Article

Elementary School Teachers’ Enactment of a Content Literacy Curriculum in a Virtual Tutoring Program for Multilingual Students

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Abstract: This study evaluated the usability of a content literacy curriculum designed for graduate students’ practicum experience in a virtual after-school tutoring program for U.S. third-grade multilingual students during the COVID-19 pandemic. We explored teacher perceptions of the successes and challenges encountered while implementing the curriculum. This study involved 12 elementary school teachers enrolled in a graduate school professional development program to fulfill their practicum requirements. The curriculum emphasized a thematic unit that utilized conceptually coherent texts across science and social studies, comprehension monitoring, academic vocabulary network building, and academic conversation. An analysis of teachers’ written reflections revealed that a significant success was the enhancement of students’ engagement in learning concepts and building vocabulary through high-interest informational texts. Teachers also recognized critical teaching moments that underscored the importance of developing interconnected knowledge structures for effective text comprehension and learning. However, the study identified a need for targeted and individualized scaffolding to support students with reading comprehension challenges, making complex texts more accessible. Additionally, the shift to remote teaching necessitated the development of a new pedagogical model for professional development to effectively address the evolving needs of teachers in virtual learning environments.

Keywords: content literacy instruction; after-school tutoring; educative curriculum; professional development; remote teaching

1. Introduction

The introduction of the Common Core State Standards [1] in the United States initiated a significant shift towards emphasizing students’ engagement with complex informational texts, particularly in content areas. These standards highlight the importance of integrating high-demand informational texts into the elementary curriculum, especially in English Language Arts (ELA) [2]. Despite this emphasis, challenges persist in effectively teaching and utilizing these texts. Research indicates that elementary students often face difficulties with reading and writing tasks involving informational texts that require a high level of knowledge [3,4]. This struggle is partly attributed to a lack of exposure to such texts in classrooms, especially in specific disciplinary content [5].

A contributing factor to this underutilization is the perception among primary-grade teachers that informational texts may not engage young students as effectively as fictional narratives [6]. Concerns also revolve around the perceived complexity of these texts, stemming from their specialized vocabulary and the intricate comprehension strategies required for understanding these texts [7]. However, recent large-scale interventions challenge these perceptions, demonstrating that content literacy instruction, which integrates science and social studies into ELA instruction through informational texts, not only enhances student
engagement in reading [8] but also bolsters their content knowledge, academic vocabulary, and reading comprehension; e.g., Refs. [9–12].

Despite growing evidence of the effectiveness of content-integrated literacy instruction [13], understanding the intricacies of its implementation is crucial. This study examined teachers’ perceptions of their experiences with such instruction, focusing on both its successes and challenges. We designed a content literacy instruction curriculum intended to serve as an educative tool for both elementary school teachers’ professional development and student learning. This curriculum emphasizes the use of conceptually coherent, complex informational texts in the science and social studies domains. The curriculum was implemented in a graduate-level practicum course and enacted by in-service elementary school teachers (also graduate students) for third-grade students participating in an after-school tutoring program during the spring semester of 2021. The unforeseen COVID-19 school closures necessitated a pivot to virtual small-group sessions, ensuring continuous learning opportunities for both teachers and students.

This study aimed to assess the usability of the content literacy curriculum in the virtual after-school tutoring context. By exploring the teachers’ perspectives on the successes and challenges encountered while enacting the curriculum, we sought to provide insights into the practical application and potential impact of content literacy instruction in elementary education. The findings of this research may contribute to the ongoing dialogue on enhancing informational text comprehension among young multilingual students, e.g., as seen in Ref. [12], particularly those in need of additional support for content-rich informational text comprehension.

1.1. Content Literacy Instruction: A Theoretical and Practical Framework

The conceptual framework of our content literacy instruction is anchored in Kintsch’s construction–integration model of reading comprehension [14]. This model describes comprehension as an interactive process where readers actively integrate text information with their existing knowledge to construct a coherent mental representation of the content. This model is particularly pertinent for students with developing reading comprehension skills and multilingual students, as it underscores the importance of engaging in strategic processing for knowledge retrieval and integration. This leads to a more in-depth understanding of complex topics, especially when navigating through multiple texts.

Building on this concept, recent advancements in content literacy instruction research have demonstrated the efficacy of thematic units and the use of conceptually coherent texts in enhancing vocabulary, content knowledge, and text comprehension among young learners [9,15,16]. The thematic unit approach, where texts are selected and organized around coherent and meaningful themes, facilitates the construction of deeper conceptual understandings and cognitive schemas. This organization of text sets enhances conceptual clarity and fosters active engagement in vocabulary learning and reading comprehension, contributing to a more integrated and holistic learning experience [8,17].

The lexical quality hypothesis [18] further supports this framework by emphasizing the significance of high-quality lexical representations in comprehension. This hypothesis suggests that a reader’s comprehension ability is heavily influenced by the richness and depth of their mental representations of words. In the context of content literacy, this implies that a strong and comprehensive understanding of academic vocabulary and disciplinary concepts is crucial for efficient word retrieval, which supports deeper text comprehension and the construction of a robust mental model of the text [19,20].

As students advance in learning challenging disciplinary content, the role of semantic networks in vocabulary development becomes increasingly important. Building and mapping these mental networks of semantically related domain-specific words enhance cognitive accessibility, deepening students’ lexical and conceptual knowledge [21,22]. This approach has been supported by empirical evidence, including a large-scale content literacy intervention study, which found that a process of vocabulary network-building in science
and social studies domains facilitated incidental learning of word meanings and had a positive transfer effect on reading and writing outcomes [11,16,23].

In addition to lexical quality, comprehension monitoring is a critical component of understanding complex informational texts. The ability to detect and address inconsistencies or areas of confusion while reading is a key predictor of successful reading comprehension [24]. This involves metacognitive awareness and regulation of cognitive processes during reading, enabling students to evaluate and repair their understanding of the text as they read [25,26]. In our study, we incorporated a focus on metacognitive comprehension monitoring strategies, including explicit instruction in effective reading strategies using nonfiction texts as examples, and emphasized the importance of understanding why these strategies are beneficial and how they can be applied in real reading situations. This approach was supported through various instructional techniques such as teacher modeling, guided practice, and independent practice [27,28].

This expanded conceptual framework synthesizes key elements from various theoretical models and empirical studies to offer a comprehensive approach to content literacy instruction. It highlights the importance of integrating thematic units, lexical quality, and comprehension monitoring strategies to foster a deeper understanding and engagement with complex informational texts. Through this approach, we aimed to equip multilingual students with the necessary skills and strategies to enhance their comprehension abilities and foster engagement in reading and learning [12].

1.2. Usability of Educative Content Literacy Curriculum

The after-school tutoring program’s content literacy curriculum in this current study was designed to enrich teachers’ pedagogical knowledge and to enhance their instructional practices across various contexts using content-rich, cognitively demanding informational texts. This educative curriculum, tailored for teachers engaged in professional development, aimed to bridge theoretical knowledge with practical application in real-world instructional settings [2,29]. The curriculum was designed to equip teachers with an understanding of how to effectively integrate literacy and content-area instruction, addressing a common shortfall in elementary education where these subjects are often taught in isolation from one another [30].

The curriculum embodies a principled design that encourages teachers to reflect critically on essential lesson components and their instructional practices. Such reflection is critical in fostering a deep understanding of content literacy instruction principles, adapting teaching strategies to address diverse student needs, and enhancing overall teaching efficacy [31,32]. By engaging with these evidence-based practices, including thematic units with conceptually coherent texts across science and social studies, comprehension monitoring, academic vocabulary network building, and academic conversation, teachers gain insights into content literacy instruction and learn to tailor their approaches to diverse educational contexts and student profiles.

However, the promise of research-based educative curricula in supporting teacher knowledge and practice must be tempered with an evaluation of its usability in specific educational settings. Usability encompasses the practicality of implementing research-based practices in real-world contexts [33]. This concept is crucial as it determines the extent to which such curricula can be effectively and sustainably integrated into existing educational systems [34].

Evaluating the usability of curriculum materials involves assessing their relevance, ease of implementation, and adaptability in various teaching scenarios. Such an evaluation provides invaluable feedback for curriculum designers, highlighting areas for improvement and guiding future curriculum and program revisions [35]. For instance, Poch et al. explored the usability and feasibility of data-based instruction for students with intensive writing needs [36]. Their findings emphasize the critical role of professional development supports in facilitating the implementation of research-based practices. This study revealed that while teachers faced challenges related to accessing materials and managing time, the
provision of continuous professional development significantly improved their ability to implement the instruction effectively. These insights illustrate the importance of support systems in enhancing the practical application of educative curricula, directly contributing to our understanding of curriculum usability in diverse educational settings.

As key stakeholders in educational transformation, teachers’ insights into the curriculum’s usability are instrumental. Their feedback helps researchers gauge the practicality of research-based instructional programs in authentic settings and addresses critical issues in design and implementation, thus bridging the research–practice divide and laying the groundwork for successful and sustainable educational development [37].

1.3. Advancing Virtual Teaching Practicums in Teacher Education for the Digital Era

The growing prominence of online teaching and learning, particularly accentuated during the COVID-19 pandemic, has shed light on the urgent need for robust professional development opportunities tailored to the evolving needs of the K–12 teaching workforce [38,39]. The pandemic’s unprecedented impact necessitated a sudden shift to online teaching formats, revealing a significant preparedness gap among many elementary school teachers [40]. Despite efforts by schools and districts to provide support and resources, a significant void persisted in professional development specifically focused on the pedagogical practices unique to online instruction [41]. This transition not only tested teachers’ adaptability but also impacted their self-efficacy and confidence in delivering effective online education [42,43]. The consequent effects on student engagement and learning outcomes during remote learning have been significant, further emphasizing the need for targeted professional development in this area [44].

In response to these challenges, it is critical for teacher education programs to broaden their scope by integrating comprehensive virtual practicum experiences. These experiences should aim to equip teachers with the necessary skills and knowledge to navigate the complexities of online instruction effectively [45]. Furthermore, incorporating research-based best practices in online pedagogy and fostering a deeper understanding of technological tools are essential components of such professional development [46–48].

Moreover, virtual teaching practicums offer a unique opportunity for teachers to experience firsthand the dynamics of an online classroom. These practicums should be designed to replicate real-world scenarios, offering teachers practical experience in lesson planning, delivery, student engagement, and assessment in a virtual setting. This hands-on approach not only enhances their teaching competencies but also prepares them for the increasingly digital future of education [49]. In this study, the integration of virtual teaching practicums into teacher education programs is more than a response to a temporary global crisis; it is a strategic adaptation to the evolving landscape of education. By proactively addressing the challenges and leveraging the potential of online teaching, these programs can contribute to the development of a resilient and adaptable teaching workforce.

2. The Current Study

The purpose of this study was to uncover the successes and challenges perceived by teachers in their implementation of a content literacy curriculum and instructional practices in a small-group, synchronous online learning context. Exploring teachers’ perceptions is critical for several reasons. First, while existing research on content literacy interventions has primarily focused on the impact of these programs on elementary student outcomes, e.g., Refs. [9,10,12,16], there remains a gap in understanding teachers’ perspectives on their instructional practices, especially when using informational texts. Recognizing teachers as active agents in curriculum enactment is crucial, as their pedagogical approaches directly influence student learning outcomes. Gaining insight into these perceptions may offer practical implications for the effective design and refinement of core components within content literacy instruction [32,50].

Second, teachers’ reflections can serve as a crucial aspect of usability testing for the newly designed tutoring program. This usability evaluation, through qualitative feedback
from the primary users (i.e., teachers), enables the identification of strengths and areas for improvement in program development and implementation. This feedback is especially valuable in assessing the effectiveness of the program’s prototype and in guiding its refinement through iterative processes.

Finally, the context in which these teachers operate adds a significant layer of depth to their feedback, primarily due to the hands-on practicum experiences and their involvement in a dynamic learning community. The participating teachers, all of whom were enrolled in a graduate-level professional development program, engaged in the tutoring program to fulfill their practicum requirements. This practical educational setting facilitates the practical application of their theoretical knowledge and nurtures a collaborative and reflective learning environment among their peers. Their insights into the successes and challenges encountered are especially valuable. They are likely to enhance the accountability of the tutoring program and offer critical perspectives that can inform and improve the practicum experience for future cohorts. This continuous feedback loop, grounded in real-world application and enriched through communal learning, is essential for evolving and enhancing the efficacy of teacher education programs [51,52].

The guiding research question for this study was “What are the teacher perceptions of successes and challenges in the implementation of evidence-based content literacy instruction practices in the online after-school tutoring program for third-grade students?” This question seeks to explore the nuances of teachers’ experiences and perceptions, providing a comprehensive understanding of the practical application and effectiveness of content literacy instruction in a real-world educational setting.

3. Methods
3.1. Participants

This study involved 12 in-service teachers (11 female) who were selected based on their enrollment in a graduate-level Practicum in Literacy Instruction course in a master’s degree program in curriculum and instruction. All participants volunteered for this study as part of their practicum requirements and provided informed consent. Table 1 shows demographic information (gender, race/ethnicity, teaching experience) of the teacher participants. The teachers reported an average of 9.6 years of teaching experience (ranging from 4 to 17 years) in elementary schools in the U.S. They participated in a 12-week after-school literacy tutoring program, which was a component of their course activities. Conducted in a synchronous virtual format, the program aimed at tutoring third-grade students from a local elementary school in a high-poverty neighborhood. Each teacher was responsible for a group of three to four multilingual students, maintaining this assignment throughout the semester.

<table>
<thead>
<tr>
<th>Teacher ID</th>
<th>Gender</th>
<th>Race/Ethnicity</th>
<th>Teaching Experience (in Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Female</td>
<td>White</td>
<td>17</td>
</tr>
<tr>
<td>T2</td>
<td>Female</td>
<td>Black/African American</td>
<td>7</td>
</tr>
<tr>
<td>T3</td>
<td>Male</td>
<td>Black/African American</td>
<td>8</td>
</tr>
<tr>
<td>T4</td>
<td>Female</td>
<td>American Indian</td>
<td>15</td>
</tr>
<tr>
<td>T5</td>
<td>Female</td>
<td>White</td>
<td>6</td>
</tr>
<tr>
<td>T6</td>
<td>Female</td>
<td>Black/African American</td>
<td>6</td>
</tr>
<tr>
<td>T7</td>
<td>Female</td>
<td>White</td>
<td>14</td>
</tr>
<tr>
<td>T8</td>
<td>Female</td>
<td>White</td>
<td>9</td>
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<tr>
<td>T9</td>
<td>Female</td>
<td>White</td>
<td>4</td>
</tr>
<tr>
<td>T10</td>
<td>Female</td>
<td>White</td>
<td>14</td>
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<tr>
<td>T11</td>
<td>Female</td>
<td>White</td>
<td>9</td>
</tr>
<tr>
<td>T12</td>
<td>Female</td>
<td>White</td>
<td>6</td>
</tr>
</tbody>
</table>
3.2. Tutoring Program

3.2.1. Curriculum and Texts

We developed a curriculum that emphasized the integration of science and social studies content into vocabulary and reading comprehension instruction. The instructional materials, designed with scripted elements, provided detailed guidance to maintain consistency in content and instructional quality while also allowing for teacher autonomy and adaptation. Teachers were encouraged to modify lessons to meet their students’ specific needs, fostering a sense of ownership.

The curriculum featured a thematic unit entitled *Natural Mysteries*, which consisted of 24 lessons evenly divided between science and social studies. This unit was structured into three subunits, each focusing on a different natural disaster: hurricanes, earthquakes, and volcanoes. As illustrated in Table 2, each subunit consisted of four science lessons and four social studies lessons that were thematically and taxonomically related. For example, Subunit 1 began with Lessons 1–4, focusing on the scientific principles of hurricanes, followed by Lessons 5–8, which explored the historical impact of Hurricane Katrina. This format was consistent across all subunits: Subunit 2 started with the scientific aspects of earthquakes and then covered the historical narrative of the 1906 San Francisco Earthquake; similarly, Subunit 3 discussed volcanoes, starting with their scientific exploration and transitioning to the historical eruption of Mount Vesuvius and its effects on Pompeii. This systematic approach facilitated a comprehensive and integrated learning experience by leveraging scientific knowledge to enhance understanding of social studies content.

Table 2. Scope and Sequence of Third-Grade Natural Mysteries Unit Curriculum.

<table>
<thead>
<tr>
<th>Sub-Unit (Theme):</th>
<th>Science</th>
<th>Social Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subunit 1 (Hurricanes)</strong></td>
<td>Science</td>
<td>Social Studies</td>
</tr>
<tr>
<td>Domain: Hurricanes</td>
<td>Hurricane Katrina (True Books: American History) by Peter Benoit (880 L)</td>
<td>Earthquake</td>
</tr>
<tr>
<td>Lesson: Lessons 1–4</td>
<td>Books on Hurricanes (Forces of Nature) by Peter Murray (850 L)</td>
<td>The 1906 San Francisco Earthquake</td>
</tr>
<tr>
<td>Book title and author(s) (Lexile level):</td>
<td></td>
<td>Volcanoes</td>
</tr>
<tr>
<td></td>
<td>What Was the San Francisco Earthquake? by Dorothy Hoobler (720 L)</td>
<td>Pompeii Volcano Eruption</td>
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<tr>
<td><strong>Selected target domain-specific academic words:</strong></td>
<td>storm surge, water vapor, meteorologist</td>
<td>evacuate, devastation, relief efforts</td>
</tr>
</tbody>
</table>

3.2.2. Lesson Activities

Each 50 min tutoring session was structured into five lesson activities. The session began with students and the teacher reviewing the previous lesson’s content and establishing learning goals for the new lesson using “I can” statements (5 min). Next, the teacher introduced students to a selected text segment, connecting it to what students already knew about the topic (5 min). During this phase, the students were introduced to two or three new domain-specific words from the text, fostering an opportunity to understand and discuss these words.

Following this, the teacher and students engaged in an interactive read-aloud activity (20 min). The teacher employed comprehension monitoring strategies, such as stopping
after small text chunks to model identifying main ideas and generating high-quality summaries. This approach supported students in actively monitoring their understanding, encouraging them to think aloud and use prompts like, “I wonder what the author meant when they said _____,” and “I don’t understand, but I notice what is confusing me”.

Students then engaged in creating visualizations of domain-specific vocabulary networks on Jamboard that gradually expanded over time (10 min). This activity involved concept mapping to connect semantically related vocabulary words, enhancing students’ understanding of word meanings and their domain knowledge in their mental organization of concepts [53]. As new and previously learned words were discussed, students made creative decisions in mapping these words on Jamboard, understanding how and why they were semantically and conceptually related. The session concluded with students engaging in structured academic conversations around the central topic. Students utilized scaffolds like sentence starters, transition words, target vocabulary, and graphic organizers. This setup was designed to enhance their skills in listening actively, sharing and expanding perspectives using textual evidence, and evaluating and comparing relevant ideas.

3.2.3. Program Implementation

Before the program implementation, teachers attended a three-hour professional development workshop to discuss the program’s conceptual framework, lesson materials, and the use of Google Meet. They focused on practical features like screen sharing and the raise hand feature to facilitate interactive sessions. They received and reviewed unit lesson plans, books, and online resources, and were paired with colleagues to collaboratively prepare for the tutoring sessions.

During the 12-week Spring 2021 semester, teachers met with their assigned groups of three to four students twice weekly for 50 min sessions via Google Meet. These interactive sessions utilized screen-sharing to display electronic versions of lesson books, Google Slides, and Jamboard, fostering a dynamic and collaborative virtual learning environment. Additionally, three trained teaching assistants supported the teachers focusing on smooth technology operation throughout the sessions.

3.3. Data Source

The data source comprised written reflections submitted electronically by the teachers at the end of the program. They were prompted to write essays addressing (a) their learning experiences, the knowledge that they gained, and observations of students’ learning experiences and (b) challenges encountered during the curriculum enactment.

3.4. Data Analysis

The written reflection essays were analyzed using a grounded theory approach, which involved iterative, collaborative coding cycles [54,55]. The analysis included reading, discussing, and rereading the written texts to immerse ourselves in the data [56]. Our approach blended deductive and inductive methods, starting broadly by identifying emergent themes and progressively refining them through closer examination of the data.

3.4.1. Open Coding

Two coders independently reviewed a randomly selected set of reflections. This initial phase involved breaking down, examining, conceptualizing, and categorizing the data [57]. They noted patterns and themes through analytic and reflective memos. A preliminary code frame was developed based on these emergent themes, where codes were inductively derived from text excerpts. Throughout this phase, the coders also applied a deductive approach by mapping back to pre-established theoretical frameworks, ensuring that the analysis was grounded in the existing literature. The coders engaged in continuous discussions to ensure multiple perspectives and reduce bias, refining codes to identify subthemes.
3.4.2. Axial Coding

During axial coding, the coders made connections between categories and subcategories [57]. This phase involved merging multiple codes to form coherent categories and themes, with a focus on how these categories were related to each other. The interplay of deductive reasoning helped link emergent themes to broader theories.

3.4.3. Selective Coding

In the final phase, the coders synthesized the categories to identify two core themes: (a) successes and (b) challenges in the teachers’ enactment of the content literacy curriculum in the online tutoring program. This phase was guided by a deductive approach, where the established themes were further refined and linked to specific aspects of the curriculum implementation discussed in the literature. Table 3 provides an overview of the two core categories, (sub)themes, and descriptions.

Table 3. Thematic Categories of Teachers’ Perspectives of Content Literacy Curriculum Enactment in an Online Tutoring Program.

<table>
<thead>
<tr>
<th>Category</th>
<th>Theme</th>
<th>Description</th>
<th>Subthemes</th>
</tr>
</thead>
</table>
| Student engagement        | Teachers noted that students gained content and vocabulary knowledge over the course of the program. They observed students becoming more engaged with content and confident in after-reading academic conversations. | • Engagement in learning new academic words  
• Building concept knowledge  
• Confidence in group discussion |
| Program successes          | Teachers described instructional components in the curriculum that helped students sustain motivation and engagement. | • Thematic (sub)unit lessons  
• Informational texts with high-interest topics  
• Vocabulary networks building  
• Explicit vocabulary instruction |
| Professional growth       | Teachers described how their participation in the tutoring program helped them grow as educators and alter their instructional approaches. | • Content knowledge development via texts  
• Comprehension monitoring using reciprocal think-alouds |
| experience                |                                             |                                                                             |
| Academic challenges       | Teachers described obstacles to student learning during the tutoring sessions, including topic and text complexity and challenges in learning technical terms. | • Academic challenge  
• Individual differences in reading level  
• After-reading academic conversations |
| Program challenges        | They also expressed difficulty in building rapport with students remotely and a lack of confidence in teaching virtually, which affected their efficacy. | • Building rapport with students online  
• Lack of confidence in online teaching  
• Length of the lessons |
| Logistical challenges     | Teachers identified lack of consistent attendance in the voluntary online after-school tutoring program. | • Student absenteeism and tardiness as obstacles  
• Absenteeism affecting the group lesson progress |
| Student absenteeism       |                                             |                                                                             |
4. Results

4.1. Virtual Tutoring Program Successes Perceived by Teachers

An analysis of coded data revealed three major themes identified as successes: (a) student engagement, (b) instructional features that contributed to student engagement, and (c) professional growth experience.

4.1.1. Student Engagement

All teachers (T) noted significant student engagement in learning new domain-specific academic words and building concept knowledge during the program. T5 commented, “students were always engaged with the subject matter . . . and topics that they were somewhat familiar with but wanted to learn more about”. Reading informational texts involved learning and understanding new words that represented complex concepts, but T5 noted that “The students seemed to enjoy (learning) the target domain-specific vocabulary terms. If they were already familiar with the terms, they were excited to share their background knowledge. If the term was new for them, they were curious to learn more”.

T11 observed increased confidence in students and engagement during group discussions, noting, “students started to feel more confident in using the vocabulary words in their answers and with each other . . . were more open and willing to talk with the teachers and their peers”. T7 also highlighted the program’s powerful impact, stating, “overall this [program] was a very powerful learning experience for the students and tutors. We all walked away with new learning and appreciation for becoming experts in content areas by reading multiple challenging texts on a similar topic”.

4.1.2. Instructional Features That Contributed to Student Engagement

Teachers identified several instructional features that contributed to students’ learning engagement. Notably, the organization of science and social studies subunits within the Natural Mysteries theme was highly engaging. T4 reported, “The organization of thematic units in science and history topics were of high interest and engaging for the students”. The design facilitated knowledge-building by sequencing topics from locally relevant to broader topics, aiding in the development of a mental structure or schema.

The intention of the program curriculum was not only to facilitate students’ content knowledge-building but also to keep students engaged through the reading of high-interest informational texts. In each thematic subunit, students first learned new science-specific words and built background knowledge about scientific concepts (i.e., volcanoes), using these as a basis to explore related social studies topics (i.e., Pompeii). Although students may have come into the program with limited prior exposure, the teachers observed significant growth in the student’s ability to make visible connections across different lessons and domains, enhancing their overall conceptual understanding. T8 noted, “students could make connections between the natural disasters units and learn about specific natural disasters that impacted people in history”. T11 further observed that “students had limited background knowledge when they first entered the program. However, after a few weeks, they were using the vocabulary learned in the science portions of the unit to the social studies portion. Students also made connections to other units. They were retaining general vocabulary words to apply throughout the hurricane, earthquake, and volcano unit. They could take those new words and explain how the different situations could be catastrophic”.

The vocabulary network-building activity was particularly effective in enhancing learning. This activity helped students link new vocabulary with their existing knowledge, thereby deepening their understanding of the content. T12 described “… the level of connections the students were able to make between new vocabulary words and previous ones, especially across topics. I also saw the value of studying similar vocabulary words across different topics”. Similarly, T3 found that “using concept maps helped students build strong networks of words and knowledge”. T9 added that the concept maps “helped to really solidify their understanding of the words. They would always ask when we were doing it. I think having them add their own pictures helped with engagement, and ultimately their comprehension”.

Moreover, the explicit instruction of target domain-specific vocabulary played a crucial role in building background knowledge, thereby elevating student engagement and comprehension. T6 reported, "explicitly teaching target domain-specific vocabulary... allows students to begin thinking about the words so when they came up in the passages they had a little bit of background knowledge in order to comprehend the text... sometimes in the following tutoring session I heard them use the newly learned vocabulary words".

4.1.3. Professional Growth Experience

Several teachers discussed transformative experiences contributing to their professional growth, particularly in relation to content knowledge development through thematic informational texts. T2 shared, "I learned... how background knowledge actually affects... a child's ability to comprehend a text". Similarly, T1 added, "After this experience, I have a better understanding... that knowledge building is an essential component to improving reading comprehension".

Initially, some teachers felt discomfort with the intervention’s focus on content knowledge, which challenged their established instructional practices. However, by the end, many reported increased confidence in their professional abilities. T4 remarked, "I was able to see in action why all of the concentration around building background knowledge was so important to a student’s comprehension. It was simply amazing to see how the students in our tutoring sessions made important personal connections to the text, the world around them and how quickly they began to imitate the language of the tutors when discussing ideas".

Their role as tutors also reshaped teachers’ approaches to comprehension monitoring and vocabulary instruction. T7 noted a shift in her teaching strategy: "After tutoring, I began rethinking my read aloud methods. Intentional think alouds while reading aloud... will help ensure my students are receiving the strategies and instruction they need". Moreover, several teachers discussed how they intended to move forward and integrate their learning about the comprehension monitoring strategy into their future class instruction. For example, T1 wrote, "I think in the future I will utilize think-alouds with my whole class to better teach metacognitive reading strategies. I will also use think-alouds with complex texts to introduce vocabulary and concepts to all the students in my class".

The explicit focus on vocabulary instruction using the vocabulary networks tool was highlighted as particularly impactful. T11 reflected on the evolution of his teaching approach: "I have gone over vocabulary words with my students in the past. But it was a simple definition and explanation and I kept it moving. I now see that focusing the content through the vocabulary words can really help the students make meaningful connections to the words. Students in the program were retaining and using the words through the different units". T8 emphasized the usefulness of this strategy for content area reading, "I now better understand how this [vocabulary network] is important for content area reading because it helps students organize and process new vocabulary and information... this is an extremely useful strategy to help my students collect and master their domain-specific vocabulary words throughout the thematic units".

4.2. Virtual Tutoring Program Challenges Perceived by Teachers

The teachers identified three main challenges in the tutoring program: (a) academic challenges, (b) logistical challenges, and (c) student absenteeism.

4.2.1. Academic Challenges

The teachers and students often encountered hurdles due to the complexity of topics and texts. T11 noted that “students loved the topics that we covered, but I know some of the students were getting burned out on some of the more complex topics.” Struggles with decoding complex words hindered deep engagement. T11 observed, “technical vocabulary words like places really confused them or had them struggle. There were students in our group that really struggled with reading through the text. So much of their cognitive ability was given to reading through the text that they could not remember what information that they learned".
This was especially challenging when the reading ability of students in a group was not homogenous. T12 highlighted the challenges of varying reading abilities, “the student read-aloud portion was the least engaging for them as they were either bored listening to the other read or getting frustrated with their decoding difficulties”. Suggestions for improvement included grouping by reading level. T11 also noted that “Grouping students by their reading level or phonics abilities could help teachers support a similar group of students with similar areas. Even adding a phonics component for some struggling readers could help support them more”.

With the lengthy and complex passages, some teachers had difficulty with gradually releasing the responsibility to their students during the interactive read-aloud activity. T6 reflected, “I noticed that the passages seemingly increased in length and complexity... The longer the passages, however, the more I had to model reading”. T12 observed students’ disengagement during teacher modeling or think-aloud of metacognitive comprehension strategies, stating that “I often felt the students were bored or disinterested in just hearing me thinking aloud and modeling. I tried to hand responsibility over to them to implement it, [but] I felt they still were not very successful with the strategy or still did not fully comprehend the text or how to use the strategy”.

T5 also observed waning engagement toward lesson ends, “at the beginning of the lessons, the students were engaged and excited to share their thoughts. Towards the end of the lessons, the students seemed to lose some of their engagement and excitement. After a long day at school and then an hour-long lesson, I believe the students were simply ready to wind down for the day”.

4.2.2. Logistical Challenges

The virtual tutoring format presented several logistical challenges. Amid COVID-19, the tutoring program, delivered through a supervised practicum course, had to adapt to virtual settings, complicating rapport-building between teachers and students. T4 observed, “[my] students were the most shy students that I have ever taught...the challenge of completing all of our sessions via Google Meets because of the pandemic added another separating element to relationship building with our students”.

Consistency in student engagement was another hurdle. Teachers reported diminished engagement, noting that some students frequently turned off their videos and muted their microphones during sessions. T12 noted the virtual academic conversation activity was “least effective for them [students]... since they did not have the whole text in front of them”.

The scheduling and duration of sessions also posed problems. T2 mentioned, “Although very content rich, they [lessons] were a bit long to try and complete within the hour... I think it was not enough time to hone in on what they [students] really needed with all the content that we had to cover.” The after-school timing meant that students often attended tutoring fatigued from their day, making the 50 min lessons challenging.

Additionally, transitioning to online teaching impacted teachers’ self-assurance. T10, with 14 years of teaching experience, expressed significant discomfort with the virtual format: “I can say with conviction that I am NOT a virtual teacher. With the current state of affairs, I have had no choice. It has taken a serious toll on my confidence to teach”.

4.2.3. Student Absenteeism

Student absenteeism and tardiness emerged as significant challenges, as reported by half of the teachers. Inconsistent attendance disrupted the continuity of lessons and hindered teaching and learning processes. T5 highlighted the difficulty, stating, “It can be difficult to complete the lessons if the students do not come to the session or if they come 30+ minutes late. It is difficult to build on previous discussions if a student was not present for the session”. Despite understanding that students and their families faced competing demands, the inconsistent presence of students posed challenges to maintaining lesson continuity and building upon previous knowledge. T12 elaborated, “Attendance has really been our only challenge. It is challenging though to create consistency and make connections between lessons when not everyone was there for the content”. This absenteeism affected individual students’ learning
and the group’s overall performance and progress as teachers struggled to engage students in activating and applying previously learned content and vocabulary in new contexts.

5. Discussion

This study explored the usability of the content literacy curriculum developed for graduate students’ practicum experience in a virtual after-school tutoring program. We examined how teachers perceived their implementation of the educative curriculum in a small-group virtual setting during the COVID-19 pandemic. The analysis provided authentic insights into the successes and challenges teachers encountered, particularly in fostering multilingual students’ engagement in content learning through literacy activities. This underscores the need for ongoing refinement of the curriculum to better support effective teaching practices and enhance engagement among multilingual students.

5.1. Positive Aspects of Curriculum Implementation

A major positive aspect of the curriculum implementation, as perceived by the teachers, was the high level of student engagement in learning new content and academic vocabulary through reading science and social studies texts. Typically, elementary-grade teachers may allocate less instructional time to challenging and complex nonfiction texts filled with academic vocabulary, believing these texts could demotivate young readers, especially those facing comprehension difficulties [5,7]. Contrary to this belief, teachers in this study viewed student engagement as a notable success during the content literacy lessons structured around a series of expository texts. They noted that students were motivated to learn new information in the domains of science and social studies, understand concepts more deeply, and build content knowledge using rich texts. This finding aligns with prior research from content literacy intervention studies, e.g., Refs. [8–12], which suggests that meaningful conceptual content knowledge building in reading instruction can positively influence students’ reading and learning engagement.

From the analysis of teachers’ perceptions, two key instructional features emerged as significant contributors to student engagement. First, sustained content-rich reading instruction around the conceptually coherent theme of Natural Mysteries over several weeks likely facilitated this engagement. The recurrent exposure to conceptual content through thematically related books over time likely boosted students’ confidence as they cumulatively built enhanced and connected knowledge structures across science and social studies domains around similar topics.

Second, teachers highlighted the importance of explicit vocabulary instruction and vocabulary network building as critical scaffolds for comprehending informational texts. Their recognition of the value of explicit teaching for domain-specific vocabulary supports the idea that developing a deep understanding of vocabulary specific to disciplines is essential for building disciplinary knowledge and comprehending texts [15,18]. The challenges associated with disciplinary texts, particularly for young children, include the abstraction of dense concepts into specialized terms, which can be mitigated by instructional support that reduces the vocabulary burden, facilitating domain learning and disciplinary text comprehension.
Additionally, teachers’ observations of students’ engagement in building semantic networks of domain-specific words align with previous intervention studies, e.g., as seen in Refs. [10,11,16], suggesting that young children can use a network composition of semantically associated words as resources to establish coherent mental schemas of concepts while reading and learning from science and social studies books. Teachers reflected that the visualization tool for semantic mapping supported students in deepening and solidifying their understanding of the complex words and concepts presented in the texts. This finding is consistent with the view that the development of graphical networks of domain-specific academic words can serve as scaffolds to integrate new knowledge into preexisting knowledge structures, thus building enriched mental representations of disciplinary texts [58]. Given that academic vocabulary knowledge is crucial for students’ disciplinary learning [59], students’ engagement in building and expanding semantic networks of domain-specific words not only deepens their vocabulary knowledge but also aids in acquiring knowledge associated with challenging disciplinary content.

Importantly, the supplemental content literacy curriculum materials in this study were also designed to expand teachers’ pedagogical knowledge, enabling them to apply these methods in new instructional settings that utilize informational texts. The enactment of these educative curriculum materials by the teachers facilitated the integration of a specific knowledge base—including theoretical rationales for incorporating instructional components—into their teaching practices, deepening their understanding of how these materials can be effectively used in different instructional contexts [29]. This aligns with findings from Poch et al. [36], which emphasize the significance of providing ongoing professional development and coaching to enhance the usability and feasibility of evidence-based instructional strategies. These supports are crucial for ensuring that teachers can implement such strategies with fidelity and adapt them to meet the diverse needs of their students.

The curriculum served as a mechanism for professional development and provided teachers with the opportunity to refine their instructional skills under supervision. Specifically, the core elements of the curriculum emphasized the importance of building background knowledge for comprehending informational texts. Additionally, the curriculum components offered insights into how teachers can support students’ comprehension of informational texts through the use of metacognitive monitoring strategies and vocabulary network-building processes. This multicomponent approach may reinforce teachers’ content knowledge and equip them with practical tools to enhance students’ engagement and understanding in content-rich environments, demonstrating the curriculum’s alignment with effective practices in content literacy instruction.

5.2. Challenges and Implications for Future Practice

The challenges that teachers faced in implementing the content literacy curriculum remotely present several practical implications for future practice. Specifically, the difficulty some students experienced with challenging texts suggests that lessons should be differentiated to meet the varied needs of students in small-group instruction. Teachers might need to provide individualized and varied instructional scaffolds (e.g., decoding multisyllabic words) to make content-rich, complex texts more accessible to a diverse range of students [60]. This differentiation is particularly critical for students from high-poverty neighborhoods who may lack the foundational content or background knowledge schema necessary to integrate new information presented in a single learning material or situation [61]. Future professional development training should equip teachers to engage in in-depth analyses of complex texts to understand the qualitative aspects of complexity and to support teachers in making necessary adaptations to lesson materials to address their students’ individual needs.

Furthermore, as remote teaching has become an integral part of many teacher education programs, a new pedagogical model of professional development and support is necessary to address the unique needs of teachers in online settings, especially in holisti-
cally supporting their students during distance learning. Although the virtual after-school tutoring program provided students with additional learning opportunities during the extended time, prolonged distance learning may have led to feelings of social isolation and attention fatigue. Particularly, in the online learning environment, lesson structure and pacing should be differentiated from traditional in-person instructional settings, considering that many young children may have relatively short attention spans and that self-regulated online learning may not yet be sufficiently developed [62]. For example, a multi-component lesson can be divided into manageable chunks so that students are not overwhelmed but rather engaged in meaningful learning experiences during after-school hours. Additionally, online teaching pedagogy should extend beyond content delivery and pedagogical approaches to focus on supporting students’ social–emotional needs and building authentic relationships with students. Teachers can allocate additional time for students to engage in group collaboration and equitable discussion activities based on what students learned in previous lessons, providing tailored support in a virtual setting.

Finally, the most significant challenge perceived by the teachers was students’ sporadic absenteeism or tardiness, which became a hindrance to teaching and learning during the disruptive period of the pandemic. To improve student attendance, the tutoring program needs to leverage parental support and involvement by ensuring that parents recognize the value of attending the tutoring sessions regularly [63], especially when learning loss was particularly pronounced among young children due to the COVID-19 pandemic [64,65]. Likewise, it is important that professional development emphasizes the establishment of ongoing parent–teacher communication to inform families of student’s learning progress and attendance records and to share feedback and suggestions.

5.3. Significance of the Study

This study contributes to the field of teacher professional development by investigating the usability of a content-rich literacy curriculum tailored for virtual after-school tutoring settings. While prior research on program implementation has predominantly assessed effectiveness based on student outcomes, e.g., as seen in Refs. [8–12], it is crucial to incorporate insights and perspectives from teachers to effectively refine program elements before evaluating their impact. Our study extends the inquiry to virtual settings, which have gained prominence during the COVID-19 pandemic. By examining how teachers navigate the successes and challenges of implementing the content literacy curriculum remotely for third graders, our findings detail practical aspects and educational implications of deploying content literacy curricula in non-traditional educational settings, thus informing future efforts in curriculum design and professional development for virtual teaching.

5.4. Limitations and Directions for Future Research

This study has several limitations that suggest avenues for future research. Our findings are not generalizable but are specific to the particular context and participants of this study. This limitation reflects the inherent challenge of extending our results to a broader range of teacher experiences across different educational settings. Conducting similar research with different cohorts of teachers and students across various contexts could provide more generalized insights. To further examine teachers’ experiences and perspectives on using educative curriculum materials for content literacy instruction, it would be insightful to replicate this study in a face-to-face tutoring setting. This would allow for a comparison of teacher perceptions in both online and in-person environments, offering a more comprehensive understanding of the curriculum’s usability in diverse instructional settings.

Moreover, future investigations into virtual after-school tutoring programs should aim to identify specific strategies that enhance student attendance and parental engagement, building on the findings from this study. Additionally, future studies could benefit from the inclusion of quantitative data, such as structured teacher surveys that rate aspects of the curriculum on a Likert scale, to complement the qualitative findings. This approach would
provide a broader perspective on the prevalence of the observed themes. Incorporating additional data sources, such as in-session observations, midpoint interviews, and regular journaling or weekly logs, could also enrich the depth and breadth of subsequent research. Finally, while this study relies on teacher-reported perceptions of student growth, future research should include direct measures of student performance. This would provide a more objective assessment of student progress and help address potential biases in teacher perceptions, ensuring a more robust evaluation of the educational impact.

6. Conclusions

Elementary students should have ample opportunities to engage with and learn from complex informational texts. Instructional materials that provide these opportunities must be carefully designed to optimize useability in real-world settings. While teaching and reflecting on their successes and challenges in an after-school virtual tutoring program, educators in this study provided important insights related to usability that can inform future efforts to prepare teachers for content-integrated literacy instruction. Professional development programs should support teachers in understanding the principles of content-integrated literacy instruction and help them recognize and overcome barriers to implementation as they enact this rich form of instruction.


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