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Using Technology to Help Struggling Readers Improve Their Reading Outcomes: Applications to Support K-12 Teachers and Teaching

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Abstract The purpose of this study was to determine the impact of an online literacy practicum course delivery on improving the quality of learning and the effectiveness of literacy specialists employed as K-12 classroom teachers. As part of their graduation requirements, literacy specialists had to complete a practicum at a literacy clinic under the supervision of their instructor. With the Flipgrid, GoReact, and YouTube video discussion platforms, literacy specialists were able to make better diagnoses and decisions and, in general, be more effective tutors. During the graduate reading practicum, struggling readers worked one-on-one with the literacy specialists. Children in Grades K–12 who needed assistance with decoding, fluency, and comprehension strategies were invited to participate in the reading clinic. The literacy specialists taught phonemic awareness, phonics, vocabulary, comprehension, fluency, and systematic self-correcting. As part of the instruction, multimedia applications and audio recordings played a prominent role in increasing comprehension. Computer-assisted instruction incorporated sound and visuals in a manner that was suitable for the tutee's learning style. In addition to capturing children's attention, technological tools and electronic books helped them gain confidence and knowledge. Using multimedia applications, hypermedia, and hypertext enabled the tutees to make reading more engaging. The use of illustrations, print, and sounds enhanced comprehension and remedied specific literacy acquisition difficulties.

Findings revealed that the technologies and other aspects of an online literacy practicum course delivery supported the quality of learning and increased the efficacy of literacy specialists. These findings are consistent with previous research that described the process of moving a literacy clinic online in order to offer the highest level of efficacy (Laster et al., 2022, Bodzin & Park 2016; Caywood & Duckett, 2019; Vokatis, 2018).

Keywords Head-raising analysis, restrictive relative clause, free relative clause, reconstruction

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1. Introduction

In the United States, there are many higher education institutions that offer graduate and undergraduate courses online via synchronous and asynchronous learning communities, including entire programs of study ranging from liberal arts to humanities to professional degrees (Laster et al., 2022, Allen & Seaman, 2013). Considering the growth of online enrollment in the United States, the trend seems likely to continue (Allen & Seaman, 2013). There is a similar trend in literacy education courses, where entire master's degrees are being offered online through hybrid and blended courses (Laster et al., 2022).

In almost every postsecondary institution, distance learning has been a part of higher education for more than a decade. Students and the program once benefited from an instructor's physical presence in the classroom, both pedagogically and economically, but administrators are now encouraging their academic faculty members to teach via video conferencing, an attractive alternative (Peterson & Slotta, 2009). Administrators who believe technology-based classrooms can produce better results than conventional classrooms are willing to offer web-enhanced courses in order to expand offerings, boost enrollment and revenue streams, and reach remote students. Many researchers agree with this view, stating that distance learning can be as effective as in-person instruction (Laster et al., 2022, Karabulut & Correia, 2008). An online course that is web-enhanced combines face-to-face instruction with internet-based activities to replace a considerable amount of "seat time" in the traditional classroom. Hybrid instruction ultimately aims to create synchronous and asynchronous learning communities that promote deep learning by creating a network of interaction between students (Li & Akins, 2005; Wang & Newlin, 2000).

Graduate students wishing to become literacy specialists must complete a practicum in a literacy clinic under the supervision of their instructors. In recent years, literacy clinics have moved to online delivery that includes both synchronous and asynchronous collaboration (Stetter & Hughes, 2010; Roblyer & Doering, 2013; Lilienthal, 2014; Lilienthal et al., 2017). By offering a practicum course online, colleges can provide educational opportunities to those who are geographically isolated (Laster et al., 2022, Frey, 2008).

A literacy clinic serves both districts and graduate students by providing instruction under supervision. The purpose of supervised instruction experiences is to help graduate students develop the skills and knowledge to administer literacy assessments and instruction that improves the reading and writing skills of young children (Atkinson & Colby, 2006). Though these literacy instruction experiences are based on common themes of fluency instruction, word study instruction, and comprehension instruction, each literacy tutoring session allocates different amounts of time and implements different instructional strategies. (Coulter, 2004; Houge et al., 2008; Manset-Williamson & Nelson, 2005; Penney, 2002).

When teaching a literacy clinic course, technology, a critical aspect of online teaching, becomes even more critical and complex because graduate students tutor children in literacy clinics, and the instructor is responsible for both delivering the course content and supervising the practicum (Laster et al., 2022). However, only a few systematic empirical investigations have been conducted to determine whether the collaborative skills of graduate students and course instructors affect literacy learning of struggling students in practicum courses offered in synchronous and asynchronous learning communities (Bodzin & Park, 2016).

This study examined the impact of an online reading practicum class on improving the learning quality of struggling readers and the effectiveness of literacy specialists employed as teachers in K-12 schools. Essentially, an online course using Zoom was designed to replace traditional classroom time with online instruction and activities. Ultimately, hybrid instruction created synchronous and asynchronous learning communities where the instructor could create networks of interaction between the instructor and literacy specialists for the purpose of facilitating meaningful reading for struggling readers (Roblyer & Doering, 2013; Li & Akins, 2005; Wang & Newlin, 2000).

2. The Research

The use of technology has often been proposed as a solution for improving the reading skills of struggling readers (Anderson-Inman & Horney, 2007; Boone & Higgins, 2007; Curry, 2003; Roblyer & Doering, 2013; Silver-Pacuilla & Fleischman, 2006; Stetter & Hughes, 2010). In order to succeed, struggling readers also need one-on-one tutoring tailored to their specific needs. Tutoring one-on-one is indeed very effective for struggling readers in the early grades, especially if tutors use structured phonetic methods (D'Agostino & Murphy, 2004; Elbaum, Vaughn, Hughes, & Moody, 2000; Slavin, Lake, Davis, & Madden, 2011). Theoretically, technology can cater to struggling readers' individual needs, building on what they already know and filling in their gaps. It has been shown that computer-assisted instruction

(CAI) can provide a powerful tool for motivating struggling readers (Kamil, Intratar, & Kim, 2000; Leu, 2000), especially in combination with tutor-led instruction through online literacy clinics.

An online literacy clinic does not use face-to-face instruction; rather, the instructor instructs students through synchronous and asynchronous communication (Vokatis, 2018). In addition, in this type of delivery, the instructor supervises the graduate students as they tutor children remotely—for instance, by watching graduate students instructing children via Zoom or a YouTube channel. Thus far, the latest innovation when moving literacy clinics to an online mode is mostly limited to a description of course design using course management systems such as Blackboard (Lilienthal, 2014). In addition, some literature espouses certain technologies, such as Skype and high-speed internet (Sanders, 2014), for supervising an online clinic. Moreover, Helfrich and Smith (2011) provided general ideas for preparation for going online, including appropriate technologies used for course content teaching and for fieldwork. However, a rigorous online clinic for increasing graduate students' efficacy that explores the latest technologies that can be used by graduate students to easily record their tutoring and share with the course instructors is not described extensively in the literature. Therefore, this research provides insight into these areas, specifically focusing on the incorporation of Canvas and Zoom into an online literacy clinic course.

The asynchronous format of web conferences via Canvas, a learning management system software, allows graduate students to become creative and innovative because they have more time to prepare a response to a set of directions or questions. Moreover, synchronous systems used in conjunction with asynchronous tools can create an online learning community that provides support to students from both peers and instructors because the web-enhanced classes boost interaction and create a sense of connectedness among students (Beattie et al., 2017). Web conferencing via Zoom has been proven effective not only in delivering course content but also in developing a rigorous online literacy clinic for increasing graduate students' efficacy. For example, web conferencing via Zoom can serve as a collaborative tool to allow graduate students from widely disbursed communities to share tutoring experiences and engage in joint problem-solving in real-life classroom situations. When used in university coursework and practicum session activities, it can be comparable to having face-to-face discussions in a conventional class setting (Laster et al., 2022).

3. The Reading Clinic

Among the Literacy Specialist Endorsement courses at a midwestern university was a practicum in literacy. A literacy practicum course prepares literacy specialists employed as K-12 teachers to teach reading intervention and remediation based on assessment data for students with reading difficulties. Literacy specialists are also taught approaches and techniques that have been proven successful in research and practice. The purpose of this course is to provide literacy specialists with a range of research-based strategies for developing the reading skills of struggling readers. It is recommended that they use technology-enriched instruction to encourage K-12 students to use more sophisticated tools, such as electronic books, interactive software, integrated media, and problem-solving applications (McKenna & Walpole, 2019).

The course was offered as a three-credit web-enhanced course. The class was divided into two categories—asynchronous and synchronous—so literacy specialists were exposed to both types of lectures: synchronous interactive web conferencing and asynchronous text-based lectures (Caywood & Duckett, 2019). One-third of the sessions of the web-enhanced class were offered through Canvas asynchronous online learning (text-based, using discussion boards), and two-thirds of the sessions were offered through the newer web synchronous conferencing tool Zoom.

A typical class week included the literacy specialists downloading text-based lecture notes (e.g., PowerPoint, Google or Word document), reading a chapter in the textbook to correspond with the lecture notes, and responding on a discussion board by the end of the week. All course content was available for literacy specialists in an asynchronous format and organized by Canvas module tools (Caywood & Duckett, 2019). Lessons via web conferencing were structured to mimic classroom discussions. The interactive nature of the Zoom instructional tools provided a real-time virtual classroom by using two-way audio, a webcam, breakout rooms, a chat window, and application sharing.

In addition to tutoring struggling readers one-on-one, the literacy specialists were expected to incorporate technology into their teaching (McKenna & Walpole, 2019). The goal of the sessions was to help children develop language and thinking skills as well as to improve their comprehension, fluency, and understanding of difficult words. As part of the curriculum, struggling readers were instructed to read and reread texts, participate in cognitively challenging discussions, summarize vocabulary terms, evaluatively respond to texts, and relate texts to real-life situations

(Atkinson & Colby, 2006). The literacy specialists assessed each struggling reader individually and adapted their instruction methods accordingly. It was identified that potential stumbling blocks might prevent struggling readers from becoming skilled readers. The assessment revealed several problems facing struggling readers. For example, all of the students who struggled were unable to understand the use of the alphabetic principle—the idea that written spellings systematically represent spoken words. The majority of them had difficulty understanding connected text or recognizing difficult words. Most of them could not transfer the comprehension skills of spoken language to reading or struggled to acquire new strategies that could be used with a wide variety of texts. They all lacked motivation to read or had not developed an appreciation for the value of reading.

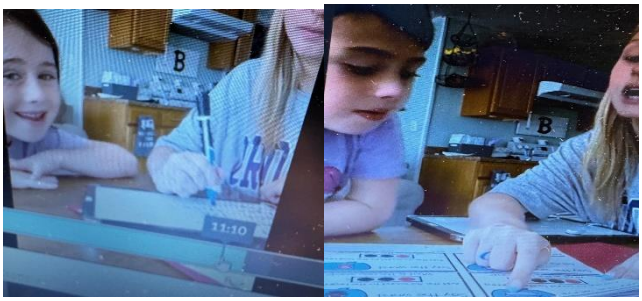
4. Tutoring with Computer Assisted Instruction at the Literacy Clinic

Literacy specialists filmed two tutoring sessions using YouTube and GoReact online platforms, one in which they interacted with struggling readers through reading and the other in which multimedia software was implemented (Laster et al., 2022, Vokatis, 2018). As part of the process, the instructor was able to watch the videos (rewinding when necessary) and provide written feedback via Canvas by analyzing interactions in more detail. With YouTube and GoReact, the literacy specialists also had the option of stopping the videos at any time and offering feedback to struggling readers.

By watching YouTube videos, the instructor evaluated how well literacy specialists taught phonics and helped struggling readers understand the relationship between letters and sounds. Based on the criteria, the instructor evaluated how phonics-based reading materials and activities reinforced sound-letter correspondence, how new vocabulary words were presented in context, with visuals, and with real-world examples in order to reinforce their meanings. In evaluating the YouTube video, the instructor looked at how literacy specialists encouraged struggling readers to use new words in writing and daily activities.

By posting YouTube videos, literacy specialists gave classmates and instructors a platform to share their expertise and methods, contributing to their professional growth and recognition

https://www.youtube.com/watch?v=6rQcn5kQT68&ab_channel=GabrielleGray



A video recording app called Flipgrid, (https://info.flip.com/en-us/getting-started.html) was used to create video discussions (Bolden, 2021). The Flip enabled literacy specialists to make better decisions and diagnoses and, in general, to be more effective tutors. With the Flip video discussion platform, teaching and learning became more engaging and personal. As a result of Flip, literacy specialists could share ideas, connect with each other, and make learning a more enjoyable and rewarding experience. Through one-on-one sessions with other participants, they offered suggestions about how to provide additional support and incorporate activities, such as using interesting materials or interactive games, to reinforce reading skills (Bolden, 2021).

The GoReact (https://get.goreact.com/) online platform was used to store literacy specialists' video reflections. Recording and replaying tutoring films allowed to see moments of struggling readers' learning, thereby helping them to understand both what went well in a lesson and what they could improve upon next time. Through the GoReact platform, literacy specialists could also provide personalized feedback to struggling readers. Their performance was evaluated using rubrics and scoring criteria. By providing personalized feedback, the literacy specialists helped struggling readers improve their skills and gain confidence in their abilities and this led to better academic performance as well as increased engagement and motivation (Kanaly, 2021). Additionally, the literacy specialists recorded themselves and uploaded the videos to GoReact for instructors and other classmates to view. The classmates and instructor provided feedback highlighting areas for improvement and offering suggestions for how to improve

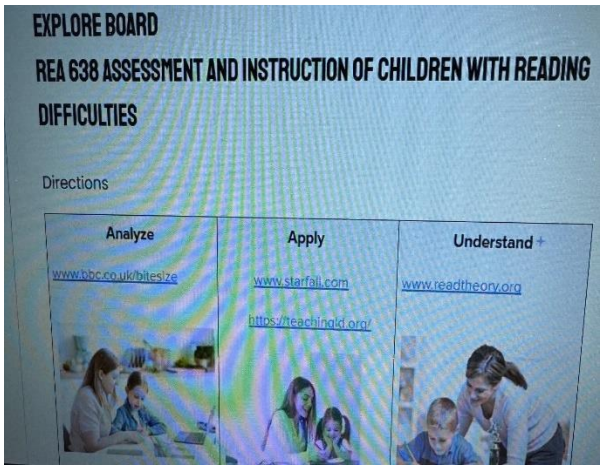
their performance. Using reflective practice allowed literacy specialists to experiment and create new ideas and approaches in order to gain maximum effectiveness (Laster et al., 2022).

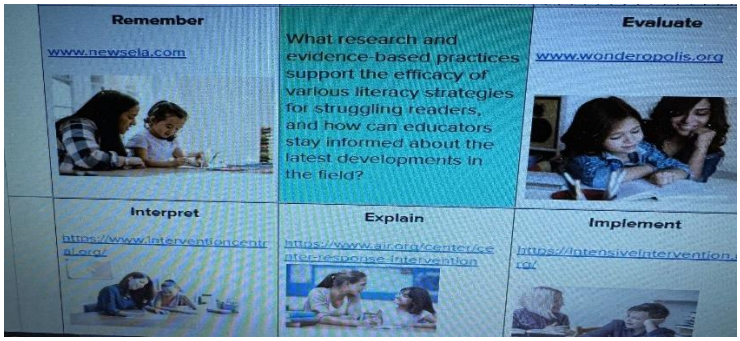
Using Explore Boards, a type of choice board, literacy specialists activated background knowledge. The Explore Boards instructor created included multimedia such as videos, audio files, and images designed to help literacy specialists tailor their approach to teaching struggling readers. In order to effectively tutor a struggling reader, literacy specialists were provided with resources they could use to improve their conceptual understanding. The resource helped them better understand the use of auditory, visual, and kinesthetic elements in teaching reading, spelling, and writing.

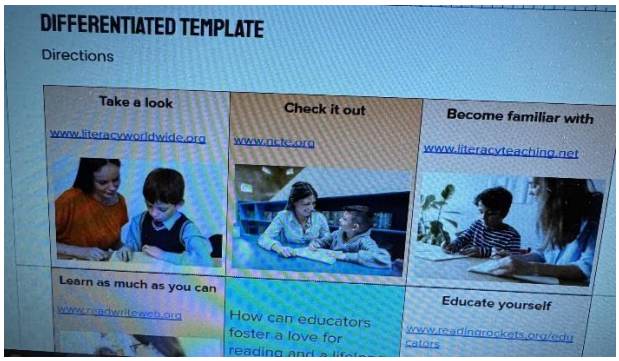
The literacy specialists presented the sites to struggling readers using an interactive whiteboard to introduce new concepts (letters, letter sounds, phonemes, blending, and sounds). They were able to use the websites to teach words with visual representations or how to encourage them to touch, see, and say words while connecting them to images, as well as how to support reading and writing by using speech-to-text and text-to-speech software.

Literacy specialists used the following explore board to access a variety of reading materials, including e-books, articles, and interactive stories

https://docs.google.com/document/d/17mOen5hiMK5ytZXaXbJt0Ksht5gGXVz2-nx76ZW2PvU/edit







5. Video Feedback on Tutoring Sessions

The literacy specialists participated in weekly, hour-long Zoom meetings with the instructor following their work with struggling readers, which included a mix of researcher-led discussions of relevant theoretical implications as well as tutor-generated discussions and questions arising from their tutoring sessions. Applying theories to practice enabled them to develop a conceptual understanding and theoretical perspective regarding struggling readers. The opportunity to gain knowledge, skills, and abilities to be a literacy coach while being productive, reflective, and adaptive was also essential.

The instructor connected with individual literacy specialists via Zoom in order to provide feedback. Through Canvas technology, the instructor provided written feedback based on video tutoring analyses. The instructor aimed to produce literacy specialists who would positively impact the learning outcomes of struggling readers through rich learning experiences (Roblyer & Doering, 2013). Other purposes were as follows: (a) to provide collaborative dialogue for literacy specialists at all levels of knowledge and experience; (b) to use assessments characterized by data-driven instruction to facilitate change in practice; and (c) to develop job-embedded professional learning to increase literacy specialists' capacity to meet individual students' needs.

6. Methods

The approach of this study was both qualitative and quantitative in nature. In this study, the relationship between variables was identified using a qualitative approach (Crossman, 2019). The study involved nine literacy specialists who worked as K-12 teachers and took the practicum course using a variety of platforms, including Canvas and Zoom.

Using a 5-point scale rubric, specific skills and knowledge areas for literacy specialists were outlined and clear criteria were provided helping literacy specialists understand what was expected of them in their discussion board and reflection assessments. Rubrics were aligned with academic standards and learning objectives ensuring that assessments were relevant and rigorous and they helped ensure that the course content and assessments met institutional and professional standards.

As part of this study, the online discussion board on Canvas was used to assess the impact of the class and the progress and needs of the literacy specialists. Through Canvas discussions, the literacy specialists in the literacy clinic were able to reflect on their learning, integrate their practice, and seek advice from each other. They were able to develop a community of learners who shared their best practices, concerns, and most pressing issues while working with their struggling readers through multimedia (Roblyer & Doering, 2013). The reflections served two purposes. The tutoring sessions aimed to stimulate reflective discussion among literacy specialists about their tutoring work. Secondly, Canvas postings provided the course instructor with insight into how to restructure the literacy clinic to better prepare literacy specialists for their roles as leaders (Vokatis, 2018).

For this study, literacy specialists' exit reflections on their teaching and learning as well as group discussions on Canvas were collected. The reflections were conducted in order to assess the impact and progress of the class as well as assess the literacy specialists' needs. The exit reflections were used to assess the academic and professional expertise of the literacy specialists. The multimedia YouTube, GoReact, and Flipgrid were used to share literacy specialists' reflections via video and audio. The reflections and discussion board responses were evaluated based on whether a literacy specialist presented ideas that reflected the integration of course material.

7. Results and Discussion

The purpose of this qualitative study was to examine how technology and other aspects of online practicum course delivery support the quality of learning and increase the efficacy of literacy specialists (Laster et al., 2022). The findings revealed that the pedagogical shifts made by literacy specialists in an online reading practicum course resulted in (a) an increase in knowledge of data-driven instruction and diagnosis, as evidenced by metacognitive reflection and progressive understandings; (b) the refinement of literacy specialists' instructional differentiation and intervention skills based on their tutoring experiences, as evidenced through their analytical reasoning; and (c) increased commitment to providing corrective reading instruction based on formal and informal data-driven instructions (Laster et al., 2022). Several strategies were identified as a result of the study: (1) composing clear articulations of learning objectives, (2) promoting contextualized and individualized learning, and (3) planning for visual and audio representation of concepts (McKenna & Walpole, 2019).

Findings from this study suggest that one-to-one literacy instruction can be an engaging and effective method to assist K–12 students in attaining appropriate accuracy and fluency while reading for comprehension and meaning (Coulter, 2004). The analysis of the informal assessment scores demonstrated that K–12 students with varying reading and writing abilities and levels of prior knowledge made significant score gains. Although the limited sample size precluded the ability to draw strong conclusions, this qualitative study identified several factors associated with successful outcomes. Among the important factors that led to the successful implementation of one-to-one literacy clinics included (a) fostering a supportive environment that motivated struggling readers to engage in tutoring sessions as well as (b) integrating strategies used during technology-enhanced field experiences (Vokatis, 2018).

8. An assessment of literacy specialists' performance through a discussion board

The literacy specialists used Canvas discussions as a time to reflect, integrate their learning and their practice, and seek advice from other classmates while tutoring (Laster et al., 2022). The discussion board prompts generated fifty-five postings on Canvas. In 50 out of 55 postings to Canvas, they assisted their colleagues in order to meet the literacy needs of their struggling readers. In over 35 postings, they discussed 38 different activities they found most useful in working with their struggling readers. Based on assignment rubrics related to learning outcomes, nine literacy specialists scored either satisfactory performance (4) or higher (5).

By integrating technology into tutoring, struggling readers were able to better comprehend texts (Roblyer & Doering, 2013). The nine literacy specialists, who had little experience with technology in teaching and learning, found that the reading methods online practicum course experience eased their computer anxiety and improved their computer proficiency instruction (Laster et al., 2022). In response to a discussion question, a literacy specialist who was also a classroom teacher indicated that new technology, such as digital texts affords rich opportunities for a variety of comprehension strategies during the sessions:

Digital texts were infused with pictures, sometimes interactive, to facilitate learning. My tutee utilized auditory and visual cues to effectively absorb the information. The combination of audio and visual signals resulted in a greater depth of understanding than either alone, which was particularly salient for the tutee, who tended to over-rely upon pictures to aid in decoding words and comprehending the text.

9. A Reflection at the Exit

In designing the practicum component, the instructor ensured literacy specialists had a chance to reflect on their best practices and seek advice from their instructor and colleagues. According to the assignment rubrics related to the learning outcome, eight of the nine graduate students achieved outstanding performance. The Goreact and the Flip were used to share literacy specialists' reflections via video and audio. Video recordings proved valuable to all nine of them since they offered an unaltered and unbiased viewpoint through which the instructor was able to assess the lessons' effectiveness (Kanaly, 2021). The videos also acted as an additional set of eyes to catch ineffective literacy strategies that they did not realize were occurring during the tutorials.

The majority of literacy specialists reported that GoReact online platform helped them improve their practice and outcomes throughout their training (Kanaly, 2021). They felt that GoReact videos enabled them to collaborate more and feedback on their instruction. With GoReact, the literacy specialists were able to create a culture of continuous learning and collaboration, leveraging feedback to tailor professional learning and promote engagement. As described in a reflective statement, a literacy specialist explained how GoReact empowered learner-led literacy skill development:

The GoReact platform gave me the opportunity to involve the tutee in the feedback assessments, enabling him to take an active role in his own learning. His own answers were recorded as well as my feedback. Furthermore, this practice saved me a great deal of time which resulted in richer learning outcomes. Using GoReact, this struggling reader has been able to learn how to reflect in a sophisticated and compelling way.

Nine literacy specialists agreed that Flipgrid provided a versatile and dynamic platform that significantly enhanced the literacy learning experience by fostering engagement, communication, collaboration, and reflection. Responding to prompts and reviewing peer videos encouraged literacy specialists to think critically about their own and others' work. The video format enabled clinic participants who struggled with reading to respond creatively since props, drawings, and other visual aids were used. Using Flipgrid helped them develop digital literacy skills which are essential in today's technology-driven world (Bolden, 2021).

10. Conclusions and Limitations

An increasing trend exists to move to online delivery of literacy clinical courses, and this research sheds light on how technologies and other aspects of an online reading clinic can support candidates working as literacy specialists and prepare them for leadership roles in their school districts. Findings reveal that the specific technologies incorporated into an online literacy practicum course delivery contributed to supporting quality learning and increasing literacy specialists' efficacy. These findings are consistent with previous research that describes the process of moving a reading practicum course online in order to offer the highest level of efficacy ((Laster et al., 2022, Bodzin & Park, 2016; Caywood & Duckett, 2019; Vokatis, 2018).

In this study, there were a limited number of participants, therefore, the results are limited in their generalizability. To overcome this limitation, researchers can conduct multiple small-scale studies to build up a larger evidence base, employ robust qualitative methods to complement quantitative data or conduct multiple small-scale studies to ensure diversity within their small sample. This research implies that online literacy clinics can help literacy specialists become more adept at teaching struggling readers and advancing theoretical knowledge. The findings also suggest that faculty should consider offering online literacy clinics while leveraging technology to improve the learning outcomes of struggling readers.

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