Language and Literacy
Langue et littératie

Culturally Relevant Model for Digital Language and Literacy Instruction

Lauren Eutsler and Araceli Pérez

Volume 24, Number 2, 2022

URI: https://id.erudit.org/iderudit/1092083ar
DOI: https://doi.org/10.20360/langandlit29576

See table of contents

Publisher(s)

Language and Literacy Researchers of Canada

ISSN

1496-0974 (digital)

Explore this journal

Cite this article

Eutsler, L. & Pérez, A. (2022). Culturally Relevant Model for Digital Language and Literacy Instruction. *Language and Literacy / Langue et littératie*, *24*(2), 107–132. https://doi.org/10.20360/langandlit29576

Article abstract

Overwhelming instructional technology options leave teachers searching for efficient approaches to foster differentiated instruction. This study examined an iterative, design-based research approach of one teacher's 10-week digital literacy and language-guided small-group instructional intervention with second-grade unidentified language learners. Students explored 15 language and literacy apps, engaged in personalized reading experiences, and created authentic artifacts reflective of their culture. Findings led to the Culturally Relevant Model for Digital Language and Literacy Instruction, a roadmap for teachers and teacher educators to plan tailored instruction to better meet the needs of identified and unidentified students' language and literacy skills.

Culturally Relevant Model for Digital Language and Literacy Instruction

LAUREN EUTSLER
University of North Texas

ARACELI PÉREZ
University of North Texas

Abstract

Overwhelming instructional technology options leave teachers searching for efficient approaches to foster differentiated instruction. This study examined an iterative, design-based research approach of one teacher's 10-week digital literacy and language-guided small-group instructional intervention with second-grade unidentified language learners. Students explored 15 language and literacy apps, engaged in personalized reading experiences, and created authentic artifacts reflective of their culture. Findings led to the *Culturally Relevant Model for Digital Language and Literacy Instruction*, a roadmap for teachers and teacher educators to plan tailored instruction to better meet the needs of identified and unidentified students' language and literacy skills.

Keywords: Culturally responsive pedagogy; Digital literacies; Elementary school; English Learners

The ability to teach and learn using multiliteracies hinges on integrating technology devices and apps that are changing too rapidly for teachers to establish a routine. The New London Group has made attempts to shift literacy toward a *pedagogy of multiliteracies* that includes "negotiating a multiplicity of discourses" (Cazden et al., 1996, p. 61). Cope and Kalantzis (2009) along with Lotherington and Jenson (2011) have also tried to address the changing nature of literacies however, a perpetuating barrier remains. Teachers find themselves searching for relevant and ongoing support for their technology integration efforts (Buabeng-Andoh, 2012; Liu et al., 2017). According to the 2019 "What's Hot in Literacy Report," which collects expert educator opinions from the member body of the International Literacy Association, the four hottest topics include English learners (ELs), digital/multimodal literacies, disciplinary literacies, and early literacy (Cassidy et al., 2020).

Digital literacy instruction, particularly with young ELs, is imperative because teachers are expected to prepare students for a digitally connected world (ISTE, 2019). Although a compelling examination of Latinx students reading with tablets for about three hours each week increased overall reading achievement (Darling-Aduana & Heinrich, 2018), obstacles kept teachers from integrating technology with their bilingual learners. Teacher buy-in with technology is a challenge because teachers perceive technology as an addition to the curriculum (Hutchison & Reinking, 2011). Similarly, teacher perceptions of their technological knowledge are directly linked to their likelihood to integrate

technology (Ifinedo et al., 2020). Teachers are inundated by the abundance of technology applications, "apps" that are available to select when planning literacy instruction. A May 2021 keyword search on the Apple® app store returned an overwhelming availability of apps: reading (n = 1,294), writing (n = 1,689), and language (n = 779). Earlier research has focused on app selection (Hutchison et al., 2012; Northrop & Killeen, 2013). Less is known about integrating apps into instruction and supporting young students' language and literacy needs (including those unidentified or who have tested out). An unidentified language learner is a student who has never been tested and admitted to the school's bilingual or English as a second language program. Rather than focusing on using technology to support drills and skills instruction, teachers could greatly benefit from having integration models that mimic the flexibility and adaptability required to meet students' individual needs in today's highly diverse classroom. For example, developing curriculum that invites students' cultural backgrounds into the learning experience. To address a paucity of research that supports teachers' implementation of digital language and literacy instruction, this study explores how a teacher and a small group of unidentified ELs in second grade use freely available language and literacy apps on the iPad to support culturally relevant language and literacy instruction.

Language and Literacy Instructional Strategies

State and national learning standards outline knowledge expectations for students. When designing language and literacy instruction, teachers are tasked to consider state-specific English Language Arts standards and English Language Proficiency Standards, in addition to relevant national standards (e.g., TESOL, 2019). Selecting standards is an important process when planning instruction (Ainsworth, 2011), but teachers require strategies that engage and invite students into the learning process.

Teachers and researchers have touted various effective ways to scaffold students' language development. In general, following a culturally relevant pedagogy model folds students into learning with a focus on academic success, cultural competence, and critical consciousness (Ladson-Billings, 1995). A multi-prong approach to instruction is effective when teaching ELs (Calderón et al., 2011; Gersten et al., 2007; Leighton et al., 2019). This includes identifying students' reading difficulties, ongoing progress monitoring, small group instruction with intensive small-group accommodations, varied vocabulary instruction, lessons that incorporate academic English skills, and peer-assisted learning opportunities (Gersten et al., 2007). Students with lower language proficiency levels significantly benefit from small group discussions where text-based evidence is required (Leighton et al., 2019). Related to Gersten et al.'s (2007) recommendation of intensive small-group instruction, students also benefit from an explicit and systematic approach to phonological, phonemic awareness, and phonics-based instruction (Dussling, 2018).

Although students benefited from sharing opinion-based statements when using text evidence (Leighton et al., 2019), ELs tend to ask too general of questions when requesting peer support (Rodriguez-Mojica, 2019). To illustrate, of the bilingual students in one 4th-grade classroom who requested peer support, only 41% of their peers could understand and respond to the question they posed. Instead, students benefit from teacher-

planned lessons that enable language learners to read, speak, write, and listen to vocabulary that is representative of higher-level topics (Manyak & Bauer, 2009).

A more comprehensive reform model can help language and literacy teachers grow professionally (Calderón et al., 2011). Calderón and colleagues' review of EL instruction identified the need to focus on eight instructional approaches: role of administration; language and literacy instruction; content instruction in secondary education; collaborative learning; professional development; family support; tutoring; ongoing monitoring and assessment. While helpful, these strategies are too general to support teachers and lack a cultural focus when implementing digital language and literacy instruction in the earlier grades.

There seems to be collective agreement that cooperative learning and small group intervention are effective strategies to support language and literacy learning. The purpose of this study is to implement strategies that explicitly consider students' diverse cultural backgrounds when designing instruction.

Integrating Technology into Language and Literacy Instruction

Although identifying effective strategies to support language and literacy development is a curricular imperative, the infusion of educational technology into these practices requires teachers to think in layers when designing instruction (i.e., teach the core curriculum, integrate technology, modify instruction). Defining integration can help clarify this complex process. Technology is perceived as *integrated* into instruction when the technology becomes a seamless part of the lesson as if woven into a quilt (Januszewski & Molenda, 2008). A teacher's likelihood to integrate technology hinges on pedagogy, managing the lesson, and engaging students in the learning process (Christ et al., 2019).

Technology and cultural connection challenges for educators. Unfortunately, technology integration continues to be inconsistent in classrooms, as teachers' technology beliefs and prior experiences closely align with their integration efforts (Chen & Chang, 2006; Hanks, 2002; Judson, 2006; Kim et al., 2011; Wood et al., 2008). Inconsistencies perpetuate because a teacher's initial attempt to integrate technology too often results in a visceral search for age and subject-appropriate apps to download to student devices (Eutsler, 2021). Teachers are inundated with the task to select apps and set a purpose for use. However, teachers have little control over how an app is designed, cannot track student progress within most apps, the apps lack explicit instruction, there is minimal repeated and varied exposure to new vocabulary, and apps lack content (Northrop & Andrei, 2019). Additional concerns hinge on language availability, dictionary use, and locating apps with relevant content. Roadblocks associated with apps help draw attention to specific areas of need when teachers actively attempt to reform their practices (e.g., Calderón et al., 2011).

A strategy to combat these barriers involves giving teachers a more systematic integration model. In response to these challenges, a technology integration model that can inform the design of language and literacy instruction and was developed at a Hispanic and minority-serving institution focuses on the instructor's pedagogy and the gradual release of responsibility model (Eutsler, 2021). This model was developed to provide an instructor approach to foster a hands-on technology-rich experiences for pre-service teachers who are

tasked with integrating technology when designing literacy instruction. Under this model, there are three main phases:

- Teachers become familiar with the app during the Teacher in Control phase, and show students exactly how to use each app.
- As teachers gain confidence and acknowledge the value added for their learners, they explore a substantial number of apps during the Teacher as Facilitator phase.
- The third and final phase, Problem-based Learning, allows teachers to create comprehensive lessons built around the students' unique learning needs, characteristics, and interests.
- Within this model, teachers select apps in consideration of the lesson objectives, explore an abundance of apps, carefully infuse apps into the lesson that align with student needs, and implement guided strategies to maximize learner engagement.

Technology and opportunities to connect with diverse learning needs. While there are some challenges associated with integrating technology, the advantages are abundant in their ability to offer more expansive learning opportunities. Some apps such as SeeSaw, epic!, and Adobe Spark Video offer visual enhancements and more personalized learning experiences, such as the ability to highlight and narrate text, define words with the click of a button, voice record, and help students practice skills across multiple apps using a variety of strategies (Eutsler, 2019; Northrop & Andrei, 2019). A systematic review of 61 studies examined how mobile technology impacted elementary students' literacy achievement. The review revealed that ELs spent more time learning when engaged with digital tasks, and text narration features helped ELs improve their comprehension and vocabulary knowledge (Eutsler et al., 2020). The ability for digital apps to extend students' literacy experiences and incorporate visual affordances such as text narration are benefits unavailable via traditional print methods.

Technology offers students the opportunity to create a unique artifact representative of themselves. Teachers are more effective technology users when the lesson objective is aligned with the selected technology and when care is directed toward what the technology can enable students to do or create (Christ et al., 2019). When technology integration is approached through a constructivist and culturally relevant lens, language learners' experience and reading outcomes are transformed (Darling-Aduana & Heinrich, 2018). More research is needed that focuses on a culturally relevant approach to integrating technology within mainstream classrooms (i.e., inclusive general education) to scaffold students' language and literacy development.

Theoretical Framework

Students' culture should be perceived as an asset to the instructional design process. *Situated Learning*, embedded within a constructivist approach to learning, considers each students' unique traits, recognizing and building on students' differences as assets to inform instruction (Herrington & Oliver, 2000; Lave & Wenger, 1991). This framework has been applied extensively to explore language learning (e.g., Chang et al., 2010) and to

improve understanding of using mobile technologies to support language learning in authentic environments (Shadiev et al., 2017). Herrington and Oliver's (2000) nine-step process of situated learning:

1. *Acknowledges the value of an authentic learning context that provides "real-life relevance" (p. 34).* Learning is meaningful to students and attunes to their interests.
2. *Is built on the idea of providing authentic lessons.* The teacher builds on students' experiences by designing activities that allow them to apply new knowledge within their own homes and communities (e.g., how does your family celebrate holidays?).
3. *Teacher modeling.* Examples improve students' self-confidence and help them realize and imagine the possibilities (e.g., the teacher creates a holiday customs collage to share with students). This can also help build community and connections within the classroom.
4. *Multiple roles and perspectives will vary from one student to the next.* If honored and praised, these differences are more likely to lead to authentic student work (e.g., encourage students to share their work with a peer).
5. *Guide students' thinking.* As students create new artifacts with technology, the teacher acts as a guide to stretch students' thinking (e.g., ask higher-order questions to challenge students to make text-text and text-self connections).
6. *Provide peer-peer collaboration opportunities.* Have students reflect to help them think deeper about the content learned and their newly created artifact (e.g., quick-write).
7. *Make new knowledge explicit.* The teacher confers with the student to bridge implied knowledge and make connections to levels of understanding (e.g., teacher-student conferencing during center rotations).
8. *Continuous coaching and scaffolding.* This step of repetitive scaffolding involves the teacher helping students maintain focus on learning (e.g., formative observation of student work, teacher suggestions, positive feedback).
9. *Assessment.* To assess student learning, carefully craft an authentic task to align with the lesson's authentic nature (e.g., student recorded reflections in response to text).

Situated Learning helps frame this study because it encompasses the design of culturally relevant instruction, gradual scaffolding of student learning, the importance of teacher support, peer collaboration, and students' creation of authentic artifacts. While students in this study use some apps to practice discrete skills, learning focuses on creating artifacts. Artifacts represent culture and everyday life, contain physical features that qualify it as distinct, embody identity, and are valued within its context (Pahl & Rowsell, 2019).

Significance of the Study

Though tireless and well-respected efforts have focused on culturally relevant education (e.g., Aronson & Laughter, 2016), teachers of literacy continue to enter the

classroom under-prepared to respond to the culturally diverse needs of their students (Keehne et al., 2018; Ndimande, 2018). This study is important because teachers need guidance on how to improve implementation of technology into their digital literacy instruction for English reinforcement (e.g., Darling-Aduana & Heinrich, 2018). In the 20 chapter *Handbook of Research on Pedagogies and Cultural Considerations for Young English Language Learners*, only one chapter is tangentially related to digital literacy, "Examining bilingual teacher candidates' use of digital media," and the research context is situated in higher education (Alanís & Machado-Casas, 2017). This study explores the implementation of digital tools with elementary language learners to help teachers design targeted interventions and facilitate active and authentic small-group instructional experiences.

Guided by *Situated Learning*, we asked the following research question:

> In what ways can an exploratory 10-week guided intervention using educational technology inform teachers' instructional design of digital language and literacy instruction?

Method

By nature of an adaptive and flexible approach to constructing and implementing lessons tailored around students, this study employs a design experiment approach to research (Brown, 1992), later coined *design-based research method* (Hoadley, 2002). Design-based research comprises a series of approaches intended to lead to new artifacts, practices, and theories. Under this design, Brown asserts the need to incorporate systematic adaptations to allow the teacher to test out different aspects of practice, to allow for flexibility in the research design, and generate theory. This design is appropriate for this study because it centers students at the heart of learning, which reflects the idea that "to foster a community of learners that features students as designers of their learning, we encourage students to be partially responsible for creating their curriculum" (Brown, 1992, p. 150). Design-based is suitable for this study because of the changing nature of technology and the need to tailor instruction to a specific context. However, more research would be helpful that applies design-based research to technology-based environments (Wang & Hannafin, 2005), while being explicit about how to revise the intervention (Zheng, 2015).

Participants and Context

A 2nd-grade teacher at an elementary campus in north Texas and in her third year of teaching was perplexed over how to provide language and literacy instruction for her five *unidentified* language learners. These students were enrolled in a PK-5th grade elementary school which is a Title 1 school where 78% of students receive free or reduced lunch. A very diverse student population includes the majority of students who are Hispanic (62.67%), followed by White (24.88%), Black (7.37%), Asian (3.46%), and two or more races (1.61%). The participants were students in a general education class with no language support. This identification derives from the child's parent or guardian's language selection on the home language survey. A home language survey is required for each student in Texas. If a language other than English is selected as the primary spoken language in a child's home, then educators initiate testing for language support. If English

is the language present on the survey, but the child does speak another language as their primary language, then the language learner becomes unidentified in a general education classroom. Since the parent or guardian selects the language, this allows them to bypass testing for their child if they choose English. These students speak multiple languages, which influences their language and literacy learning in unique ways compared to their peers. With a keen awareness that these students enjoyed learning with educational technology, the teacher wondered how digitally supported instruction might enhance students' language and literacy learning experiences.

To explore this phenomenon and seek out a plan to help her students succeed, the teacher sought advice from one of her former university instructors, an educational researcher specializing in technology integration in literacy. After some discussion, the teacher agreed to collaborate with a certified teacher to design and implement a guided, digital language and literacy intervention centered on cultural relevance. Therefore, the instructional intervention was led by a supporting certified teacher. The supporting teacher provided an iPad® for use by each student and herself. Each iPad was labeled with a colored sticker to ensure that each student used the same iPad throughout the study, which allowed for efficient login procedures.

The five students in this study were between seven and eight years old—two girls and three boys. Three students identified as Latinx, one Indian (Asian American), and one Caucasian. The elementary school was situated within a suburban community in the southwestern United States, at a Title I school, where 7% of students were economically disadvantaged and 42% were identified as ELs.

Data Collection and Analysis

Data collection spanned a 10-week intervention with two groups of students in a guided, small-group setting. The teacher met with the same group of two to three students once a week, one after the other, for 30-minutes each. Grouping was based on ability level so that the teacher and students could read similar texts together. This can be compared to a teacher meeting with students weekly during guided reading time. During this time, the teacher and students explored the 15 literacy apps that were loaded on the iPads (e.g., Reading Racer, StoryLine Online, Kids Doodle). App selection was informed by earlier research studies of early elementary students and preservice teachers using iPads to plan literacy instruction (Eutsler, 2019; Eutsler, 2021). The teacher also spent about an hour preparing for each set of lessons, with another 15 minutes reflecting on the weekly sessions on the guided lesson plan.

Data collection was triangulated (Denscombe, 2010) to include audio recordings, student artifacts, and an ongoing lesson plan maintained by the teacher that contained reflective notes about lessons and ideas for modification. Before and after each lesson, notes were corroborated by collaborations with the researcher in the study, to help guide the teacher with her pedagogy.

Though Brown (1992) clearly describes her process of doing design-based research, little is stated about how to analyze the collected data. Brown claims that emphasis should be on theory development to solve everyday problems of practice. Others have recommended that analysis be "iterative" (Wang & Hannafin, 2005, p.6), a process

that is executed immediately after and persists throughout the duration of the study. Further, "design-based research relies on techniques used in other research paradigms, like thick descriptive datasets, systematic analysis of data with carefully defined measures, and consensus building within the field around interpretations of data" (DBRC, 2003, p. 7). In Reeves' (2006) description of design-based research in educational technology, he emphasizes a final analytical process of "reflection to produce 'design principles' and enhance solution implementation" (p. 59). We apply each of these elements to the design-based research approach implemented in this study.

To implement a design-based research approach into this study, we followed an iterative and systematic process before, during, and after each lesson, where the supporting teacher in this study reflected on the lesson planning and implementation to make modifications for each future lesson iteration. The implementing teacher checked in after each lesson with the classroom teacher and researcher for guidance and support, which helped to arrive at a group consensus regarding student use and experiences of digital literacy instructional lessons. We used reflective note-taking to document each lesson on the lesson planning spreadsheet and included student artifacts to represent the learning experiences. With an emphasis on developing theory, these practices led to the development of a model of instruction to support bilingual digital literacy instruction in the classroom. Since each lesson was audio recorded, the implementing teacher noted students' perceptions and likeness to each activity and app, which allowed for future lesson modifications.

Results

Multiple lessons were implemented (and reimplemented, per the testing model of design-based research) over the 10-week intervention, where students engaged in the authentic creation of meaningful literacy activities. To show the process of the intervention, the explorations of some lessons are reported in detail. These explorations led to the design protocol. A focus on pedagogy reveals the phases that demonstrate the specific, yet a flexible model for teachers to implement: *Culturally Relevant Model for Digital Language and Literacy Instruction.*

A variety of apps enabled students to practice language and literacy skills to record, write, draw, and engage in skills-based formative assessment activities. To document ongoing progress in a digital portfolio, students uploaded screenshots of their artifacts to *Seesaw*, an app viewable to the teacher and the student's family. Table 1 provides an overview of how the teacher aligned literacy strategies to apps, languages spoken or available within the app, and an example of the app applied within practice.

Table 1

App alignment to literacy strategies and use.

App	Literacy Strategy	Languages	Use
Adobe Spark Video	Fluency Vocabulary Comprehension	English, Danish, Dutch, Finnish, French, German, Italian, Japanese, Korean, Norwegian Bokmål, Portuguese, Simplified Chinese, Spanish, Swedish, Traditional Chinese	Allows teachers to present concepts authentically, and the app can support teachers during literacy development activities while concurrently developing the students' technological skills.
Seesaw	Phonics Phonemic Awareness Fluency Vocabulary Comprehension	English	The student completed activities can be measured on a timeline. Audio and video recording, captions, links to external sources—confidential communication between teachers, students, and parents/guardians.
StoryLine Online	Order of Events Fluency Main Idea & Details Plot & Resolution	English Spanish (captions)	Auditory learning and self-paced. Features include repeating sections, visuals, and audiobooks.
Princess FairyTale Maker	Order of Events Retelling Summarizing	English	Supports visuals by creating filmstrips—personal choice of design in filmstrips and recording audio to describe the filmstrip.

Reading Racer	Questioning Fluency	English	Students read aloud using the speech recognition feature. Rewards users as they read the words correctly—two pace selection.
Kids Doodle	Questioning	English and Simplified Chinese	Support student creativity after reading a text through a design process.
ChatterPix	Determining Importance Plot & Resolution Retelling	English	Make a visual talk. Users take any picture, insert the line where the mouth will be, and record their voice.
epic!	Main Idea & Details Plot & Resolution Fluency	English, Hindi, Japanese, Korean, Simplified Chinese, Spanish, Traditional Chinese	Provides users with a library of books by reading level. Features include leveled readers, audiobooks, and assessments.

The "About Me" video creation. Adobe Spark Video allowed students to create videos using artifacts within their own communities. Students could speak, listen, read, and write with this app. The teacher began the lesson by allowing each student to use the *Adobe Spark Video* app to introduce themselves. They recorded their names and talked about their favorite subjects and interests while decorating their videos with visual art and emojis. Each student took pictures, added captions to their images, recorded their voices, and watched and discussed each other's videos to allow for a collaborative language learning experience.

*A self-selection of digital read-aloud stories***.** A digital book enabled students to experience an independent read-aloud through *StoryLineOnline* (via a web browser or app). Reading a book of their choice, they listened to the story, followed along with closed captions (available in Spanish and English), and paused the story as often as they needed. Instructional guides for teachers were available for free for the teacher to generate ideas. On average, students spent about 15 minutes reading each book. After reading the book from *StoryLineOnline*, students created a foldable to summarize the story's order of events. A foldable provides students with multi-dimensional and interactive opportunities based on the skills students are mastering. The foldable included three labeled tabs, beginning, middle, and end, and was uploaded to *SeeSaw* (Figure 1).

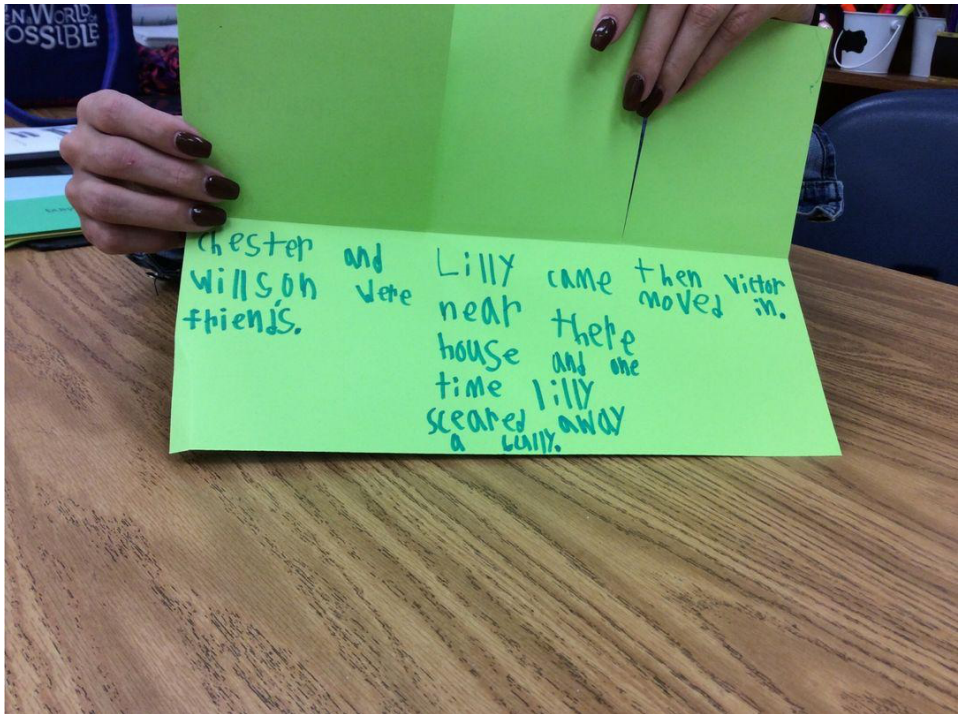

Figure 1. Foldable of sequence of events after reading a digital book on StoryLineOnline.

Students retelling by creating a digital story. Following the lesson on order of events, students summarized the story using *Princess Fairytale Maker*, to retell the story in their own words. They selected the events to depict the sequence of events they read. The app allowed students to draw, write, record, and decorate each scene using preloaded graphics, to represent the order of events. Figure 2 displays an example created by Josiah from *Me and My Cat* by Satoshi Kitamura.

Figure 2. Order of events: "So a boy and a cat are in a bed at night and the witch switches their minds."

Students make connections from digital stories to their culture. The teacher encouraged students to share their culture and traditions. Students shared about everyday occurrences, such as mealtime and household responsibilities, by beginning each lesson to discuss everyday occurrences in the child's home. They also discussed holidays important to them. This openness naturally helped students make connections with a story they read (e.g., *Hanukkah in Alaska* by Barbara Brown) to their culture and to what they were learning in their classroom.

> Teacher: Does this story remind you of anything in your lives?
> Josiah: (pronouncing the word Hanukkah) "Hanukkah in Alaska, Hanukkah, Hanukkah is a Holiday."
> Araya: "Yeah, it's what [another student in the class] had for their project."

Araya refers to a student who completed their class project on a holiday they celebrate, Hanukkah. Her and Josiah stop to think and discuss who they know that celebrates that particular holiday.

Interactive apps help reinforce literacy skills. An interactive app helped students practice language and literacy skills, such as retelling and determining importance. The teacher selected a book on students' instructional reading level, read the story aloud, and allowed students to retell the main idea and determine important events in the story. To do this, students summarized the main events by finding items of importance to them in their backpacks. After taking a picture and utilizing the *Chatterpix* app, they created a mouth to make the item(s) talk. This allowed students to record the main idea and retell story details, which built upon students' oral fluency skills. Afterward, students watched and listened to their videos, where they witnessed photographed inanimate objects talking with their voice-overs (see Figure 3). Josiah summarized the story (*Quackenstein Hatches a Family* by Sudipta Bardhan-Quallen) by saying, "The main message was that things aren't what they seem. When Quackenstein was like running away from the thing and the egg that hatched when he didn't know it was just a cute little, cute little animal inside."

Figure 3. Screenshot of Chatterpix video to summarize the story.

Read adaptive stories and ask questions. Students used the *Reading Racer* app to read a book for 15 minutes. Preloaded with stories, this app required minimal preparation. The app adjusted the reading level for each student as they progressed through activities embedded within the app. Once students read their story, the *Kids Doodle* app allowed them to write or audio record questions about the story they read from *Reading Racer*. Without prompting, Josiah retells the story before asking questions about the story.

- Josiah: "Jay lay in his green bed. Jay has a sheet. Jay has a green sheet in his bed. Why did it say that it sum [sic] was sitting [sic] on a mat?"
- Teacher: "Are you singing this?"
- Josiah: "Kinda."

Araya asked, "How can a pig walk to a market?" and "Why did a pig eat a mouse?" (see Figure 4). An excerpt in response to Araya's reading demonstrates her thinking process and desire to further engage with the teacher and to understand the story's context further.

> Let's dump oil on the snake. But why? What's the snake ever doing to them? The snake sat in a coil. Why is it saying [inaudible]? The snake said, do not dump oil [inaudible]. That is rude. I have so many questions.

Figure 4. Questioning strategy using Kids Doodle.

Utilize objects in the environment to make story inferences. Through *StoryLineOnline*, students selected and read a story of their choice. Then, they revisited the *ChatterPix* app to take pictures of related classroom objects that were important to them. After, they narrated their images by talking about the plot, events, and resolution of the story. Students made inferences about the character's feelings. For example,

- Josiah: "Get out of my house." (mimicking a character in the book *Hanukkah in Alaska* by Barbara Brown)
- Araya: (inferred) "She was worried about her swing."

Self-paced fluency and comprehension practice. Fluency, summarizing, questioning, and related language and literacy strategies, skills, and processes were applied using the epic! app. Each student chose a story on epic!, an app that contains over 40,000 preloaded books in multiple languages, books that can be read-aloud, and text-only books (similar in design to a print book). After reading the book, students completed a quiz to assess their comprehension of the story. Some students reread the story, asked questions, and discussed the main points of the plot. The teacher encouraged students to collaborate and discuss what was read together while listening to the story and responding to the comprehension questions.

The Design Protocol

This study's experiential learning process led to the development of the *Culturally Relevant Model for Digital Language and Literacy Instruction*. This model fits within situated practice and is not intended to be an expansion of all of multiliteracies. This model breaks down a complex decision-making process to allow for implementation through a 6-phase approach (Figure 5). The model is intended to be followed in accordance with its specific processes (Zheng, 2015), yet adapted by each teacher according to the unique characteristics of students.

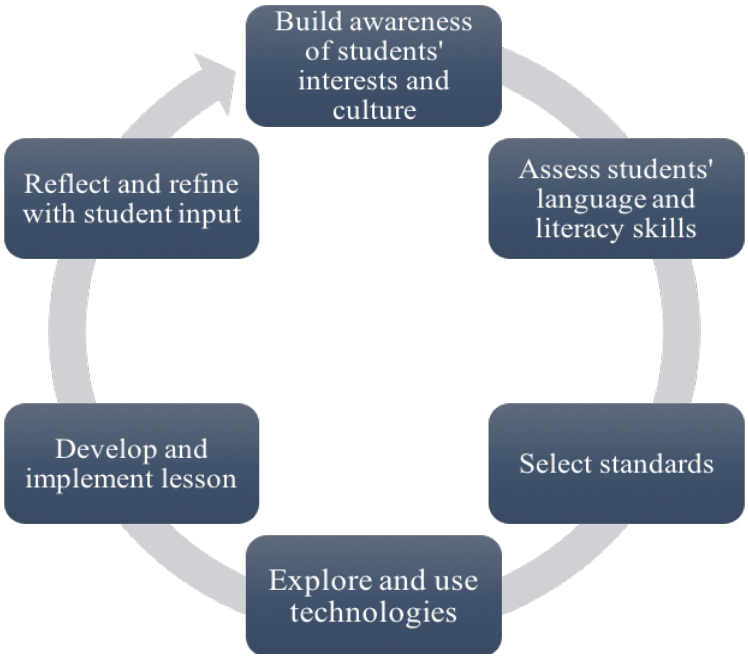

Figure 5. Culturally relevant model for digital language and literacy instruction.

The first phase requires allocating time to build awareness of each student's cultural background and experiences. In this way, planning and implementation are shaped around students' unique traits and values (e.g., create an About Me video using *Adobe Spark*). Curating a knowledge base of each student's language and literacy skills and bringing culture to the forefront paves a pathway to design instruction and selecting developmentally appropriate apps. Cultural relevance is established by building awareness of students' culture (i.e., throughout the earliest lessons, week one of this study's intervention). It is important to understand what students value in their lives because this fosters more meaningful conversations and lesson activities.

The second phase of this model entails formatively assessing students' language and literacy skills. Teachers might learn more about students' strengths and weaknesses by collecting multiple forms of assessment probes, especially if students read a passage that covers an unfamiliar topic and they lack the background knowledge to comprehend the content (i.e., the beach, if they have never visited). Formative measures might include: comprehension checks built into stories (i.e., epic!), listening to students record themselves

reading, evaluating students' responses to reading, and listening to discussions with other students. We caution that using apps to develop students' language and literacy skills is not limited to voices only, but also the ability to create, discuss, and record their response to text. With independent and instructional reading levels determined, the third phase involves the selection and identification of the learning standards and language and literacy strategies.

The fourth phase requires hands-on experiential learning to explore and use a variety of technology devices, apps, and software programs. This phase also involves collaborating with other teachers and browsing articles within relevant teacher networks (e.g., International Literacy Association, National Council of Teachers of English, Facebook groups). An alternative to creating social media accounts is to read weblogs, news articles, and Twitter. During this investigative phase, teachers are encouraged to identify authentic ways to integrate the app into the lesson that aligns with students' cultural backgrounds. Conditional factors might be identifying languages available within the app and determining options for downloading a language-specific keyboard to the device. It is essential that students can openly explore the app in a way that is similar to the way the teacher did.

The fifth phase is to develop and implement a lesson. Refer to phase four ideas to help organize ideas in a spreadsheet to refer to during planning and lesson implementation. This spreadsheet should identify the app, state whether it is open (i.e., create) or closed (i.e., skills and drills), and list what language and literacy strategies the app can address (i.e., vocabulary, fluency). Then, the teacher can create personalized lessons by adding multiple columns to insert different lesson ideas and document the uses of the app over time (Table 2).

Table 2

Example lesson implementation spreadsheet.

App	Open/Closed	Literacy Strategy(ies) and Standards	Lesson 1	Lesson 2
StoryLine Online	Closed	Make Connections §110.4. E (b) 6 (E) CCSS.ELA-LITERACY.CCRA.R.9 Author's Purpose §110.4. E (b) 10 (A) CCSS.ELA-LITERACY.CCRA.R.2	Make Connections Ask students to look at the title and illustrations of the characters and respond to, why do you think there are no mirrors in Nana's house? How does this remind you of *The Bad Case of Stripes*?	Author's Message Work with a partner to talk about the important details in the book. Based on the discussion, what do you think the author is trying to tell us?

Teaching Reflections			Students wondered if the author excluded mirrors because the characters in the book might have been embarrassed by the way they looked. They made a connection with the other text by identifying that the characters felt shamed by others for how they looked. Consider having students dialogue about their own identity and how that makes them feel.	Students could talk about general events but had trouble identifying details from the text. Consider having students complete a story map to help them recall text events. Stop and pause more frequently to allow for students to question and discuss the text.
(insert app)	-	-	-	-
Teaching Reflections			-	-

Note. Align standards to state requirements.

The sixth and final phase requires the teacher to consider and generate modifications after each lesson, including a reflection of student artifacts. Following each lesson, revisit the spreadsheet generated during phase five to add reflective feedback to the teaching reflections column (e.g., include student comments, self-reflection, what could be changed to improve). These reflections will allow the teacher to make the necessary future adaptations (e.g., select a new app, use the same app to address a different literacy skill).

After each lesson, repeat the *Culturally Relevant Model for Digital Language and Literacy Instruction*. If the model is repeated over the course of a school year, the lesson planning spreadsheet can provide a bird's eye view of the frequency of how often a literacy strategy is practiced, illustrated with lesson ideas, which could be a valuable teaching aid for the context in which it was created.

Limitations

Research studies contain limitations. The data collected for this study included observations, student artifacts, audio, and video. It is important to note that observations

are subjective and those classroom observations were limited to 30-minutes per group. The time frame might have influenced many factors that may have challenged how students connected to the lesson. It is important to note that "if a researcher is intimately involved in the conceptualization, design, development, implementation, and re-searching of a pedagogical approach, then ensuring that researchers can make credible and trustworthy assertions is a challenge" (Barab & Squire, 2004, p. 10). Though challenging, the analysis included both the researchers and followed a systematic process as detailed in the data analysis procedures. Moreover, a careful analysis of the observations, videos, artifacts, and audio reflects an accurate depiction of the participants' experience.

Discussion and Implications

Findings from this study are intended to more explicitly support teachers' planning of digital language and literacy lessons. Through exploration with technology tools, three complexities were addressed: inviting students' backgrounds and culture into the curriculum (Ladson-Billings, 1995), selection of appropriate apps (e.g., Northrop & Killeen, 2013), and emphasis on teacher's pedagogical knowledge when designing digital literacy instruction (Eutsler, 2021). To expand upon how teachers teach to a situated practice, the experiences in this study led to the formation of the *Culturally Relevant Model for Digital Language and Literacy Instruction*.

Invite Students' Background and Culture into the Curriculum

This study built on the knowledge of students' culture and interests to inform the design of culturally relevant instruction as a *Situated Learning* experience (Herrington & Oliver, 2000). This study provides evidence of how centering learning on students' lives and implementing the nine phases of *Situated Learning* helped to arrive at the design protocol in this study. Actual implementation can be challenging, especially when teachers are forced to comply with teaching a boxed-based curriculum (i.e., Lucy Calkins), which was the reality for the 2nd-grade teacher in this study. To cultivate this perspective, students' differences were viewed as assets rather than deficits. Ladson-Billings (1995) calls upon teachers to put students' lives at the center of the curriculum. The "About Me" videos sparked interest among students to share personal insights about themselves. This activity provided insight to the teacher about students' lives, specifically what was important to them. A benefit of the video was that students had the option to narrate their stories, type, or use the touchscreen to write, which attuned to their individual language proficiency levels. This study is a reminder of the importance of inviting students' cultures into the classroom and building on students' prior knowledge. Throughout the lessons, students were encouraged to narrate and compose stories that invited examples of their lives, families, and communities into the learning experience. This appeared to be engaging and motivating for students. It is likely that students were invested in learning because they were cognizant that the teacher adapted lessons to invite their culture and lives into the school day, which resulted in students creating artifacts representative of themselves. For example, students in this study were allowed to select their own books to read, which enabled them to make connections to holidays within the book and the relevance to the holiday celebrated by a peer in their class (i.e., Hanukkah). This observation supports the

notion that artifacts should represent students' everyday lives and are valued within the classroom (Pahl & Rowsell, 2019).

Earlier research by Rodriguez-Mojica (2019) found that ELs tend to ask too general of questions when requesting peer support, but this study arrived at counter findings. The teacher observed students engaged in asking highly specific and detailed questions about the stories they were reading, and commenting on one another's artifacts and reflections. The multiple modes of media afforded by the digital tools provided alternate options for students to respond to and develop their language and literacy skills. As noted earlier when using apps with voice recording features, it was common for Josiah to respond to another student's question or idea. This suggests that while students in this study were focused on their individual work (likely because students had access to their own iPad), they were also aware of and eager to contribute to one other's questions. One possible explanation for the collaborative learning environment could have been influenced by the small-group setting in which the learning took place. Another possibility for this collaborative nature might be explained by the digital learning community afforded by the *SeeSaw* app, which mimics a social media platform. Thus, the app served to provide students with a space for their voices, with the ability to easily edit their responses, whether written or recorded through media.

Build Pedagogical Knowledge to Design Digital Literacy Instruction

Sometimes teachers feel isolated and siloed from other teachers. Teachers require support when planning and selecting digital resources to teach student sub-populations (e.g., Liu et al., 2017), such as unidentified ELs in this study. Building an awareness of the educational technology options and affordances (e.g., devices, apps, software) were pivotal to determining which apps could scaffold students' language and literacy development. Phase five of the design model calls for networking with teachers, or at a minimum, reading weblogs and recommendations by teachers to help guide decisions when teaching with technology. If a colleague is unavailable or feels inept to share ideas, collaborations with like-minded networks can help expand teachers' instructional ideas. Specific networks include Facebook groups (e.g., Ed Tech Ideas During COVID-19), Reddit (e.g., "Teachers"), Twitter (e.g., search #teacher, #reading, etc. to locate people to follow or browse without an account), and Instagram (e.g., "bilingualdiaries"). Teachers with a range of experience and grade-level expertise use Pinterest to search for educational resources (Schroeder et al., 2019). Teachers can also browse app reviews from a trusted educational organization, such as Common Sense Media (https://www.commonsensemedia.org/lists/apps-that-help-kids-learn-a-new-language).

In this study, ongoing support focused on the teacher's technological pedagogical knowledge helped to improve technology planning within authentic problem-based learning contexts (Eutsler, 2021). This study emphasizes the importance of teachers and researchers bonding together to solve everyday problems of practice (e.g., Brown, 1992) to support teachers as they adapt to the ever-changing landscape that depicts 21st-century teaching. Debriefing sessions and lesson co-planning helped the teacher select apps and develop ideas to modify lessons to address specific language and literacy skills. Similar in thinking, Calderón et al. (2011) emphasized the importance of teacher professional

development, and this study demonstrates the benefit of how one-to-one direct teacher support influences instructional planning. A two-year case study of one first-grade teacher's experience integrating individual iPads with her students revealed the critical importance of debriefing sessions and coaching (Eutsler, 2019).

This study builds upon Calderón's suggested strategy of *language and literacy development* because an explicit model has been created for teachers to implement with their students. The teacher's careful design of instruction was tailored to students' culture and language levels, apps were explored by the teacher and students, and the teacher reflected on these experiences with an experienced user of technology within literacy. With a focus on pedagogy, educational technology served as a medium to reinforce students' language and literacy skills. Lessons allowed the teacher to accommodate students with various language and literacy proficiency levels. Students could practice a variety of comprehension strategies and skills, such as visualization, determining importance, and summarizing. This study builds on Manyak and Bauer's (2009) review of English vocabulary instruction for ELs because the findings emphasize the assertion that ELs benefit from specific words and word-learning strategy-based instruction. Students in this study used apps that were carefully selected and intended to teach a specific language or literacy strategy, which helped develop students' reading, writing, and speaking skills. To illustrate, students engaged in repeated readings of stories on *StoryLine Online* and epic!, which contributed to the development of students' fluency skills. Once students were familiar with using a variety of apps, the teacher could incorporate multiple apps into one lesson to create more engaging digital literacy experiences. The students practiced plot, order of events, and story resolution strategies through the combination of *StoryLineOnline* and *ChatterPix*. Providing choice to students served as a way to differentiate learning and attune to students' cultural interests.

Future Research

Future research should explore how teachers in other classrooms employ the *Culturally Relevant Model for Digital Language and Literacy Instruction*. This research might investigate a teacher's planning and implementation processes and how they vary by small and whole group implementation, grade-level, context, professional support, access to technology devices and apps, and students' language proficiency levels. Teachers can reflect on how their students' language and literacy skills and cultures differ across these variables and how this influences their digital language and literacy instructional planning. Another related study might examine a larger sample of students using digital portfolios such as *SeeSaw*. This research might explore students' ability to produce language and literacy artifacts and collaborate with one another on a digital platform.

Teacher educators could also implement the *Culturally Relevant Model for Digital Language and Literacy Instruction* to prepare preservice teachers for planning digital language and literacy instruction for today's diverse classrooms of learners. Because this is a new model, it would be interesting to gather preservice teachers' perceptions of what it means to plan culturally relevant instruction before introducing this model, then revisit

their perceptions after implementation, discussing opportunities to foster culturally relevant digital language and literacy instruction.

As technology innovations continue to evolve, it would be prudent for teachers and teacher educators to explore new ways to scaffold students' language and literacy development. Emerging apps and tools to consider to support collaboration in language and literacy learning include YouTube language learning videos viewable in virtual reality (VR), AltspaceVR, VR chat, and Immerse Me.

Conclusion

With today's highly diverse classrooms, it is common for teachers to have unidentified ELs in the mainstream classroom who require unique support. Folding a diverse set of students into all aspects of digital language and literacy instruction is a curricular imperative, noted by literacy experts (Cassidy et al., 2020) and directives from language, literacy, and educational technology standards (e.g., ISTE, 2019; TESOL, 2019). This study was guided by Situated Learning principles (Herrington & Oliver, 2000; Lave & Wenger, 1991) to help students create authentic artifacts centered on their culture. This framework enabled us to implement an evidence-based intervention and develop a practice-based 6-phase approach to help teachers more carefully infuse technology into language and literacy instruction. The *Culturally Relevant Model for Digital Language and Literacy Instruction* can guide teachers to integrate technology with their language learners more efficiently, putting students' cultural heritage at the epicenter of a meaningful and authentic learning experience.

Statement on Conflicts of Interest

The authors declare that they have no conflicts of interest.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

Ainsworth, L. (2011). *Rigorous curriculum design: How to create curricular units of study that align standards, instruction, and assessment.* Lead+ Learn Press.

Alanís, I., & Machado-Casas, M. Examining bilingual teacher candidates' use of digital media. (2017). In Onchwari, G., & Keengwe, J. (Eds.). *Handbook of Research on Pedagogies and Cultural Considerations for Young English Language Learners* (pp. 239-256). IGI Global. https://doi.org/10.4018/978-1-5225-3955-1

Aronson, B., & Laughter, J. (2016). The theory and practice of culturally relevant education: A synthesis of research across content areas. *Review of Educational Research, 86*(1), 163-206. https://doi.org/10.3102/0034654315582066

Barab, S., & Squire, B. (2004). Design-based research: Putting a stake in the ground. *Journal of the Learning Sciences, 13*(1), 1–14. https://doi.org/10.1207/s15327809jls1301_1

Brown, A. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences, 2*(2), 141–178. https://doi.org/10.1207/s15327809jls0202_2

Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using ICT*, *8*(1), 136-155. https://www.learntechlib.org/p/188018/

Calderón, M., Slavin, R., & Sánchez, M. (2011). Effective instruction for English learners. *The Future of Children*, 103-127. https://doi.org/10.1353/foc.2011.0007

Cassidy, J., Grote-Garcia, S., & Ortlieb, E. (2020). What's hot in 2019: Expanded and interconnected notions of literacy. *Literacy Research and Instruction, 59*(1), 39-52. https://doi.org/10.1080/19388071.2019.1665786

Cazden, C., Cope, B., Fairclough, N., Gee, J., Kalantzis, M., Kress, G., Luke, A., Luke, A., Michaels, S., & Nakata, M. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review*, *66*(1), 60-92.

Chang, C. W., Lee, J. H., Chao, P. Y., Wang, C. Y., & Chen, G. D. (2010). Exploring the possibility of using humanoid robots as instructional tools for teaching a second language in primary school. *Journal of Educational Technology & Society*, *13*(2), 13-24. https://www.learntechlib.org/p/75345/

Chen, J., & Chang, C. (2006). A comprehensive approach to technology training for early childhood teachers. *Early Education and Development, 17*(3), 443-465. https://doi.org/10.1207/s15566935eed1703_6

Christ, T., Arya, P., & Liu, Y. (2019). Technology integration in literacy lessons: Challenges and successes. *Literacy Research and Instruction*, *58*(1), 49-66. https://doi.org/10.1080/19388071.2018.1554732

Cope, B., & Kalantzis, M. (2009). "Multiliteracies": New literacies, new learning. *Pedagogies: An International Journal*, *4*(3), 164-195. https://doi.org/10.1080/15544800903076044

Darling-Aduana, J., & Heinrich, C. J. (2018). The role of teacher capacity and instructional practice in the integration of educational technology for emergent bilingual students.*Computers & Education, 126*, 417-432. https://doi.org/10.1016/j.compedu.2018.08.002

Denscombe, M. (2010). *The good research guide: For small-scale social research projects* (4th ed). Open University Press.

Design-Based Research Collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational researcher*, *32*(1), 5-8. https://doi.org/10.3102/0013189X032001005

Dussling, T. M. (2018). Examining the effectiveness of a supplemental reading intervention on the early literacy skills of English language learners. *Literacy Research and Instruction*, *57*(3), 276-284. https://doi.org/10.1080/19388071.2018.1453898

Eutsler, L. (2019). 1:1 iPads in 1st grade: Case study of a teacher's concerns and implementation. In Y. Zhang & D. Cristol (Eds.), *Handbook of Mobile Teaching*

and Learning (2nd ed., pp. 1-16). Springer. https://doi.org/10.1007/978-3-642-41981-2_132-1

Eutsler, L., Mitchell, C., Stamm, B., & Kogut, A. (2020). The influence of mobile technologies on preschool and elementary children's literacy gains: A systematic review spanning 2007-2019. *Educational Technology Research and Development, 68*, 1739-1768. https://doi.org/10.1007/s11423-020-09786-1

Eutsler, L. (2021). TPACK's pedagogy and the gradual release of responsibility model coalesce: Integrating technology into literacy teacher preparation. *Journal of Research on Technology in Education.* https://doi.org/10.1080/15391523.2020.1858463

Gersten, R., Baker, S. K., Shanahan, T., Linan-Thompson, S., Collins, P., & Scarcella, R. (2007). *Effective literacy and English language instruction for English learners in the elementary grades.* National Center for Education Evaluation and Regional Assistance. Institute of Education Sciences, US Department of Education. https://eric.ed.gov/?id=ED497258

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory Into Practice, 34*(3), 159–165. https://doi.org/10.1080/00405849509543675

Hanks, R. F. (2002). Environmental and personal factors effecting K-12 teacher utilization of technology. *National Educational Computing Conference Proceedings,* (pp. 1-16). https://eric.ed.gov/?id=ED475934

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development*, *48*(3), 23-48. https://doi.org/10.1007/BF02319856

Hoadley, C. P. (2002). Creating context: Design-based research in creating and understanding CSCL. *Proceedings of CSCL 2002*, (pp. 453-462). https://repository.isls.org/bitstream/1/3808/1/453-462.pdf

Hutchison, A., & Reinking, D. (2011). Teachers' perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly*, *46*(4), 312-333. https://doi.org/10.1002/RRQ.002

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher*, *66*(1), 15-23. https://doi.org/10.1002/TRTR.01090

Ifinedo, E., Rikala, J., & Hämäläinen, T. (2020). Factors affecting Nigerian teacher educators' technology integration: Considering characteristics, knowledge constructs, ICT practices and beliefs. *Computers & Education*, *146*, 103760. https://doi.org/10.1016/j.compedu.2019.103760

ISTE. (2019). ISTE standards for educators. https://www.iste.org/standards/for-educators

Januszewski, A., & Molenda, M. (Eds.). (2008). *Educational technology: A definition with commentary*. Routledge.

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection. *Journal of Technology and Teacher Education, 14*(3), 581-597. https://www.learntechlib.org/primary/p/6046/

Keehne, C. N., Sarsona, M. W., Kawakami, A. J., & Au, K. H. (2018). Culturally responsive instruction and literacy learning. *Journal of Literacy Research*, *50*(2), 141-166. https://doi.org/10.1177/1086296X18767226

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, *29*, 76-85. https://doi.org/10.1016/j.tate.2012.08.005

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge University Press.

Leighton, C. M., Ford-Connors, E., Proctor, C. P., & Wyatt, J. (2019). Engaging second-grade English learners in complex texts, topics, and tasks. *Literacy Research and Instruction*, *58*(4), 272-294. https://doi.org/10.1080/19388071.2019.1638473

Liu, F., Ritzhaupt, A. D., Dawson, K., & Barron, A. E. (2017). Explaining technology integration in K-12 classrooms: A multilevel path analysis model. *Educational Technology Research and Development*, *65*(4), 795-813. https://doi.org/10.1007/s11423-016-9487-9

Lotherington, H., & Jenson, J. (2011). Teaching multimodal and digital literacy in L2 settings: New literacies, new basics, new pedagogies. *Annual review of applied linguistics*, *31*, 226-246. https://doi.org/10.1017/S0267190511000110

Manyak, P. C., & Bauer, E. B. (2009). English vocabulary instruction for English learners. *The Reading Teacher*, *63*(2), 174-176. https://doi.org/10.1598/RT.63.2.11

Ndimande, B. S. (2018). Unraveling the neocolonial epistemologies: Decolonizing research toward transformative literacy. *Journal of Literacy Research*, *50*(3), 383-390. https://doi.org/10.1177/1086296X18784699

Northrop, L., & Andrei, E. (2019). More than just word of the day: Vocabulary apps for English learners. *The Reading Teacher*, *72*(5), 623-630. https://doi.org/10.1002/trtr.1773

Northrop, L., & Killeen, E. (2013). A framework for using iPads to build early literacy skills. *The Reading Teacher, 66*(7), 531-537. https://doi.org/10.1002/TRTR.1155

Pahl, K., & Rowsell, J. (2019). *Artifactual literacies: Every object tells a story*. Teachers College Press.

Reeves, T.C. (2006). Design research from a technology perspective. In J. van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (pp. 52-66). Routledge.

Rodriguez-Mojica, C. (2019). "I don't get it. I need help": Emergent bilinguals seeking and receiving help from peers in language arts. *Literacy Research and Instruction*, *58*(2), 105-121. https://doi.org/10.1080/19388071.2019.1585492

Schroeder, S., Curcio, R., & Lundgren, L. (2019). Expanding the learning network: How teachers use Pinterest. *Journal of Research on Technology in Education*, *51*(2), 166-186. https://doi.org/10.1080/15391523.2019.1573354

Shadiev, R., Hwang, W. Y., & Huang, Y. M. (2017). Review of research on mobile language learning in authentic environments. *Computer Assisted Language Learning*, *30*(3-4), 284-303. https://doi.org/10.1080/09588221.2017.1308383

TESOL International Association (TESOL). (2019). *Standards for initial TESOL Pre-K-12 teacher preparation programs.* https://www.tesol.org/docs/default-source/books/2018-tesol-teacher-prep-standards-final.pdf?sfvrsn=23f3ffdc_6

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, *53*(4), 5-23. https://doi.org/10.1007/BF02504682

Wood, E., Specht, J., Willoughby, T., & Mueller, J. (2008). Integrating computer technology in early childhood education environments: Issues raised by early childhood educators. *The Alberta Journal of Education Research, 54(2),* 210-226. https://ajer.journalhosting.ucalgary.ca/index.php/ajer/article/view/630/613

Zheng, L. (2015). A systematic literature review of design-based research from 2004 to 2013. *Journal of Computers in Education*, *2*(4), 399-420. https://doi.org/10.1007/s40692-015-0036-z

Author Biographies

Lauren Eutsler, Ph.D., is an associate professor in the department of Learning Technologies at the University of North Texas, Denton, USA: email lauren.eutsler@unt.edu. She teaches learning technology courses and researches technology integration when planning literacy instruction.

Araceli Pérez, Ph.D., is a high school Spanish teacher and adjunct instructor in the department of Teacher Education and Administration at the University of North Texas, Denton, TX, USA: email araceliperez@my.unt.edu. She teaches literacy courses and researches technology integration within bilingual language and literacy instruction.