagement with nonfiction conventions. It also encouraged students to create a multimodal product that reflected their growing knowledge of text structure and informational writing. In an interview, the classroom teacher described the project as follows:

> We had the firemen come in and taught us all about the fire truck and what we should do in a fire. We had a bunch of books and materials that we used. We actually used [a digital book platform] to learn about fire safety. We take all those resources and kind of put them together. The kids try to find two or three facts that they want to write about that they learned about fire safety.

In describing the process within the digital poster platform, she said:

> So they actually upload pictures right into that app, pictures they take, or I actually took a couple pictures of them with the firetruck, so I airdropped them to the kids…And then they'll go ahead and add any facts they have…They can type them right in. Most of the facts came from books.

The teacher explained that students were familiar with pulling facts from traditional and digital texts for exit tickets used during literacy centers. This practice supported their work in incorporating facts into digital creations.

This example illustrates how the classroom teacher intentionally increased the rigor of both technology use and literacy skill development through the use of scaffolded instructional design. Students integrated images and information from multiple sources, including photographs that the teacher airdropped to their devices. They progressed from simply adding labels to composing captions that conveyed factual information, demonstrating an increased level of textual sophistication. The project required students to construct a digital artifact that reflected their understanding of nonfiction text structures, specifically, the main idea and supporting details, through the use of appropriate text features. This purposeful integration of digital tools and literacy objectives raised the cognitive demands of the task, supporting deeper engagement and higher learning expectations.

The next digital platform integrated into the curriculum was a digital whiteboard application, which offered similar functionalities to the poster creation platform but also enabled students to produce short videos that included their narration and integrate the use of other applications into the project. In the observed project, students were air-dropped a word problem and learned to import it into the digital whiteboard. The application's drawing tool allowed them to annotate the problem and write an equation. They then used a tens-frame application to solve the problem, captured a screenshot of their work, and imported the image into their digital whiteboard workspace. Following this, students applied the same process to solve the problem on a number line. Having been introduced to these tools in prior lessons, students were now able to integrate their knowledge to combine features from multiple platforms. To conclude the activity, students wrote a sentence in a text box explaining their solution and used the recording function to articulate their approach verbally. The completed project, a multimodal artifact incorporating reading, writing, and speaking, was saved as a video and emailed to the teacher. This task not only expanded students' technological proficiency but also enhanced their literacy skills within the context of a mathematics activity, effectively fostering cross-curricular learning.

During an interview with the classroom teacher, she emphasized the importance of scaffolding the use of applications throughout the year to support students in applying what they already know to engage in more sophisticated activities. She said after introducing the first digital tool used in class that:

> When I go to introduce a new app, it's very easy for them to pick out… that's the share buttons we need to share it. Or a plus sign is the add, so if we want to add anything, we need to use that plus sign. It's pretty much across apps, so it makes it easy for them.

Selecting applications with common features enables growing independence in use and a focus on literacy activities within the platform.

Midway through the observation period, the teacher discussed the new features students were exploring, highlighting the increasingly complex digital platforms. This reflection underscored the intentional scaffolding embedded in her instruction and the strategic use of platforms to support student learning. She said, "Now we're getting into more of the technical things like the icons, air-dropping, taking pictures, uploading pictures into different apps, things like that."

As the school year progressed, the teacher utilized a core set of digital platforms to support a range of literacy activities, progressively increasing both the complexity of the technological skills required and the literacy tasks students were expected to master. The teacher deliberately selected applications that posed greater challenges in terms of technology use while designing literacy activities that fostered deeper learning. This approach provided the scaffolding and modeling necessary for students to progress, as supported by Vygotsky's (1978) concept of the Zone of Proximal Development, through the strategic integration of digital tools. When digital tools are introduced in a sequenced and intentional manner, they become part of the classroom's cultural tools, resources that support learning. These tools, when embedded in authentic literacy tasks, allow students to engage in social practices, interacting with both their peers and digital texts in ways that mirror literacy use outside of school.

Strategically adding platforms also engaged students in practices emphasized in the New Literacy Studies (New London Group, 1996; Street, 2005), such as interacting with texts in diverse ways, using multimodal communication, and developing literacy through digital interactions. When teachers strategically integrate digital tools into literacy instruction, they are enabling students to participate in the multimodal literacy practices that define communication in contemporary society. By scaffolding these experiences through modeling, guided practice, and independent exploration, educators not only support skill development but also help students engage in authentic, socially and culturally relevant uses of literacy. These activities mirror how meaning is constructed and shared outside the classroom, whether through video, images, audio, or interactive digital media.

In designing and scaffolding literacy experiences with digital technology, the teacher applied content knowledge (CK) to identify literacy objectives that were appropriate and aligned with students' developmental levels (Koehler et al., 2013; Mishra & Koehler, 2006). Technological knowledge (TK) enabled the teacher to select platforms that aligned with the goals and understand their features, which were then incorporated into the task design, modeling, and staged introduction of increasingly complex platforms. Pedagogical knowledge (PK) was key to ensuring that both content and technology aligned with students' Zone of Proximal Development (Vygotsky, 1978), guiding how to model activities and scaffold platform use throughout the year. In line with the previous strategic consideration, the teacher's effective use of TPACK (Technology, Pedagogy, and Content Knowledge) ensured that students were able to engage with complex literacy tasks using digital tools, demonstrating how intentional planning and instruction can support advanced learning outcomes for young learners.

Consideration 3: Allow Students to Lead

The third strategic consideration, *Empowering Student Leadership*, highlights the value of allowing students to take the lead in exploring and engaging with new digital tools and literacy activities. As noted previously, allocating time for student-led exploration of technology not only benefits learners but also creates opportunities for instructional scaffolding (Kang, 2018; Vygotsky, 1975). Furthermore, combining scaffolding with whole-class modeling enables students to draw upon their existing knowledge of educational technology. This approach promotes greater independence and a sense of ownership over their learning, ultimately leading to a deeper and more meaningful understanding of the literacy tasks at hand.

Understanding student knowledge of technology and digital tools supports teachers in deciding how to introduce literacy activities and new platforms using a continuum of instructional approaches. These decisions requires teachers to have both pedagogical knowledge (PK) to consider how to best structure a lesson with a digital literacy activity and the technological knowledge (TK) to know what understanding students may already have about the platform to support decisions about scaffolding and modeling (Koehler et al., 2013; Mishra & Koehler, 2006). When students have limited experience with a platform or its features, direct instruction and modeling support the use of this technology for literacy learning activities. If students are familiar with a platform or its features, an interactive inquiry approach to exploring the digital platform for literacy activities supports a collaborative exploration, guided by the teacher. When students understand a platform or tool, they can take the lead in reviewing how to apply it for use in a literacy activity.

Students were leading the lesson when the teacher began by introducing the mathematics-based literacy activity described in the previous section. This activity was described in detail in the previous section. The teacher had initially planned a direct instruction lesson where she would model the use of the new digital whiteboard platform and how to solve a word problem in multiple ways using other applications. As she began the lesson, the teacher explained the activity and mentioned that the students would be using a new platform for the lesson. The teacher displayed the platform on the touchscreen television, and students were seated on the carpet in front of it.

After explaining the activity, she asked the students how they might accomplish the task using the platform on the board. One of the students responded that they would add a picture using the picture icon and then look through the gallery to find the photo to add. The teacher realized that the students were making a connection between the picture icon on this platform and a similar icon they had seen before. This student involvement prompted her to shift to a more inquiry-based approach, where she continued to ask students what they would do next and then modeled the action on the board. When students became uncertain about how to complete a step, she would provide support. However, the lesson shifted from direct instruction by the teacher to a student-led approach, as class members offered directions on how to accomplish the goals. This decision required a strong knowledge of pedagogy (PK) to adjust the teaching approach planned based on the student responses (Koehler et al., 2013; Mishra & Koehler, 2006). In reflecting on this observed activity, the teacher shared:

> The first time I introduced a math word problem was very different than I had in past years. I always kind of let the kids explore it. What do you think we are going to do? How do you think we are going to solve this problem? But this group of kids were very quick to lead me right through how to solve the problem. I mean, they quickly knew that [a digital whiteboard platform] was going to be the best program and why. Okay, well, now we're in [the platform], what should we do? And the kids would say. Let's get that problem from your camera roll and upload it…Now we need to find another app. Well, what app? I mean they walked me through the whole program, and I really never had to teach it. It was very student-led, which was pretty cool to see.

In both the observation and follow-up reflection, the instructional adjustments made by the teacher in response to student background knowledge were evident. She allowed the children to lead the lesson by sharing what they already knew and filled in with instruction and modeling as needed. In the described activity, all of the students successfully created a product that incorporated multiple modes of literacy while solving a word problem, thanks to the pedagogical decisions (PK) made by the teacher to allow the students to lead the lesson.

The teacher further discussed students' ability to navigate digital platforms in class. She shared, "Generally, it's pretty quick and easy. It's amazing how quickly they catch on because they're so familiar with the devices…from using them with mom and dad at home. So it's very similar, really quick." She also noted that students gain more independence with literacy activities utilizing technology, as the year progresses. She said, "Later in the year, they'll come up with ideas. How can we use this program for this?" The focus shifts from teacher-led to student-led literacy activities using digital platforms.

An additional factor that supports students in taking the lead with digital tools for literacy learning is the development of a classroom environment that fosters peer-supported learning. This example again highlights the significance of pedagogical knowledge (PK) in facilitating the development of effective classroom structures that leverage digital technology to enhance literacy experiences (Koehler et al., 2013; Mishra & Koehler, 2006). As students arrive at school with varying experiences with digital technology, some may possess more knowledge of different platforms and their features. Peer mentoring or coaching has been found to be an effective tool for supporting social and academic skills in young learners (Bowden, 2014; North & Kim, 2017). This technique can also support the learning of technology skills. Providing opportunities for peer mentoring, where students help their peers by utilizing digital tools during literacy activities, enables students to emerge as experts. During an interview, the classroom teacher shared her approach to building peer coaching. She shared:

> There’s always those kids that tend to be experts in the classroom, and you find them very quickly. And I try to find an expert at each table who gets it, and then I tell them you’re going to be the expert at this table. I really want you to help the rest of your classmates.

The classroom teacher specifically mentioned a student with limited technology experience at home and in the previous grade level. This student was apprehensive about using technology, but the teacher indicated that through the supportive peer environment, “She kind of emerged as a leader. And it’s really nice to see that she’s helping others at the table.” The teacher encouraged the development of a collaborative environment that enables students to support one another and work together through digital literacy activities. This collaboration can create a positive learning environment and encourage learning.

By allowing students' prior knowledge and experiences to guide learning with digital literacy activities and tools, teachers can tailor their instructional approaches during class lessons to better meet the individual needs of their students. This aligns with sociocultural theory, which posits that students acquire knowledge through social interactions, particularly within the school context (Vygotsky, 1978). The design of the literacy activities also supports students within their Zone of Proximal Development (ZPD), as the teacher and students in the class are guiding the interaction with digital platforms. This is expanding their literacy and technology skills through scaffolding and modeling as a collaborative class activity.

From the perspective of the New Literacy Studies, enabling students to take the lead in their learning creates an environment where both literacy and technology are integrated as social practices (New London Group, 1996; Street, 2005). In this context, learners draw upon their multimodal experiences with digital platforms, applying this knowledge to support their ongoing learning and development. The learners are taking an active role in their learning, exploring and utilizing new digital platforms for literacy learning. In the work of the NLS, literacy encompasses not only reading and writing but also engaging with multiple forms of communication, including digital media (Kress, 2010). By allowing students to lead the exploration of digital tools and literacy activities, teachers provide students with opportunities to engage in these multimodal practices.

Through the lens of the TPACK (Technological Pedagogical Content Knowledge) framework, the teacher demonstrates the application of technological knowledge (TK) by selecting platforms and tools that support multimodal communication, enabling students to create, manipulate, and interact with content in ways that mirror real-world literacy practices (Koehler et al., 2013; Mishra & Koehler, 2006). Pedagogical knowledge (PK) is evident in the teacher's approach to effectively teaching and scaffolding literacy activities involving digital media. By allowing students to take the lead in exploring digital tools, the teacher encourages autonomy, fosters deeper engagement, and promotes social learning.

Lastly, content knowledge (CK) ensures that the digital tools and activities are aligned with the specific literacy goals of the lesson. In empowering students to lead their exploration of digital platforms and create literacy projects, the teacher integrates technological, pedagogical, and content knowledge to inform instructional decisions.

Consideration 4: Design Open-Ended, Multimodal Opportunities

The fourth strategic consideration, *Design Open-Ended, Multimodal Opportunities*, focuses on developing learning activities that allow for creativity and multiple modes of expression. The New London Group (1996) held that people act as designers who create in ways that interpret the culture and reflect society. Through open-ended opportunities, teachers provide students with the chance to design and create in ways that demonstrate their learning, utilizing digital technology, a constant feature of modern society and culture. Kress (2010) maintained that we use multiple modes of communication and select the modes that are most beneficial for the purpose at hand. These modes include visual, verbal, gestural, auditory, and others. The New Literacy Studies also emphasize the importance of multiple modes of communication in the digital age (New London Group, 1996). Multimodality and open-ended design are crucial affordances of integrating digital technology and literacy.

Students can achieve higher levels of learning when teachers strategically select platforms and design digital literacy activities that allow for student autonomy, creativity, and the integration of various modes of communication. These types of open-ended learning activities not only encourage creativity but also foster a deeper understanding of literacy skills. To create these rich digital learning experiences, teachers can select platforms that foster creativity, offer opportunities for student choice, support informed decision-making, and engage learners through multimodal forms of expression. Technological knowledge (TK) is crucial for selecting appropriate platforms to achieve these goals (Koehler et al., 2013; Mishra & Koehler, 2006). However, designing multimodal literacy experiences also requires content knowledge (CK) to establish literacy-based goals and pedagogical knowledge (PK) to understand the diverse modes of literacy and how they interact within the activity. When designing literacy activities that incorporate digital technology, teachers must thoughtfully consider these elements to promote creativity, foster engagement, and support authentic reading, writing, listening, and speaking practices.

In an interview, the classroom teacher described an open-ended, multimodal activity. Students created multimodal digital books focused on phonics patterns and word webs in this activity. Using the same pattern, they developed the web by adding their own words and pictures to the assigned pattern.

> The kids will actually create word webs. So, if they were working on the "o-u" sound, we would do lots of work with books, chaining, things like that, without using the devices, and then we'll go on, and the kids will pick three or four different words. Maybe they'll pick the word cloud, and they'll have to find a picture of a cloud to match it, and then what they'll have to do is write a sentence to go with it. So they'll do a word web…and they'll record their voices. So they read the sentences that they made up…we can save it as a video and embed it in a [digital] book.

This creative activity supported the development of phonics skills while also integrating multiple modes. Students incorporated text, images, and audio to create a multimodal project that demonstrated their learning and provided ongoing support with literacy skills. The teacher added:

> They will actually have a book by the end of the year with all of the vowel combinations we made with their own videos attached, so they can go in and click on the video, and it will have their voice reading all of the sentences.

In designing this literacy activity, the teacher needed to have content knowledge (CK) of the phonics skills and the developmental trajectory of those skill in the grade level, the pegagological knowledge (PK) to know about modes and which would support the phonics activity, and the technological knowledge (TK) to select a platform that allowed multiple modes to be integrated and how to use those features (Koehler et al., 2013; Mishra & Koehler, 2006).

An additional example of open-ended, multimodal literacy using digital technology was the opportunity for students to authentically share their written work. To support their development in reading, writing, speaking, and listening, students wrote stories, designed cover images, and recorded themselves reading their work aloud. This multimodal project enabled students to share their creations with classmates and families through an online platform used in the classroom, fostering both literacy skills and digital communication. The teacher explained further:

> Let's say they write a story that they want to share, what we often do is have them create a cover for the story that they've written, and they simply take a picture of the cover…and then we let them practice reading their story so they become fluent.

In providing additional description, she added,

> So they practice reading that story three or four times with a partner, and then they can record their voice. They send it home. It's a nice piece because it doesn't include the actual writing, so parents aren't really focused on how the spelling is and if there's capital letters or anything like that. They're simply listening to the children tell the story."

During the interviews, the classroom teacher emphasized her goal to utilize digital technology in ways that provided for open-ended, multimodal learning engagements. The examples above exemplify these features and demonstrate how digital tools allowed learners to engage in complex literacy activities for authentic purposes.

In discussing the platforms she used throughout the year for literacy activities, the teacher indicated, “They’re not specific skill apps. They’re really creative apps, and you can use them any way you want, and that has been a huge part of this.” She insisted:

> I don’t want the [tablets] to be used as an app machine. I don’t want them to be used as something they just watch. I want it to be something that these kids are totally engaged in and that they are engaged in for learning. They are using these devices…for the learning involved, and that’s how I use them every day…it’s an active engagement type of thing.

When students are using technology in this way, she said, “You’re doing all of that - reading, writing, listening, thinking.”

The classroom's use of digital platforms that provide open-ended, multimodal opportunities facilitated rich literacy experiences, supporting student growth in alignment with grade-level standards and goals. These platforms enabled students to engage in the creation of complex digital products, which fostered the development of both literacy and technology skills through the intentional design of literacy activities. The Sociocultural Theory (SCT) emphasizes the importance of cultural context and social interaction in learning (Vygotsky, 1978). The use of platforms offering open-ended, multimodal opportunities aligns with SCT by fostering collaborative learning and peer interaction, creating spaces where students engage in social practices. As students apply their knowledge to create within these platforms, they actively participate in cultural practices, mirroring authentic literacy activities in the broader world. Additionally, the teacher guides student interactions with the digital platforms, enabling students to internalize and expand their literacy and technology knowledge within their Zone of Proximal Development (ZPD).

The New Literacy Studies (NLS) framework, which emphasizes literacy practices in a digital society, is closely connected to the classroom’s use of digital platforms and multimodal opportunities (New London Group, 1996; Street, 2005). Through engagement with these platforms, students are immersed in authentic literacy practices that reflect how literacy functions in contemporary society. The open-ended, multimodal platforms also allow for the integration of various modes of communication, a key consideration within the NLS framework (Kress, 2010; New London Group, 1996).

The TPACK (Technological Pedagogical Content Knowledge) framework offers a valuable lens for understanding teachers' decisions in designing open-ended, multimodal literacy activities (Koehler et al., 2013; Mishra & Koehler, 2006). Technological knowledge (TK) is essential for selecting platforms that support multiple modes of expression and enable complex, creative literacy tasks. The teacher intentionally scaffolds opportunities for students to engage in multimodal design and collaborative sharing, demonstrating pedagogical knowledge (PK). Finally, the integration of digital platforms with literacy content goals reflects strong content knowledge (CK), ensuring that students' digital products align with literacy standards. These activities support literacy development by having students create digital products that demonstrate their understanding of text features, storytelling, and communication strategies. The application of content, pedagogical, and technological knowledge in designing open-ended, multimodal literacy activities reflects a thoughtful and cohesive approach to teaching with digital tools.

Discussion

Literacy educators must continue to adjust teaching practices to reflect the current social and cultural contexts within which learners are experiencing modern literacy. Students are engaging in literacy practices with digital technology outside of school on an ongoing basis. The practice of integrating digital tools and platforms in the classroom builds upon their existing digital activities, creating an engaging classroom environment for literacy learning. The classroom teacher in this study affirmed how engaged and confident young students were in their learning using digital tools, saying, "I mean, it's natural to the kids. The kids will say can we do this and can we do this and…they love it." She also noted that the use of tablets supports students in developing problem-solving and collaborative skills. She said the way platforms are used for literacy activities in class

> ...aren't about knowing the answer. It's about the strategies you use, or how did you know, how did you figure that out, or where did you get this, or how did you solve that. So, I think it kind of lends itself to that. That helping mentality of working together and trying to solve a problem.

As the use of digital tools for learning can be so engaging, teachers must apply a critical lens to inform decisions about the technology integrated into the teaching and learning of reading and writing.

The four strategic considerations discussed provide guidance for making these choices for teaching and learning. Each of these considerations requires educators to be knowledgeable about the content, teaching and learning, and technology. The TPACK framework supports an understanding of these areas of expertise that can be applied to make decisions about teaching and learning with technology (Koehler et al., 2013; Mishra & Koehler, 2006).

The first consideration focused on using learning standards and curricular goals to align technology platforms and tools to the developmental needs of learners and support the growth of literacy skills. To accomplish this, the teacher must possess knowledge of the literacy content (CK) to formulate objectives and technology knowledge (TK) to select platforms that will help achieve these objectives (Koehler et al., 2013; Mishra & Koehler, 2006). The design of the learning activity that integrates content and technology takes pedagogical knowledge (PK) to teach students how to accomplish the task, and for the skill to be applied in the activity. When all three areas of knowledge intersect, the use of technology is most effective.

Strategically planning activities that support the growing application of skills and the addition of new digital tools to enhance engagement and growth are additional layers of planning for technology integration, a second consideration. Just as educators apply a scope and sequence for literacy learning, they should also apply this concept to the digital tools used. This consideration requires teachers to have both pedagogical knowledge (PK) and technological knowledge (TK) (Koehler et al., 2013; Mishra & Koehler, 2006). In the findings, the teacher applied the concepts of scaffolding and modeling when integrating digital technology to support learners with increasingly complex platforms and tasks. However, this also requires knowledge of the platforms, what features are present, and what can be done with those features.

The third consideration focuses on responding to students' background knowledge when planning and teaching digital literacy activities to support student growth and allow students to take the lead. This strategy emphasizes strong pedagogical knowledge (PK), as teachers must adjust their instructional approaches to accommodate diverse student backgrounds and teach in collaboration with students (Koehler et al., 2013; Mishra & Koehler, 2006). However, this strategy also requires a knowledge of the content (CK) that is developmentally appropriate for the age group and a knowledge of the technology (TK) that is being used to probe students for their understandings and what information is still needed for learners to apply their content and technology skills in the activity.

Finally, designing literacy activities in digital spaces that allow for creativity and multimodality supports higher-order literacy skills, integrates modalities, and develops engagement and motivation is the fourth consideration. As with the previous consideration, this strategy requires pedagogical knowledge (PK) for the teacher to design tasks that are engaging, multimodal, and allow for creative design while applying literacy knowledge in a digital space (Koehler et al., 2013; Mishra & Koehler, 2006). Knowing the content knowledge (CK) and the technological knowledge (TK) enables the teacher to develop activities that allow learners to demonstrate their literacy skills by creating multimodal artifacts in a digital space. The observations of the classroom in this study suggest that young learners can learn effectively through these complex activities and that the use of digital technology can constructively support their learning.

As each of the strategic considerations discussed in this article is factored into the curriculum planning and lesson design process, educators should ask reflective questions to evaluate the integration of digital technology and literacy learning activities. Figure 3 includes questions to think through for each strategic consideration when planning literacy engagement that involves the use of digital platforms. These questions require the educator to apply their content, technology, and pedagogical knowledge to make decisions about technology use and supports the use of the TPACK framework (Koehler et al., 2013; Mishra & Koehler, 20063). This reflective work supports the effective design and integration of learning activities with digital technology (Niess, 2011). Reflecting on the ways digital technology supports student learning of literacy standards and skills allows for a critical analysis of the integration.

Strategic Considerations	**Questions to Ask**
1. Build Digital Connections that Complement Instructional Goals	● How can we utilize digital technology to learn the curriculum more effectively or more deeply? ● How does the use of the digital tool support growth with standards and skills?
2. Add Digital Tools Strategically	● What purpose does the platform serve, and how are learners going to engage with it? ● What is the sequence of the addition of digital tools?
3. Allow the Students to Lead	● What do students already know, and how can the teacher best support the use of a platform for higher-level learning? ● How does this support decisions about introducing a literacy activity that utilizes digital tools and the tool itself?
4. Design Open-Ended, Multimodal Opportunities	● How can students create artifacts to show their learning in unique ways? ● How can multiple modes be integrated to support literacy learning?

Figure 3. Questions to support the application of strategic considerations

Limitations

As with all qualitative research, this study is subject to certain limitations that must be acknowledged. First, the research focuses on a single case study involving a single teacher and a first-grade classroom. The teacher participant was selected through purposeful sampling due to her high level of engagement with digital technology, which enabled an in-depth exploration of effective integration practices. While the findings offer valuable insight into how technology can support early literacy learning, the limited sample size restricts the generalizability of the results. Additional case studies across grade levels and educational settings would strengthen the evidence base and provide broader perspectives on the strategic considerations teachers employ when integrating digital tools into literacy instruction.

Second, the study was conducted in a rural-suburban district with a well-established elementary technology initiative. This context likely influenced both the accessibility and implementation of digital tools. Research in settings with varying levels of technological infrastructure, including urban, remote, and under-resourced schools, would provide a more comprehensive understanding of how contextual factors influence instructional decisions related to technology use.

A third limitation is the duration of the study, which spanned 16 weeks and included approximately 16 hours of classroom observation. This timeframe enabled the collection of rich data and provided insight into the introduction and early adoption of digital technology in the classroom. However, a more extended study period encompassing a full academic year would offer the opportunity to observe the continued development of student competencies, ongoing engagement with platforms, and evolving instructional strategies over time.

Finally, the primary data sources consisted of participant observations, a limited number of artifacts, and three semi-structured interviews with the teacher. While these sources yielded rich, descriptive data, the inclusion of additional perspectives, such as student interviews or video recordings of classroom interactions, could further enhance the analysis. These supplementary data sources would support a more robust triangulation of findings and potentially reveal additional dimensions of classroom learning and engagement.

Despite these limitations, the study offers strategic considerations that are relevant beyond the immediate context. While rooted in a specific first-grade classroom, the findings contribute to broader discussions about how teachers design effective literacy instruction that integrates digital technology. Future research that explores similar questions across diverse educational settings, grade levels, and subject areas will further advance the field and inform the development of effective, equitable digital literacy practices.

Conclusion

This study offers several important implications for educational policy, instructional design, and teacher professional development. The research highlights the importance of intentional and pedagogically informed technology integration in early literacy instruction. Drawing on the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006; Koehler et al., 2013), the findings show the importance of balancing technological knowledge (TK), content knowledge (CK), and pedagogical knowledge (PK) when designing effective digital learning experiences for young learners.

Curriculum Design and Technology Integration

First, schools should consider embedding technology integration goals into curriculum development processes. This alignment ensures that digital platforms and tools are selected with clear attention to both instructional objectives and developmental appropriateness. Through the lens of TPACK, technology use becomes most effective when grounded in teachers' deep understanding of disciplinary content (CK) and students' developmental needs and literacy trajectories (PK), combined with technological fluency (TK) to make informed instructional choices. Such intentional integration moves beyond rote, skills-based applications, emphasizing instead authentic, engaging, and purposeful literacy practices that reflect the complexities of contemporary digital engagement (Koehler & Mishra, 2006).

When the strategic considerations identified in this study are combined with the TPACK framework, educators are empowered to make instructional decisions that are responsive, developmentally appropriate, and culturally sustaining. This approach recognizes the professional expertise of teachers, and it centers students as active participants in learning, enabling them to use digital tools to construct meaning and express themselves in complex, multimodal ways.

Depth Over Breadth in Platform Selection

A second implication is the need to narrow the scope of educational technology platforms used in classrooms. Rather than prioritizing a breadth of tools, schools and educators should emphasize a deep, sustained engagement with a smaller number of open-ended platforms that allow for creative expression and higher-order thinking. Strategic platform selection requires an integrated consideration of TK, PK, and CK, encompassing the understanding of digital tools' features and limitations (TK), the pedagogical strategies necessary to scaffold and model their use (PK), and the connections to content and curricular outcomes (CK) (Koehler & Mishra, 2006). Focusing on fewer tools enables both teachers and students to develop fluency and flexibility, resulting in richer and more meaningful literacy experiences.

Professional Development and Ongoing Support

Third, the study highlights a teacher with a great deal of experience using digital technology for teaching and learning, but educators have varying backgrounds with digital platforms. As Alaniz and Wilson (2015) and Moser et al. (2021) note, many teachers lack sufficient training to use digital tools effectively. Findings from the EdWeek Research Center (2022) further confirm this, revealing that 36% of administrators and 20% of teachers felt unprepared to integrate technology into instruction. Professional development that is embedded, collaborative, and aligned with curriculum design is essential. Such training must develop teachers' technological knowledge (TK) and support the intersections with content (CK) and pedagogical knowledge (PK), thereby enhancing their capacity to plan and implement literacy lessons that leverage technology meaningfully (Koehler & Mishra, 2006).

Future Research Directions

Finally, future research should delve deeper into the professional development needs of educators, particularly across various grade levels and educational contexts. Moreover, studies that examine the impact of integrating digital literacy in diverse learning environments such as rural, urban, multilingual, and multicultural settings are essential to expanding our understanding of student needs and effective instructional practices. Investigating how technology can support literacy growth while honoring students' sociocultural identities remains a pressing area of inquiry. There is also a need for scholarly work that supports educators in critically evaluating digital tools and platforms, not only in terms of function but also in terms of their implications for equity, access, and student agency. Continued research can inform both pre-service and in-service teacher education programs, ensuring that teachers are equipped with the tools and frameworks necessary for thoughtful integration.

Final Reflections

This study illustrates how one early childhood educator navigated the integration of digital tools into literacy instruction, drawing on all three dimensions of the TPACK framework. Her instructional decision-making demonstrates that effective technology use requires reflective practice, grounded in an understanding of young learners' cognitive, linguistic, and cultural strengths. As Niess (2011) argues, teacher reflection through a TPACK lens is essential for designing and facilitating engaging, responsive, and developmentally appropriate learning experiences.

The findings affirm that young children are capable of using digital tools to create, collaborate, and communicate in meaningful ways. When educators connect technology to content goals and pedagogical intentions while also honoring students' lived experiences, they create powerful opportunities for literacy development. The key is to position children as capable learners and use technology as a tool for empowerment and expression, rather than merely as a means of content delivery and skill practice.

References

American Academy of Pediatrics (2016, November). *Media and Young Minds.* American Academy of Pediatrics. Retrieved from https://publications.aap.org/pediatrics/article/138/5/e20162591/60503/Media-and-Young-Minds

American Academy of Pediatrics (2025, March). *Screen time at school.* American Academy of Pediatrics. Retrieved from https://www.aap.org/en/patient-care/media-and-children/center-of-excellence-on-social-media-and-youth-mental-health/qa-portal/qa-portal-library/qa-portal-library-questions/screen-time-at-school/?srsltid=AfmBOorBnZ-tNpfd0AMizWcgwwdXb4Rdd4IyKOR_wahRtfcewBQRDhT_

Alaniz, K., & Wilson, D. (2015). *Naturalizing digital immigrants: The power of collegial coaching for technology integration* (1st ed.). Rowman & Littlefield Publishers.

Bohnert, M., Gracia, P. (2021). Emerging digital generations? Impacts of child digital use on mental and socioemotional well-being across two cohorts in Ireland, 2007–2018. *Child Indicators research: The Official Jounral of the Interational Society of Indicators 14*(2) 629-659. https://doi.org/10.1007/s12187-020-09767-z

Bowden, S. H. (2014). Rocks, Paper, Scissors: Best Practices in Peer Mentoring. *Dimensions of Early Childhood*, *42*(3), 4-10.

Bruner, J. (1990). *Acts of meaning.* Cambridge, MA: Harvard University Press.

Charmaz, K. (2014). *Constructing grounded theory* (2nd ed.). Sage.

Christen, B. (2009). Technology integration in the classroom. *Master of Education Action Research Papers, 2*(1), 1-18.

Cope, B., & Kalantzis, M. (2009). Multiliteracies: New literacies, new learning. *Pedagogies: An International Journal, 4*(3), 164-195.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Sage.

Dörnyei, Z. (2007). *Research methods in applied linguistics: Quantitative, qualitative, and mixed methodologies*. Oxford University Press.

EdWeek Research Center (2022, June). *Smartphones and other devices in schools: Results of a national survey*. Retrieved from https://epe.brightspotcdn.com/3d/b1/68cea2b846939f67c45d3e2af4c3/tc2020-survey-report-6.5.20.pdf

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic field notes* (2nd ed.). The University of Chicago Press.

Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical

relationship. *Computers & Education, 59*(2), 423-435. http://doi.org/10.1016/j.compedu.2012.02.001
Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2020). Preparing for life in a digital world: IEA International Computer and Information Literacy Study 2018 International Report (1st ed.) Springer International Publishing. Imprint: Springer. https://doi.org/10.1007/978-3-030-38781-5
Fram, S. M. (2013). The constant comparative analysis method outside of grounded theory. *The Qualitative Report, 18*(1), 1-25.
Geertz, C. (1995). *After the fact: Two countries, four decades, one anthropologist*. Harvard University Press.
Glaser, B., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Aldine.
Green, C. (2020). Re-envisioning environmental print: Reading and writing across multiple literacy spaces [Doctoral dissertation, University of Rochester, Rochester, NY]. *ProQuest Dissertations Publishing.*
Harverson, J., Paatsch, L., Anglim, J., & Horwood, S. (2025). Digital technology use and well-being in young children: A systematic review and meta-analysis. *Computers in Human Behavior*, *168*, 108660. https://doi.org/10.1016/j.chb.2025.108660
Higgins, K., Huscroft-D'Angelo, J., & Crawford, L. (2019). Effects of technology in mathematics on achievement, motivation, and attitude: A meta-analysis. *Journal of Educational Computing Research, 57*(2), 283-319. http://doi.org/10.1177/0735633117748416
Hutchison, A. C., & Colwell, J. (2014). The Potential of Digital Technologies to Support Literacy Instruction Relevant to the Common Core State Standards. *Journal of Adolescent & Adult Literacy*, *58*(2), 147-156. https://doi.org/10.1002/jaal.335
Kang, G. Y. (2018). Playing With Digital Tools With Explicit Scaffolding. *The Reading Teacher*, *71*(6), 735–741. https://doi.org/10.1002/trtr.1672
Kearney, M., Schuck, S., Aubusson, P., & Burke, P. F. (2017). Teachers' technology adoption and practices: lessons learned from the IWB phenomenon. *Teacher Development*, 22(4), 481-496. https://doi.org/10.1080/13664530.2017.1363083
Koehler, M. J., Mishra, P., & Cain, W. (2013). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education, 193*(3), 13-19. https://doi.org/10.1177/002205741319300303
Konok, V., Bunford, N., & Miklósi, Á. (2019). Associations between child mobile use and digital parenting style in Hungarian families. *Journal of Children and Media*, *14*(1), 91–109. https://doi.org/10.1080/17482798.2019.168433

Kress, G. (2003). *Literacy in the new media age*. Routledge.
Kress, G. (2010). Multimodality: A social semiotic approach to contemporary communication. Routledge.
Lankshear, C., & Knobel, M. (2011). *New literacies : everyday practices and social learning* (3rd ed.). Open University Press.
Liu, J., Riesch, S., Tien, J., Lipman, T., Pinto-Martin, J., & O'Sullivan, A. (2022). Screen Media Overuse and Associated Physical, Cognitive, and Emotional/Behavioral Outcomes in Children and Adolescents: An Integrative Review. *Journal of Pediatric Health Care*, *36*(2), 99-109. https://doi.org/10.1016/j.pedhc.2021.06.003
Liu, L. (2022). The impact of screen time on working memory function of children and adolescents. In *Proceedings of the 2022 International Conference on Sport Science, Education and Social Development.* http://10.2991/978-2-494069-13-8_30
Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.
Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research*. Sage.
Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.
Moser, K. M., Wei, T., & Brenner, D. (2021). Remote teaching during COVID-19: Implications from a national survey of language educators. *System*, *97*, 102431. https://doi.org/10.1016/j.system.2020.102431
New London Group (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review,* 66, 60-92.
Niess, M. L. (2011). Investigating TPACK: Knowledge growth in teaching with technology. *Journal of Educational Computing Research*, 44(3), 299–317.
North, C., & Kim, J. S. (2017). Peer influence on children's reading skills: A social network analysis of elementary school classrooms. *Journal of Educational Psychology*, *109*(5), 727-740. https://doi.org/10.1037/edu0000166
Ottenbreit-Leftwich, A., Glazewski, K., Newby, T., & Ertmer, P. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education, 55*(3), 1321-1335. http://doi.org/10.1016/j.compedu.2010.06.002
Palys, T. (2008). Purposive sampling. In L. M. Given (Ed.), *The Sage encyclopedia of qualitative research methods* (Vol. 2, pp. 697-698). Sage.
Polly, D., Byker, E. J., Putman, S. M., & Handler, L. K. (2020). Preparing elementary education teacher candidates to teach with technology: The role of modeling. *Journal of Digital Learning in Teacher Education, 36*(4), 250–265. http://doi.org/10.1080/21532974.2020.1795953

Rideout, V., & Robb, M. B. (2020). The common sense census: Media use by kids age zero to eight, 2020. *Common Sense Media.* https://static1.squarespace.com/static/5ba15befec4eb7899898240d/t/5fb2e58acc0b050e6bd149ed/1605559694662/2020_zero_to_eight_census_FINAL_WEB.pdf.

Rogoff, B. (1991). *Apprenticeships in thinking: Cognitive development in social context.* Oxford University Press.

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). Sage.

Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*, 4-14. http://dx.doi.org/10.3102/0013189X015002004

Siddiq, F., Scherer, R., & Tondeur, J. (2016). Teachers' emphasis on developing students' digital information and communication skills (TEDDICS): A new construct in 21st century education. *Computers & Education, 92-93*, 1-14. https://doi.org/10.1016/j.compedu.2015.10.006

Stake, R. E. (1995). *The art of case study research.* Sage.

Starkey, L. (2019). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, *50*(1), 37-56. https://doi.org/10.1080/0305764X.2019.1625867

Street, B. V. (2005). Recent applications of New Literacy Studies in educational contexts. *Research in the Teaching of English*, *39*(4), 417-423.

U.S. Department of Education. (2017). *Reimagining the role of technology in education: 2017 national education technology plan update.* Office of Educational Technology.

Vygotsky, L. S. (1978). *Mind in society: The importance of higher psychological processes.* Harvard University Press.

Vygotsky, L. S. (1984). Interaction Between Learning and Development. In *Mind in society: The development of higher psychological processes* (pp. 84-91). Harvard University Press.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology, Psychiatry, & Applied Disciplines, 17*, 89-100. http://doi.org/10.1111/j.1469-7610.1976.tb00381.x

Yang, X., Kuo, L.-J., Ji, X., & McTigue, E. (2018). A critical examination of the relationship among research, theory, and practice: Technology and reading instruction. *Computers and Education*, *125*, 62-73. https://doi.org/10.1016/j.compedu.2018.03.009