Detect and Correct: Teaching Teacher Preparation Program Students to Identify Oral Reading Errors and Implement Corrective Feedback Using Content Acquisition Podcasts

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APPROVAL OF THE DISSERTATION

This dissertation, "Detect and Correct: Teaching Pre-Service Teachers to Identify Reading Errors and Implement Feedback Using Content Acquisition Podcasts," has been approved by the Graduate Faculty of the Curry School of Education and Human Development in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

National reading scores have remained consistently low for several decades (NAEP; National Center for Education Statistics [NCES], 2022). Classroom teachers are poised to make important impacts on student success through instructional knowledge (Moats, 2009; Piasta et al., 2020). Teacher education programs (TPP) are tasked to train their students in evidence-based practices. This study used an online multimedia module, Content Acquisition Podcast- Teacher Video model plus Practice (CAP-TVP) to instruct TPP students to detect and correct oral reading errors for beginning reader and those experiencing decoding difficulties. The CAP line of research has an established research based. The current study extended this research with the addition of forced choice practice item using video clips of students reading. The dependent variable was a researcher created pre/posttest. Results indicate a trend in data that suggests CAP-TVP increased TPP student pedagogical knowledge and participants echoed this in their indication the CAP-TVP increased their potential to enact reading error correction procedures during teaching.

DEDICATION

The dissertation is dedicated to all the little ones who want to dive deep into books but find the words get in the way.

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Chapter 1: Introduction

The reading field has endured the proverbial pendulum swing in reading theory and practice for generations. Recently, there has been an uprising of criticism and rebuttals to the enduring policies and educational practices that emerged through reading debates in the 1990s and early 2000s where *whole language* and *balanced literacy* dominated teacher training and classroom curriculum (Seidenberg, 2013). The current reading debate is evident in mainstream media as well as the research world with parents, journalists, reading professors, and researchers reevaluating how we teach reading and how we train teachers to teach reading (Petscher et al., 2020; Tortorelli et al., 2021).

The *Science of Reading* (SOR) movement is the most recent to emerge in the conversation about best practices for reading education. The SOR refers to the integration of research from a variety of fields of study, including psycholinguistics, neuroscience, cognitive psychology, and education to form a coherent understanding of reading development. In short, the SOR integrates and promotes a post-positivist view of reading in contrast to the constructivist view of the recent past (L. Moats, 2014; Seidenberg, 2013). However, and interestingly, the mainstream SOR movement is not new. In fact, researchers such as Jeanne Chall (1976), Marilyn Adams (1990), Louisa Moats (1994) and Sally Shaywitz (Shaywitz, 1996) have been calling for the integration of science and educational research for decades.

The SOR calls for reading instruction for all students that is explicit and systematic. The SOR movement stems, in part, from parent dyslexia advocacy groups - well organized groups of parents who have children served in both general and special education (Johnston & Scanlon, 2021; Youman & Mather, 2018). Explicit and

systematic instruction has had a long history within special education with a wealth of empirical research to support it (Duffy et al., 1986; Hughes et al., 2017). In contrast, general education proponents' whose work stems from a whole language perspective value qualitative and observational research over quantitative reading research and neuroscience (Hanford, 2019; Seidenberg, 2013). However, national reading scores over several decades have illustrated the continued need for a closer evaluation of reading instruction in the U.S., and have called attention to how we train teachers to teach reading.

Most recently, in the late 1990s, the National Reading Panel (NRP), was federally commissioned to give definitive answers to how children learn to read. Synthesizing research from 1970 to 2000, the NRP reported that sound reading instruction should consist of five essential components: phonemic awareness, phonics, fluency, vocabulary, and comprehension (National Reading Panel, 2000). In the time since the NRP report, NAEP scores have continued to show a national reading struggle. Changes in teacher preparation programs (TPPs) designed to better align with the recommendations in the NRP report may not have been strong or swift enough to move reading achievement (Moats, 2014; Seidenberg, 2013).

The Problem

Current National Reading Scores

The National Assessment of Educational Progress (NAEP; National Center for Education Statistics [NCES], 2022) has reported national reading scores since 1971. NAEP reading scores for fourth, eighth, and twelfth graders indicate that our nation's lowest performing readers remain low performing as they progress through the grade

levels. The lowest 10 percent of students have continually remained low since NAEP reporting began in 1971 (NCES, 2022). These students continually test at a below basic or basic reading level. A basic reading level indicates that a student is moderately able to synthesize and infer with given text. Below basic indicates that a student is struggling to comprehend and extrapolate information from grade level readings and is not gaining new knowledge from novel text. In the latest review from 2019, the NAEP report showed 65% of fourth graders (9-year-olds), 66% of eighth graders (13-year-olds), and 63% of twelfth graders (17-year-olds) were reading at or below a basic reading level (NCES, 2022). The statistics show that well over half of our nation's school-aged readers are experiencing reading difficulties. Importantly, this trend has been evident for decades (NCES, 2022).

Since NAEP began assessing and reporting national reading scores, scores have shown a third of the nation's fourth, eighth, and twelfth grade students read at a proficient reading level for their age and grade. This leaves nearly two-thirds of our nation's schoolchildren progressing through and leaving our education system with inadequate reading skills. This data includes scores for general and special education students. Furthermore, in 1990, McKinney showed evidence that students placed in special education for reading intervention showed a decrease in word level reading skills. A decade later in 2002, Torgesen reported that public schools often maintain a student's reading ability rather than remediate it. Sadly, NAEP statistics continue to affirm McKinney and Torgesen's laments.

The Effect of the Reading Wars on Reading Instruction in TPPs

The NAEP reading scores may show that effective reading instruction is not accessible for all students in the U.S. Moats (2014) and Seidenberg (2013) argue that educational academia's inconsistent use of scientific evidence, and thus how we train teachers in TPPs, contributes to our nation's stagnant reading scores. The issue, in reality, is complex and not only involves TPPs, but existing in-service mentor teachers who may not be trained in current evidence-based methodologies and/or philosophies. In 2014, Clarke et al., stated that TPPs are not equipped to ensure the highly qualified status of all mentor teachers. Ehri and Flugman, (2018) describe training 69 in-service teachers over 30 weeks in systematic phonics instruction. They note their professional development required 149 hours of training and yielded proficient phonics teachers and medium to large effects in student reading growth. TPPs do not have the resources or time to ensure that all mentor teachers are highly qualified. Furthermore, Matsko et al., (2020) explain that a highly qualified teacher does not equate to a highly qualified mentor.

The issue is complex and multi-layered but, Ehri and Flugman (2018), Moats (2014), and Seidenberg (2013) argue for reform to begin within TPP coursework that instructs TPP students in the linguistic components of English, how the brain processes language and reading acquisition, and that provides practice in effective evidence-based teaching methods for systematic phonics instruction. Their request is seemingly straightforward and simple, but some argue that this instruction is not occurring in a large number of TPPs (Drake & Walsh, 2020). Abbreviated training times in conjunction with an untrained teaching force as mentor teachers may be to blame, but in consideration of the national teacher shortage, this dilemma will likely continue.

According to the National Council of Teaching Quality (NCTQ), seemingly half of TPPs are adequately preparing teachers to teach reading to developing readers (Drake & Walsh, 2020). The standards by which NCTQ grades TPPs are based on the NRP's report and focus on the five foundational components of reading: phonemic awareness, phonics, fluency, vocabulary, and comprehension. The NCTQ scores TPP elementary reading courses through syllabi and textbook review. While not an absolute measure for instruction quality or fidelity to syllabi, the NCTQ gives us a window into TPP programming throughout the U.S. They argue that the number of TPPs instructing the five NRP components has increased each year of their review since 2013. However, the percentage of institutions adequately addressing phonemic awareness is currently 51% and the percentage addressing phonics instruction adequately is 68%. The authors caution that while the SOR is beginning to influence TPPs, change is slow, and TPPs continue to underprepare TPP students to provide effective reading instruction as they move into their career in the classroom. The NCTQ report is not an exhaustive examination of TPP coursework or programming and should be viewed as an indication rather than an absolute. However, the NCTQ reports, coupled with evidence that in-service teachers lack basic language knowledge (Ehri & Flugman, 2018; Hudson et al., 2021; Joshi et al., 2009; S. Piasta et al., 2009; Pittman et al., 2020; Washburn et al., 2011, 2014; Washburn & Mulcahy, 2014), signal a need for TPPs to strengthen coursework to address the SOR.

In reaction to reports, such as those from NCES and NTCQ, parent advocacy groups (e.g., Decoding Dyslexia, 2022) across the nation have influenced the adoption of laws with specific SOR language that direct TPPs and school districts to ensure teachers

are trained to implement science-based literacy programs with progress monitoring (Johnston & Scanlon, 2021; Mather et al., 2020; Youman & Mather, 2018; VDOE, 2022). Such laws may begin to impact student performance as there is evidence that teacher knowledge is highly correlated with instructional practice (Moats, 2009; Piasta et al., 2020).

Effective Training in Reading Instruction

Knowledge and Skills Standards

Two prominent organizations in reading, the International Literacy Association (ILA) and the International Dyslexia Association (IDA) set standards for teacher training in reading. The ILA set standards that are followed by general education teaching programs and reading education programs. It follows that ILA standards are utilized in general and reading education programs as ILA supports reading instruction for all students with a focus on typical learners. IDA, however, focuses its standards for teachers of students at risk for or with dyslexia. IDA has a specific focus on dyslexia and promotes a specific type of instruction termed Structured Literacy (SL). SL refers to reading instruction that is explicit, systematic, based on data, taught to mastery, and utilizes multisensory teaching techniques (Moats, 2019; Sayeski et al., 2019; Spear-Swerling, 2019).

Accordingly, the two entities differ somewhat in their standards and skill suggestions while the intentions for both groups point to developing reading skills in all learners. ILA's standards for general education elementary teachers state that candidates should have a wide array of knowledge in literacy that incorporates theoretical, conceptual, and evidence-based practices (EBPs). ILA standards for reading/literacy

specialists state that “Candidates use foundational knowledge to design literacy curricula to meet the needs of learners, especially those who experience difficulty with literacy” (ILA, 2018 p. 35). IDA standards begin by defining SL with nine specific tenets such as modeling tasks, explicit instruction, and multiple opportunities to respond. The fifth tenet states: “Corrective feedback is provided after initial student responses”. The current study applies both ILA and IDA standards to preservice teacher (TPP student) training by training TPP students to give immediate corrective feedback when a reader misreads during oral reading.

Explicit instruction was the focus of the current study. Using IDA’s SL tenets, correction feedback following an initial student response was the centered teaching skill used to develop the procedural error correction steps in this study.

Alignment of Training with the SOR

The current study examined a specific piece of explicit reading instruction- oral reading error detection and correction. TPP students were instructed in specific steps to detect and correct oral reading error in closed, (I.e., short vowel) one syllable words. Closed syllables are often the first syllable taught to beginning readers and the first syllable type reviewed for readers experiencing decoding difficulties especially in SL or SOR aligned curriculum. Next, the specific steps outlined in the current study address explicit instruction tenets with immediate feedback, a focus on sound-symbol relationship to decode closed syllables words, and engaging the student in the correction process through targeted and precise guided questions and prompts.

There is no extant research examining specific TPP student training to identify reading errors and/or give feedback for oral reading errors in general education, special

education, or reading programs within TPPs. However, research has examined how TPPs instruct teacher candidates in code-based reading instruction. The term "code-based" refers to the NRP's five core components with specific attention to phonemic awareness and phonics. When attending to code-based instruction rooted in phonics, curriculum is more likely to focus reading practice on targeted phonics skills. Thus, reading errors, and corrective feedback, are more likely to occur alongside newly learned phonemic and phonics skills. As discussed previously, the SOR criticizes curricula that focus more on meaning-based approaches and do not adequately address these NRP's instructional recommendations for phonemic awareness and phonics (Moats 2014; Seidenberg, 2013).

Interestingly, in 2017 Clark and colleagues found that TPP students who took fewer reading specific courses had significantly stronger basic early literacy knowledge than TPP students who took more reading courses. The researchers found that a university that offered only two required courses on reading produced TPP students with statistically higher results in knowledge compared to the university that required five reading courses. The authors noted that courses in the program requiring five courses were centered on subjects such as children's literature and observational data gathering while the courses in the program requiring only two classes focused on the five core components suggested by the National Reading Panel (2000). This study highlighted course content and quality over course quantity as sufficient in building foundational literacy knowledge for TPP students.

Detecting and Correcting Decoding Errors

As with any newly learned skill, students developing reading skills will make errors. Oral reading errors are expected in all readers and are not necessarily a sign of

reading disability. However, when errors are persistent and/or a disability is identified, specific instruction and error correction procedures play an important role in remediating encountered difficulties (Heubusch & Lloyd, 1998; Moats, 2014; Seidenberg, 2013). Furthermore, all readers, no matter ability or disability, benefit from skilled teachers who detect reading errors (Sayeski et al., 2017) and give immediate and precise corrective feedback (Archer and Hughes, 2011; Heubusch & Lloyd, 1998). Research shows that interrupting readers to correct mistakes aids comprehension (Archer and Hughes, 2011; Heubusch & Lloyd, 1998). In essence, detecting and correcting reading errors hurts no one and is essential for students who struggle.

In training TPP students to detect reading errors, we must first provide background knowledge. For reading instruction, one component of background knowledge is the linguistic construct of the English language. Several researchers have lamented the lack of linguistic knowledge in both TPP students and in-service teachers (Binks-Cantrell et al., 2012; Hudson et al., 2021; Pittman et al., 2020; Washburn et al., 2011). The current study incorporates TPP student training in one element of linguistic constructs through a focus on syllable instruction and detecting common errors students make when learning to read closed syllables. Beginning readers and readers experiencing decoding difficulties often begin to master closed syllables first. Closed syllables have a spelling pattern in which a vowel is followed by one or more constants and the vowel makes a short sound (e.g.,., act, cut, stomp; Kearns, 2020). In the current study, TPP learned about closed syllables and letter sound errors students make when they are in the process of learning to read closed syllables. Beginning readers and readers experiencing decoding difficulties may make other reading errors while reading such as sound

blending errors, however, this study used simple, one syllable words with a consonant-vowel-consonant (CVC) pattern with isolated phoneme errors to focus participants on the detection and correction procedures.

Following error detection and identifying the type of error made, a teacher enacts specific corrective feedback to aid learning based on literature in explicit instruction (Archer & Hughes, 2011; Duffy et al., 1986; Heubusch & Lloyd, 1998; Hughes et al., 2017). Feedback is an essential and important component of explicit instruction (Archer & Hughes 2011; Hughes et al., 2017). The current study provided succinct steps to provide error correction (e.g., corrective feedback) based on closed syllable errors made at the beginning, middle or final phoneme within a CVC pattern word. TPP students in both general and special education benefited from the explicit instruction and practice opportunities provided.

CAP-TVPs: An Innovative Approach to Teacher Preparation in Reading

The current study utilizes an innovative approach to providing instruction for TPP students called Content Acquisition Podcasts (CAPs). CAPs are narrated slide presentations which are purposefully created to reduce cognitive load on the learner; Mayer, 2020). CAPs are specifically designed to adhere to 15 principles (see Appendix C) to achieve a coherent slide deck and recorded narration based upon the Cognitive Theory of Multimedia Learning (CTML; Mayer, 2020). CAPs have been used by researchers for over a decade (e.g., Kennedy et al., 2011; Miller & Uphold, 2021). CAP research has shown a positive impact on content knowledge learning for high school students, TPP students, and in-service teachers.

CAPs have been used within varied education disciplines from professional development on adapted physical education for school administrators (McNamara et al., 2020) to increasing TPP students use of behavior specific praise (e.g., Miller & Uphold, 2021) to improving science vocabulary for high school students (e.g., Kennedy et al., 2015). Within their varied usage, CAP iterations have included teacher video models of instructional practice, called CAP-TVs. The current study used video models of students reading while a teacher corrected their error. Additionally, CAP research has examined the use of practice opportunities on declarative knowledge. The current study imbedded practice opportunities for procedural/ pedagogical knowledge using the teaching video models. Taken together, the video models and practice in the current study create a new line of CAP research termed Content Acquisition Podcast-Teacher Video plus Practice (CAP-TVP).

The CAP literature is to be further discussed in chapter two, however, of note is CAP research focused on portions of NRP's five core components for TPP students. Carlisle et al. (2016) and Sayeski et al. (2015) created CAP modules addressing TPP student knowledge of phonological awareness, phonemic awareness, and phonics. When compared to reading an article, both studies showed CAPs to be significantly more effective for improving TPP students' declarative knowledge on foundational reading skills. Driver et al. (2014) also found that CAPs outperformed article reading in increasing TPP student's knowledge of phonological awareness. In addition, Ely et al. (2014) found that TPP students who watched a CAP video used more EBPs for vocabulary instruction with readers experiencing decoding difficulties than those who did

not watch a CAP. These findings suggest that CAPs are an effective tool in delivering the SOR and NRP content to TPP students.

To date, there are no CAP studies that examine the performance of TPP students in identifying oral reading errors and prescribing appropriate corrective feedback. This study is built on past research on CAPs and on TPP student training in reading to fill that gap. The present study extended previous CAP research by assessing TPP students' ability to apply skills (in addition to their acquisition of knowledge). Application is a key element of TPP programming; therefore, the study used best practices for TPP methods as well as best practices in reading content.

Problem Statement

We can glean from the literature and current standards across reading organizations that TPPs may not be providing sufficient training in language construct knowledge and pedagogical content knowledge. Furthermore, despite NCTQ reporting that TPPs are beginning to adopt the SOR, national reading scores continue to stagnate. All teachers who instruct developing readers or readers experiencing decoding difficulties should be versed in the SOR. Without this foundational knowledge, access to effective reading instruction will continue to be inequitable. Therefore, the present study begins to build TPP student knowledge in addressing oral reading errors as they occur for beginning readers and readers experiencing decoding difficulties.

Current Study

The current study employs a non-experimental design to examine the efficacy of a CAP-TVP for improving TPP students' ability to detect decoding errors during oral reading and identify an appropriate correction procedure. Instruction taught TPP students

to identify decoding errors by type based on letter sound correspondence miscues (e.g., initial sound, medial sound, or final sound) and to provide effective corrective feedback in consideration of error type. TPP students work through an online module within their course that consists of an introduction video, a demographic survey, a pretest, the CAP-TVP, a posttest, and a social validity survey. Pretest and posttest data were analyzed using paired T-tests to determine instructional efficacy. The CAP-TVP instruction was based on the SOR for reading error detection and corrective feedback.

The CAP-TVP first provided a theoretical background for reading skills. Next, participants learned the components of a closed syllable (i.e., a vowel followed by one or more consonants that makes a short sound). Instruction then turned to two decoding lesson preparation steps and three error detection and correction steps used during teaching. Lastly, participants viewed teaching models and answer detection and correction questions with example clips. These practice opportunities allowed participants to apply their learning by asking them to 1) listen to recordings of a student reading and making an error, and 2) identify the misread word, the error type, and an effective correction procedure. TPP students checked their responses against model answers that followed the forced questions.

Research Questions:

1. Are CAP-TVPs effective for improving participants' knowledge of effective decoding practices?
    a. Are CAP-TVPs effective for improving participants' ability to identify oral reading errors?

   b. Are CAP-TVPs effective for improving participants' ability to select the appropriate correction procedure for identified oral reading errors?

2. How does prior knowledge and experience impact participants' knowledge of effective decoding practices?
3. How do TPP students rate the effectiveness of CAP-TVP for their learning and rate their enjoyment of the approach?

Chapter 2: Literature Review

First, this chapter will discuss reading theories and synthesize the literature on feedback during oral reading to provide context for the explicit instructional decoding methods used in the current study. Next, this chapter will explore empirical research supporting the use of CAPs (CAP-TVPs in this study) in teacher education and the theoretical underpinnings of the CAP multimedia technology. Finally, the chapter will conclude with the CAP-TVP process for the current study and discuss hypotheses for intervention outcomes.

Reading Theory

The Simple View of Reading

Gough and Tunmer (1986) developed the Simple View of Reading (SVR) model, which proposes that reading skills are supported through the development of decoding and language comprehension. It is important to note that the SVR is a multiplication equation in which reading is the product of decoding and language comprehension. This model has held for decades, and the field recognizes three distinct reading disabilities related to SVR. Reading difficulties can manifest as deficits in decoding only, language comprehension only, or as deficits in both decoding and language comprehension (Gough & Tunmer, 1986; Spear-Swerling, 2016; Tunmer & Greaney, 2010). It is also important to note that within the SVR decoding and language comprehension hold equal weight. The current study focuses solely on the decoding factor, but this author acknowledges the essential role that comprehension plays in skilled reading.

Decoding deficits are centered in word recognition skills such as phonemic awareness and phonological awareness and result in difficulties in the matching of print

and sound (Seidenberg, 2013). Decoding deficits require word-level remediation (Moats, 2014). Oral language comprehension deficits may be composed of difficulty with morphology, vocabulary, syntax, or discourse; and may exist beyond reading text (Spear-Swerling, 2016; Tunmer & Greaney, 2010). A combination of decoding and oral language comprehension deficits denotes difficulties with matching print to sound *and* gaining meaning from read text (Spear-Swerling, 2016).

When decoding deficits are present, readers have trouble with word-level skills and sub-skills such as phonemic awareness, letter sound correspondence, and sight word recognition (Moats, 2014; Spear-Swerling, 2016). Phonemic awareness and phonics are the subcomponents of decoding. Phonemic awareness is the ability to hear and manipulate the smallest units of sound (phonemes) in words while phonics is the ability to make accurate phoneme-grapheme (I.e., sound-letter) matches to blend and read words. It's important to note the National Reading Panel's report (2000) also stipulates the need for a student to have phonemic awareness, or the ability to hear and manipulate the individual phonemes (sounds) in words, to apply phonics skills

Phases of Development

The SVR places decoding and comprehension as equal components in reading. Decoding can also be described as word identification utilizing phonics to sound out, or decode, words, but ultimately, it leads to an automatic skilled reader- one who effortlessly, accurately, and quickly recognizes words in print (Gough & Tunmer, 1986). To understand how one progresses to automatic word recognition within the SVR, we turn to phases of development. Ehri (2005) discussed phases by which a reader develops word recognition skills. A reader achieves the alphabetic knowledge through a series of

phases. The first phase, the pre-alphabetic phase, describes a pre-reader who is developing letter identification skills, letter-sound knowledge, and who relies on pictures to assist in "reading" text. The second phase, the partial alphabetic phase, describes a beginning reader who has most letter-sound matching, but is not yet using decoding skills accurately or consistently. The third phase, the full alphabetic phase, describes a reader who can read words automatically, but also noticeably isolates phonemes, spelling patterns, or morphological units to decode with unfamiliar words. The fourth and final phase, the consolidated alphabetic phase, describes a reader with a sizable lexicon who entwines reading words with their spelling patterns, meaning, and uses morphological units to decode when needed.

The Role of Orthographic Mapping

Researchers have found that proficient and efficient readers first use decoding strategies, then move to context cues for assistance with unfamiliar words as needed or for confirmation of decoding efforts (Davis et al., 2020; Ehri, 2005; Miles & Ehri, 2019). In alignment with the SVR, decoding is a necessary, but not sufficient component of reading. According to Ehri (2005), comprehension through word meaning does aid readers, but not until decoding skills are secure so that the reader can rely on both systems (I.e., decoding and comprehension) to assist with novel words. In the SVR equation, comprehension and decoding are equally weighted as both are equally important for the development of reading skills. However, language comprehension has a slight advantage as oral communication is an innate natural phenomenon while reading is an unnatural, learned skill (Seidenberg, 2013). Thus, decoding instruction for beginning readers and readers experiencing decoding difficulties should be targeted.

In order to effortlessly and fluently read, a reader must be able to recall words automatically on sight and be freed from decoding individual sounds contained within a word (Davis et al., 2020; Ehri, 2020; LaBerge & Samuels, 1974; Miles & Ehri, 2019; Nguyen et al., 2020; Ryder et al., 2008). However, this automatic process occurs through a developmental operation where letter-sound correspondence and pronunciation of letter combinations is cemented through orthographic mapping. Orthographic mapping secures words in memory as sight words for automatic recall and allows for fluid reading and text comprehension (Nguyen et al., 2020). Orthographic mapping is not the memorizing of words as a whole unit or picture, but rather the ability to scan a word and quickly recall the pronunciation.

The process of automatic word pronunciation coupled with meaning is the intersection where *reading* occurs and is the completed equation for the SVR (Ehri, 2005; Gough & Tunmer 1986; Tunmer & Greaney, 2010). When unfamiliar words are encountered, decoding and context can be employed to support word reading. However, the use of meaning and context is secondary to letter-sound decoding for expert readers (Davis et al., 2020; Ehri, 2005). Explicit and systematic instruction in the letter-sound and letter-combination pronunciations should engage in repetitive exposure to letter sounds, word patterns, and whole words such that words are orthographically mapped in the reader's lexicon. Repeated exposures coupled with explicit instruction is especially important for beginning readers and readers experiencing decoding difficulties (Davis et al., 2020; Ehri, 2020; Miles & Ehri, 2019; Ryder et al., 2008).

Efficient and proficient readers do and should encounter unfamiliar words. When this occurs, much like beginning readers, they rely on decoding *and* comprehension skills

to aid reading and understanding (Miles & Ehri, 2019, Ehri, 2005). Letter-sound correspondences and pronunciations are bedrocks for decoding new or unfamiliar words while lexical skills aid in comprehending and applying meaning for the newly encountered words. It is through these letter-sound connections that words become retained in memory alongside their meanings, enabling readers to automatically recognize words. Repeated exposure may be needed for proficient readers to orthographically store a new word in their lexicon such that pronunciation recall is automatic and attached to meaning (Davis et al., 2020, Ehri, 2005; Miles & Ehri, 2019).

Less proficient readers (such as beginning readers or readers experiencing decoding difficulties) will skip over unfamiliar words rather than exert effort to decode them (Miles & Ehri, 2019). In order to promote and assist a reader through the alphabetic phases, identifying their reading errors and delivering precise corrective feedback reinforces the decoding skills appropriate for their current phase in their reading development.

The Sound Spelling Meaning Model

Recently, researchers developed the Sound Spelling Meaning (SSM) model (Davis et al., 2020) as a framework for how students learn to read. The SSM shares similarities with the alphabetic principle. The authors propose that reading occurs first at the grapheme level where the reader either engages in the decoding process (sound) or automatic word reading (spelling) with meaning and context acting as an accuracy monitoring support. They further state that decoding is prioritized over spelling in an attempt to move teachers away from the three-cueing model (discussed below),

acknowledging that meaning (semantics and syntax) is not effectively engaged by readers when they approach unfamiliar words.

Corrective Feedback in Oral Reading

There has been a long history of research in error correction during oral reading in the classroom. The current study utilized a phonic analysis approach for error correction that trains teachers to focus the student on the sound-symbol relationship within misread words. The following section will review literature which note a variety of error correction methods (Jenkins & Larson, 1978; McCoy & Pany, 1986; Rosenberg, 1986). The current study was focused on accuracy in reading development.

In a review of the literature and observational study, Jenkins and Larson, (1978) noted that the majority of teachers utilized word supply as an oral reading correction method. Word supply involves simply feeding the correct word to a reader after they have misread a word. The authors studied six types of error corrections on five high school students with learning disabilities and found that word supply as well as drill (word supply plus flashcard practice with misread words) provided the most robust impacts on student readers the following day.

McCoy and Pany (1986) reviewed the literature on oral reading corrections and noted seven corrective instructional responses: word supply, drill, sentence reread, end of page review, word meaning, phonic analysis, and corrective cue hierarchy. In the phonic analysis method, the method used in the current study, the authors noted that a teacher would 1) stop a student when they misread a word, 2) call attention to letter-sounds or word parts, and 3) encourage sounding out the phonemes with the teacher and blending the word. They concluded, like Jenkins and Larson (1978), that word supply and drill are

the most impactful methods to increase word recognition while having at least neutral to positive impact on comprehension.

Rosenberg (1986) studied word supply, drill, and phonic drill rehearsal in a two-phased alternating treatment design with four middle school students. In the phonic drill rehearsal, the teacher placed misread words on flashcards and used an "I do, we do, you do" model for sounding out misread words. The author concluded that while the drill method outperformed word supply and phonic drill rehearsal in both word recognition and reading rate (I.e., fluency), they caution that practitioners should consider their purpose and audience before investing instructional time in any particular method. They state that phonic drill rehearsal slowed reading rate due to the reader stopping and employing sounding out techniques and would therefore be more meaningful at the skill acquisition stage rather than during fluency work. Authors found that drill methods did not hinder reading rate and are therefore better suited to use during fluency building. This important distinction lends to the current study, as the focus for error correction and feedback was on readers experiencing decoding difficulties who are at the point of acquiring and cementing phonemic and blending skills.

Hattie & Timperley (2007) discussed feedback as an important and essential component of instruction. The authors noted that effective and powerful feedback is specific to a goal and answers three questions, "Where am I going? (I.e., What are my goals?); How am I going? (I.e., What progress am I making toward my goals?); and Where to next? (I.e., What activities do I need to do to make better progress?; Hattie & Timperley, 2007, p. 86). They further proposed four levels on which these questions should be addressed: task level, process level, self-regulation level, and self-level. The

task level is surface knowledge, the process level holds the process to complete a task, the self-regulation level includes self-monitoring and adjustments for the task, and the self-level is internalized self-evaluation. When a reading error occurs, a teacher can begin to enact the feedback levels. At the task level, the teacher would call attention to the error. Next, at the process level, the teacher would model or guide saying each letter sound then blending the sounds to read the word. Lastly, at the self-regulation and self-levels, the teacher would monitor the student for self-correction behaviors during oral reading.

Feedback Specificity and Timing

In their analysis of the research, Hattie and Timperley (2007) found feedback that provides specific information on correct responses (e.g., "Great. You said the correct sound for the vowel in that word.") is more effective than general corrective feedback (e.g., "That word was wrong."). However, corrective feedback that is specific to faulty interpretations (e.g., saying /ę/ for the letter a) and which moves students from task to processing to regulation (e.g., "Let's look at that word again. Say the sounds for each letter. Good, you have the sounds. Now read the word. Good reading. What helped you correct that word?") has the greatest impact. This type of feedback is well supported in the literature and is known as behavior specific praise (e.g., Miller & Uphold, 2021).

Hattie and Timperley (2007) also explained that immediate corrective feedback on simple tasks that are within the student's current level of understanding aid in faster acquisition, but hinder fluency and automaticity. When the focus is on building fluency and automaticity, feedback should be delayed rather than immediate (Hattie and Timperley, 2007). This work is important to the current study. For the purpose of this

study, TPP students learned that immediate corrective feedback during oral reading is most appropriate when oral reading is being used for the purpose of improving decoding accuracy. The purpose for interrupting and correcting a reader's oral reading mistakes in the current study was to aid readers in developing self-regulation and self-correction decoding procedures with teacher guidance.

Important Findings on Corrective Feedback in Oral Reading

Hattie and Timperley's (2007) findings build on work of Heubusch and Lloyd (1998). Heubusch and Lloyd reviewed 24 research papers from 1974 to 1996. The authors found important components to correcting oral reading errors:

1. Interrupting readers during oral reading does not impede comprehension.
2. Oral reading improves with correction vs. no correction.
3. Feedback based on the sound-symbol relationship can improve reading accuracy.
4. Students must be engaged in the corrective feedback process (I.e., they repeat the correct word).
5. Immediate corrective feedback is more effective than delayed feedback. Goal and purpose for reading should assist in determining the most effective type of corrective feedback.

Explicit Instruction

Archer and Hughes (2011) describe explicit instruction as a "structured, systematic, and effective methodology for teaching academic skills" (p. 1). They further explain explicit instruction uses unambiguous teaching in which students are actively engaged and supported through small learning units. During explicit instruction, the

teacher monitors student responses to frequent requests and provides guidance throughout learning. Important to the current study was the role of corrective feedback within explicit instruction. Archer and Hughes state,

> Provide immediate affirmative and corrective feedback. Follow up students' responses as quickly as you can. Immediate feedback to students about the accuracy of their responses helps ensure high rates of success and reduces the likelihood of practicing errors. (p. 3)

Providing immediate corrective feedback was a core component of the instructional recommendations included in the training provided in the current study. Following the principles of explicit instruction, the current study taught TPP students to stop a reader when an error is made and engage them in letter-sound matching for error correction. This explicit instructional move in decoding instruction has been documented as effective practice in research (Foorman et al., 1998; Ryder et al., 2008). Two selected studies are highlighted below.

Foorman and colleagues (1998) investigated the use of explicit code-based instruction for 285 at-risk first and second grade students. The authors placed students in one of three conditions: 1) letter-sound correspondence instruction paired with decodable text (DC), 2) less direct, but systematic instruction based on spelling patterns paired (i.e., onsets and rimes) with connected text (i.e., predictable books; EC), and 3) indirect code instruction paired with connected text (IC). The EC and IC conditions mirrored one another with the use of connected (i.e., less decodable) text, but the EC condition taught analogy decoding strategies. The IC condition used a guided reading approach that focused on syntax, semantics, and spelling patterns. Foorman and colleagues found that

students in the DC condition acquired word recognition skills at a faster rate than students in the EC and IC conditions. The authors concluded that explicit, code-based instruction paired with decodable text may prevent reading failure for at-risk readers in the early grades.

Ryder and colleagues, (2008) studied the use of explicit instruction in phonemic awareness and phonemically-based decoding skills on 24 first grade students who tested at risk for reading difficulties. Students in the intervention group received 56 lessons via a 25-minute semi-scripted program that included phonemic awareness exercises, lessons on letter-sound correspondences, and practice in decodable text. The control group received standard instruction. Results during testing and at a two-year followed up showed the intervention group outperformed the control group in all tested categories of phonemic awareness, pseudoword decoding, word recognition, and comprehension. The authors contend that explicit, word-level instruction is vital for many readers and necessary for those who experience decoding difficulties.

Decodable Text

In the current study, decodable text is used as a vehicle to extend practice in the taught concept – the closed syllable. Mesmer (2001) developed a theoretical model for when to use decodable text. Leaning on Ehri's phases for word recognition, Mesmer suggested that decodable texts are most useful when readers are seen developing the partial and full alphabetic phases. At this time, lesson preparation and teaching goals, Mesmer asserts, should be focused on readers applying letter-sound knowledge in connected text. The reciprocal nature of instruction paired with decodable text practice allows reinforcement for taught lexical patterns. The author further states that decodable

text should and can be used less as the reader moves through the full-alphabetic stage. The current study leans on Mesmer's model placing decodable text as a fundamental instructional planning step.

Research on the use of decodable text is limited; however, Vadasy et al., (2005) note that the use of decodable text is often advised in practice. The authors state there is an underlying assumption that decodable text affords the reader additional practice with taught concepts and speeds the path toward orthographic mapping. In their quasi-experimental study, the authors separated 57 at-risk first graders into no treatment, word study paired with decodable oral reading practice, or word study alone. The authors found that first grade students given intensive word study paired with decodable text outperformed students given only intensive word study lessons on fluency measures. Additionally, the authors note that all participants in the two treatment groups made significant improvements in word level skills, reading comprehension, and reading fluency giving credence to explicit word level instruction for at-risk beginning readers.

Mesmer (2005) worked to understand the claim that decodable text is preferable for beginning readers in a study that compared the use of decodable text following phonics instructions to phonics instruction followed by grade level (i.e., less decodable) text. Mesmer found that first grade readers given decodable text increased their application of letter-sound matching strategies and relied less on adult help when compared to those reading less decodable text following phonics instruction. Considering Mesmer's (2000) theoretical model that decodable text aids readers during the window of the partial and full alphabetic phases, this study as well as Vadasy et al.'s

(2005) affirm that the use of decodable text increases a readers' use of letter-sound knowledge during oral reading.

Training in Declarative and Pedagogical Knowledge

According to Snow et al., (2005), TPP students learn through two means, declarative knowledge ("knowing that") and pedagogical, or procedural, knowledge ("knowing how to"). These two means of learning produce TPP students who know "the what" and "the how" of instruction. In effect, declarative knowledge (I.e., knowledge of language constructs and types of reading errors) is an essential foundational element of TPP student training, but a well-rounded TPP must also provide training in pedagogical knowledge (I.e., knowledge of *how to* effectively implement correction procedures based on knowledge of language constructs and error types).

Declarative Knowledge

There is evidence that both preservice and in-service teachers possess inadequate knowledge of language constructs for reading instruction (Hudson et al., 2021; Joshi et al., 2009; S. Piasta et al., 2009; Pittman et al., 2020; Washburn et al., 2011, 2014; Washburn & Mulcahy, 2014). It is generally recognized that having reading and spelling skills does not equate to language construct knowledge, thus this knowledge must be taught in TPPs (McCutchen et al., 2002). However, language construct knowledge alone does not equate to best practice in classroom instruction (Carlisle et al., 2016). In fact, Ely et al. (2014b) state that teacher knowledge is not a direct correlate to enhanced teaching. Additionally, Arrow et al. (2019) found that linguistic knowledge may be necessary for teachers to accurately instruct and guide students through reading

development, but knowledge alone is not sufficient to translate into explicit instructional practices.

Researchers continue to call for TPPs to enact specific language construct training because evidence shows in-service and TPP students lack this foundational literacy component (Binks-Cantrell et al., 2012; McCutchen et al., 2002; Moats, 1994; Piasta et al., 2020; Pittman et al., 2020; Porter et al., 2021; Seidenberg, 2013). Bos et al. (2001) surveyed 252 TPP students across three universities and 286 in-service K-3 general and special education teachers across the country on their perceptions and knowledge of early reading instruction. The authors found that in-service teachers were more positive about using explicit pedagogy while TPP students favored implicit. Both groups showed limited knowledge in early reading instruction terminology and basic language constructs. Additionally, both TPP students and in-service teachers reported feeling moderately prepared to instruct beginning readers and readers experiencing decoding difficulties. The authors note that educators must be equipped with the knowledge and skills they are imparting to their students.

Porter et al. (2021) used a 50-item assessment on basic literacy constructs such as phonology, phonemic awareness, decoding, and encoding across general educators, special educators, and reading specialists in the early grades in the U.S. Participants were 1369 classroom teachers, 74 reading interventionists, and 131 special educators in one southern state in the U.S. Performance was concerning, with total correct percentage scores ranging from 54%-68% with literacy interventionists scoring the highest. Furthermore, data revealed that literacy specialists outperformed general (GED) and special education (SPED) teachers with medium to large effect sizes on all subtests such

as phonological sensitivity, phonemic awareness, decoding, encoding, and morphology. Additionally, the researchers compared GED and SPED teacher knowledge and only found that general educators out performed SPED with a small effect in the subtest of decoding (d = .28). This study showed that not only is knowledge low across elementary education, but special educators, those who teach the most readers experiencing decoding difficulties, are underperforming in basic language construct knowledge.

Pedagogical Knowledge

Teaching is an applied profession; therefore, knowledge must be intertwined with practice. Arrow et al.'s (2019) observational study of New Zealand teachers used the Basic Language Construct Survey (BLCS) developed by Binks-Cantrell et al. (2012) to determine if and when teachers' linguistic knowledge translated to their applied practice. Their sample of 27 teachers scored high in phonological knowledge, medium in phonemic knowledge, and low in phonic and morphological knowledge. Specific to pedagogical decisions, teachers relied first on implicit prompting to correct errors by directing a student to continue reading so that they might use meaning to help with an unfamiliar word. However, the authors found that the teachers with the highest levels of linguistic knowledge used word-level prompting strategies in their feedback to students, but did so after context-based strategies were not successful. Explicit linguistic knowledge may play a role in if, how, and when a teacher employs word-level assistance for a reader. Additionally, the authors conclude that linguistic knowledge is necessary, but not sufficient in determining whether a teacher will deliver systematic and explicit phonics instruction. Research has suggested that teachers need practice and guidance to hone pedagogical skills (Arrow, 2019; Ely, Pullen, et al., 2014; Moats, 2014). The

current study embedded practice through video model scenarios in the learning module and repeated the use of video clips in the pre/ posttest.

What are TPPs Teaching?

In their integrative literature review, Tortorelli et al. (2021) examined how researchers have studied code-based teacher preparation. The authors note the impetus for their review is based on the SOR movement's argument that TPPs are not adequately preparing TPP students in reading instruction. Tortorelli et al. (2021) therefore investigated how research has assessed these areas in TPPs. Of the 27 studies that matched their inclusion criteria, 21 were quantitative, 3 were qualitative, and 3 were mixed methods. The authors found that a majority of research assesses declarative knowledge (knowing what), but only 2 of the 27 studies included discussed pedagogical knowledge. Tortorelli et al., (2021) conclude that research does not yet inform us of the pedagogical skills that TPP students are taught or attain within elementary TPPs. The current study addresses this gap in the literature by instructing and assessing how TPP students provide feedback on oral reading errors.

The long standing and current research in literacy and reading development show that TPPs can improve training for TPP students who instruct beginning readers and readers experiencing decoding difficulties. TPP students need direct and explicit instruction in (a) linguistic knowledge (I.e., phonemes, syllable types, morphology); (b) explicit instruction methods; and (c) the integration and application of linguistic knowledge and explicit instruction through sequenced literacy lessons (Archer & Hughes, 2011; Moats, 1994; 2009; 2014; Seidenberg, 2013; Binks-Cantrell et al., 2012). TPP students, like their future students, benefit from direction instruction and applied practice

(Lane et al., 2021). The current study utilizes an innovative multimedia instructional tool (CAP-TVP) to give direct instruction on a basic language concept, the closed syllable, and provide practice opportunities in correcting closed syllable oral reading errors through embedded video model scenarios.

Content within the Current Study

The current study incorporated five essential explicit instruction components in what Vaughn et al. described as overt teaching (2012), and addressed both declarative and pedagogical knowledge with teaching videos modeling pedagogical practice opportunities. The current study instructed TPP students to use the following two lesson preparation steps and three instructional step process:

Preparation 1: Assume a goal of reading accuracy.

Preparation 2: Use decodable text for accuracy instruction.

Step 1: Immediately interrupt the reader when an error occurs.

Step 2: Focus the student on the specific sound-symbol relationship that needs repair.

Step 3: Engage the student in the corrective process.

The first two steps involve TPP students' declarative linguistic knowledge and instructional planning.

The first preparation step requires the teacher to understand the targeted reading concepts for the instructional period. For the purpose of this study, the instructional concept was the closed syllable. Closed syllables were described as words containing a vowel followed by one or more consonants where the vowel sound is short (e.g., at, cat, spat, stamp; Kearns, 2020).

The use of decodable text in preparation two further highlights understanding of the concept as teachers are prompted to select text an appropriate text for the targeted reading skill. In the current study, decodable text was defined as text that contained a majority of closed, single syllable words – the syllable type used for instruction for accuracy. Decodable text was selected as a planning component as it supports readers' word identification practice of taught concepts in a lesson-to-text match, allowing for letter-sound emphasis for practice (Mesmer, 2000) and corrective feedback when needed (Hattie & Timperly, 2007).

The three corrective teaching steps stem directly from the principles of explicit instruction in which students are closely monitored for errors, feedback is given immediately, tasks are broken into small steps, and students are engaged in learning through instruction (Archer & Hughes, 2011). In this study, the previous explicit instruction principles are subsumed within the three steps of: 1) Stop, 2) Focus, and 3) Engage.

Step 1 (Stop) directs the teacher to stop the student from reading further in text once an error has been detected. Archer and Hughes (2011) note that corrective feedback should be immediate. In this study, TPP students are instructed to either stop the student at the misread word or at the end of the sentence containing the misread word.

Step 2 (Focus) directs the teacher to highlight the letter-sound match for the misread word and focus the student on producing the correct letter sounds. In this way, the task is reduced (Archer & Hughes, 2011) to phoneme isolation and production for a single word creating a small teaching unit.

Step 3 (Engage) directs the teacher to maintain student involvement in the correction procedure such that the teacher uses guiding questions and/or supports. These questions and supports prompt the students with correct letter sounds to reread the misread word (Archer & Hughes, 2011).

The Content Acquisition Podcast (CAP) Line of Research

The intervention tested in this study extended a line of research on Content Acquisition Podcasts (CAPs), in which narrated slide decks follow a prescribed design (Mayer, 2009) that reduces cognitive load for the learner (e.g., Kennedy et al., 2016; Kennedy & Thomas, 2012). The concept for CAPs and early CAP research centered around vocabulary instruction for students with disabilities (SWD; see Kennedy et al., 2015). Later iterations of CAP research, content acquisition podcasts for teachers (CAP-T), focused on in-service and preservice teachers' declarative and pedagogical knowledge acquisition (see Ely, Pullen, et al., 2014; Kennedy et al., 2018). CAPs with embedded videos (CAP-TV) used teacher modeling videos within the CAP (see Ely, Kennedy, et al., 2014; Ely, Pullen, et al., 2014). Borrowing from in-service teacher training, Romig et al. (2018) utilized CAP- professional development (CAP-PD), which focused on teacher candidate learning through the use of CAP-TVs aligned with coaching as a professional development package. At least one CAP study has used CAPs as an assignment within a course (Alves et al., 2018) where participants learned to create CAPs to use with K-12 students.

Theoretical Framework for CAPs

The CAP line of research is informed by the cognitive theory of multimedia learning (CTML; Mayer, 2009; 2020, see Appendix C). Early iterations of CAPs aligned

their design with Mayer's (2009) nine principles for multimedia instruction. The CTML principles (see Appendix C) act as parameters for module construction that limit cognitive load for the learner by limiting the visual and auditory input to only essential information for targeted knowledge. The principles target three cognitive processes: extraneous, management, and generative. Essentially, the CTML serves to guide instructors to create powerful multimedia presentations that merge words with pictures in a purposeful and meaningful way to maximize learning.

Empirical Research Using CAPs in TPPs

CAP vs. Text. In 2012, Kennedy et al. and Kennedy and Thomas began the CAP line of inquiry in TPPs with two studies investigating the use of CAPs in TPP student training. Both studies compared CAPs to a TPP student friendly text using group experimental designs. Kennedy and Thomas found that TPP students who viewed a CAP on the use of school wide positive behavioral supports outperformed TPP students who read a book chapter on the same content. The results were statistically significant, with a medium-to-large effect at both posttest and maintenance with *Cohen's d* calculated at d=.98 for posttest and d=.97 for maintenance.

Next, Kennedy et al. (2012) explored which condition, reading a practitioner friendly article *before* (Pre-CAP) or *after* (re-CAP) viewing a CAP, impacted TPP student performance a test of their knowledge of the characteristics students with learning disabilities (LD) and high functioning autism spectrum disorder (HFASD). Interestingly, in this three-group design experiment, the authors found that the sequence of reading and CAP viewing did not statistically impact test outcomes. Additionally, both groups who viewed the CAPs outperformed the reading-only group, thereby indicating that CAPs

have a positive impact on TPP students' scores. The reported effect size at posttest showed medium-to-large effects for CAPs (LD: Pre-CAP vs. Text only, $d = 1.24$, Re-CAP vs. Text only, $d = .94$; HFASD: Pre-CAP vs. Text only $d = .63$, Re-CAP vs. Text only $d = .94$). Several other group design studies with pretest-posttest designs compared CAPs to text reading with similar results (see Ely, Kennedy, et al., 2014; Hart & More, 2013; Kennedy et al., 2014).

CAP vs. Live Lecture. Hirsch et al. (2015) compared CAPs to live lectures using a pretest-posttest design. The study compared the effect of a CAP to the effect of live lecture on TPP students' knowledge of functional behavior assessment. In their study, the researchers found a medium effect size of $d = .45$ for CAPs, a smaller effect when compared to the previous CAP vs. text only studies. However, (Kennedy, Hirsch, et al., 2016) examined the same content with a CAP vs. live lecture with a smaller effect size ($d = .26$).

In 2020, Green et al. compared the effects of using a CAP to teach a math instructional strategy against live lecture for TPP students. The study used a pretest-posttest design and the pre/posttest included both multiple choice and open-ended items. The authors disaggregated test scores by multiple choice and open-ended questions that asked the TPP students to identify details about the math strategy. The researchers found that the CAP group outperformed the live lecture group on multiple-choice items ($d = .384$) and on open-ended items ($d = 1.10$). The authors hypothesize that there was a larger effect associated with open-ended items because these items require deeper knowledge and the CAP resulted in deeper learning.

CAP Innovations in TPPs. Kennedy, Wagner, et al. (2016) began to further explore the power of CAPs in increasing TPP student knowledge in various special education topics across a semester-long course. Using a linear regression model, the researchers were able to show that the number of CAP-T views correlated with assessment performance at the midterm and exam assessments. The authors note that a midterm score increased by .31 for each CAP-T view above the mean. On the final exam, a score increased by .13 for each CAP-TV view above the mean. This was the first study to use CAP engagement as a predictor of achievement.

Firestone and Rodl (2020) extended the Kennedy and Thomas's (2012) study on TPP students' knowledge of PBIS practices by creating a quasi-experiment with three conditions (CAP only vs. CAP plus live discussion [CAP-LD] vs. CAP plus professor assisted application activity [CAP-PA]). Using Kennedy and Thomas' (2012) previously created CAP and 18 item multiple choice assessment, the researchers found that both the CAP plus groups outperformed the CAP only group with large effect sizes (CAP-LD d = .85; CAP-PA d = .78). The maintenance assessment showed a further increase in effect size with sustained large effects in the CAP-LD (d = 2.12) and CAP-PA (d = 1.54) groups compared to the CAP only group. This study was the first to pair CAP instruction with traditional in-person formats I.e., professor led in-person discussion, practice application with professor supervision).

Hirsch et al. (2020) employed a two-group pretest-posttest-maintenance design to explore the effect of a CAP with embedded questions versus a traditional CAP-T. This was the first CAP study to examine opportunities to respond (CAP-OTR; embedded questions with forced answers) as a mediator of achievement. However, the researchers

found no statistically significant effect in posttest results for those who viewed the CAP-OTR compared to those who viewed the traditional CAP, $F(1,89) = 3.67$, $p = .059$. The maintenance phase scores also showed no statistically significant effect, $F(1,74) = .212$, $p = .646$. The authors concluded that the embedded questions may have violated Mayer's (2009) CTML by increasing cognitive load. The embedded questions required CAP-OTR participants to pause during the CAP-T to answer questions before proceeding, which may have increased cognitive load.

Miller and Uphold (2021) used a randomized multiple-probe-across-participants design to investigate how five undergraduate TPP students enacted behavior specific praise (BSP) during math instruction. Participants were observed during their student teaching placements and emailed feedback 24 hours after the observation occurred. During intervention, the TPP students watched a CAP-TV on BSP. The authors reported three demonstrations of a functional relationship between CAP-TV viewing and follow-up feedback. Data for two participants was incomplete due to time constraints. Nevertheless, the three instances of a functional relationship meet What Works Clearinghouse criteria with reservations for single case design. This study was the first to address BSP in TPP. BSP is an important component of direct instruction and is useful in any content area for K-12 instruction.

The current study expanded on the OTR component within CAPs. Unlike, Hirsch et al. (2020) participants in the current study viewed teaching video models and enact listening practice to detect and correct a reading error. In this way, the participants are not answering declarative knowledge questions, but employing pedagogical or procedural knowledge (Snow et al., 2005; Tortorelli, 2021) during practice opportunities. These

practice opportunities may increase cognitive load, but I hypothesized that the benefit of applied practice would outweigh any negative impact of increased load.

CAP Innovations with Literacy Content in TPPs. Several CAP studies have specifically questioned whether CAPs can be used effectively to enhance TPP student's retention of reading development content. These studies are outlined below with attention to their innovative mechanisms.

CAP vs. Text. In 2013, Kennedy et al. began to use CAPs to build TPP students' foundational literacy knowledge by investigating the use of CAPs in increasing phonological awareness (PA) for TPP students. The authors used a two-group pretest-posttest-maintenance design. Like much of the early CAP research in teacher preparation, the researchers compared a CAP to a practitioner friendly article and found that CAPs were associated with large effects. When compared to students who read an article on PA, the CAP assigned group outperformed at posttest (d = .86) and maintenance testing (d = .98).

While Kennedy et al. (2013) was the first study to examine literacy content using CAPs, several researchers found similar effects. Driver et al. (2014) also studied PA knowledge and found large effects when comparing participants in the CAP group to participants assigned a practitioner-friendly article at posttest (d = .76) and maintenance (d = .98). Carlisle et al. (2016) used a two-group baseline-pretest-posttest design to investigate phonological awareness *and* phonics knowledge acquisition on TPP students using a required textbook reading + CAP (TB+CAP) versus required textbook reading + article (TB+A). The authors reported large effects using eta squared and found a

statistically significant effect for the TB+CAP at posttest ($\eta_p^2 = .19$) when compared to the TB+A group.

CAP-TV. Ely, Pullen, et al. (2014) used a two-group pretest-posttest-maintenance design to explore a new CAP variation embedding teacher modeling videos within the instructional CAP (CAP-TV). Focusing on evidence-based vocabulary instruction for students at risk or with LD and comparing CAP-TV to text only, participants in the CAP-TV group outperformed those in the text only group at posttest (*d* = .85) and maintenance (*d* = .95) on a multiple-choice assessment. Ely, Kennedy, et al. (2014) built on the previous study by using a group design to examine TPP student knowledge and skills with a multiple-choice test and an application assessment using observed teaching behaviors. The authors found that the CAP assigned students outperformed those assigned to article reading on a multiple-choice posttest (*d* = .72). However, in the CAP-TV group, the observed teaching behaviors that occurred during a shared text reading showed a large effect (*d* = 1.06) and a medium effect (*d* = .65) when instruction followed a text reading.

CAP vs. Video. Sayeski et al. (2015) compared five CAP modules detailing foundational literacy knowledge (I.e., reading disabilities, phonemes and letter sounds, phonemic awareness, the alphabetic principle, and phonics) to a business-as-usual documentary, *Journey into Dyslexia*. Using the Survey of Basic Language Constructs (Binks-Cantrell et al., 2012) the authors reported large effects at posttest (*d* = .91) and maintenance (*d* = .93) for the CAP participants compared to the students who viewed the 77-minute documentary.

Application Assessment. Kennedy, Wagner, et al., (2016) investigated the use of CAPs to increase TPP student knowledge of curriculum-based measurement (CBM) for oral reading in a group pretest-posttest-maintenance design. The researchers used an assessment tool as a proxy for real-world data analysis with 7 open-ended questions along with 44 multiple choice questions to assess knowledge. The authors found that the students assigned to the CAP condition outperformed those assigned to read an article with large effects on the knowledge test at posttest (d = 1.39) and maintenance (d = 1.29) and on the application of skill test at posttest (d = 1.65) and maintenance (d = 1.75).

The application of skill in Kennedy, Wagner, et al. (2016) centered on using sample data to create CBM graphs including baseline and long-term goals. The authors found that the CAP produced more robust answers around technical skills used in CBM. Participants in the CAP group gave more detail in calculating CBM scores for sample data which suggests a deeper understanding and application ability for CBM content. Furthermore, the researchers found that CAP participants report higher rates of motivation and instructional satisfaction than their peers in the reading only group.

CAP-TV vs. Text vs. Live Lecture. Romig et al. (2018) combined the comparison of text and live lecture to a CAP-TV with a three-group design using a pretest-posttest outcome measure across three universities. The study focused on self-regulated strategy development (SRSD), an EBP for writing instruction. As with previous CAP research studies comparing CAP modules to an article-only group, the CAP-TV group significantly outperformed the article-only group at posttest (d = 1.15). However, there was no statistically significant difference between the CAP-TV and lecture groups. This can be attributed to the identical nature of the CAP-TV and the live

lecture (both scripted using PowerPoint slides). Additionally, the authors included performance observation data derived from the participants in the first university (n = 115, 59% of total participants). The researchers found that the CAP-TV also outperformed the article-only group and the lecture group with large effects (d = 1.92 and d = .71, respectively).

CAP as TPP student Assignment. Alves et al. (2018) used a two-group pretest-posttest with product assignment to determine if the making of a CAP-S (CAPs for K-12 students) improved knowledge and application skills compared to TPP students assigned to write an instructional plan (IP). Both groups watched a CAP on EBPs for vocabulary instruction for students at risk or with LD. The CAP-S group was shown a CAP on Mayer's (2009) CTML principles and a sample CAP-S. They were then instructed to create a CAP-S on five vocabulary terms. The comparison group was asked to plan and describe the importance of their plan for the same five vocabulary terms. The researchers found that the CAP-S group outperformed the IP group with a medium effect (d = .44). They noted that the CAP-S group on average included more EBP components in their lesson than the IP group. Interestingly, there was no statistically significant difference in posttest assessment score for the CAP-S and IP groups.

CAP-TV Plus Feedback. Peeples et al., 2019 examined TPP students vocabulary instruction with the use of CAP-TV plus feedback (CAP-TVF) in comparison to lecture with feedback (LF) and article reading with feedback (AF). The authors used a three-group pretest-posttest design with performance observation videos at baseline, intervention, and feedback stages. They found that the CAP-TVF condition participants outperformed the LF and AF conditions in using EBPs during 3-5-minute recorded

vocabulary lessons. The authors reported medium effects between the first and last recorded videos for CAP-TVF vs. LF (d = .50) and the CAPT-TVF vs. AF (d = .47). While instructional performance showed a comparison effect, the knowledge skills posttest did not produce statistically significant differences between groups.

The authors attribute the lack of statistically significant difference on the knowledge posttest to feedback in all conditions. They assert that feedback completes the cognitive apprenticeship (Collins & Brown, 1986) cycle so that TPP students learn about a teaching skill then practice and hone knowledge and skills through feedback. This was the first CAP study to see a statistically significant difference for CAP participants in procedural application through performance.

CAP-TVP Process: CAP - Teacher Videos plus Practice (CAP-TVP)

The current study proposed improved TPP student declarative knowledge and enhanced pedagogical knowledge through an intervention grounded in the CTML (see Appendix F). The current study extended past CAP research within TPPs by a) embedding video models within a CAP (Ely, Kennedy, et al., 2014; Ely, Pullen, et al., 2014) and b) assessing pedagogical knowledge through video model scenarios (Kennedy, Wagner, et al., 2016). The CAP research line on preservice teacher learning has shown positive effects when compared to standard in person lectures (Ely, Pullen, et al., 2014; Kennedy, Wagner, et al., 2016; Miller & Uphold, 2021; Romig et al., 2018). This study used the CAP-TV approach with the addition of two embedded application practice opportunities creating a CAP-TV plus practice (CAP-TVP).

Procedural Knowledge Through Practice Opportunities

As discussed above, past CAP studies have assessed TPP student knowledge using tests of declarative knowledge (e.g., Driver et al., 2014; Kennedy et al., 2013). However, few CAP studies have assessed TPP students ability to apply declarative and pedagogical knowledge (Ely, Kennedy, et al., 2014; Peeples et al., 2019; Romig et al., 2018). The current study provided instruction in declarative knowledge in alignment with past CAP research. In an effort to improve TPP students' pedagogical knowledge, the CAP-TVP also provided opportunities for TPP students to use their knowledge to answer embedded applied questions. The CAP-TVP prompted TPP students to listen to a child read and make an oral reading, then identify the type of error and correction procedure. This applied practice addition to CAP-TPVs differs from the types of practice opportunities provided in past CAP research. I hypothesized that the applied practice opportunities allowed TPP students to routinize pedagogical/ procedural knowledge before working directly with K-12 students.

Hirsch et al. (2015) examined opportunities to respond using CAPs by embedding declarative knowledge questions within the CAP module. Participants were required to answer the questions to proceed through the CAP. The authors found no effect when compared to a traditional CAP with no embedded questions. The current study extended research on embedded OTRs within CAPS because prior research, in contrast, indicates that OTRs enhance TPP student procedural knowledge (see Ely, Kennedy, et al., 2014; Hughes et al., 2017). Although declarative knowledge OTRs did not improve CAP effectiveness in Hirsch et al.'s (2015) study, the current study tested applied practice OTRs' effectiveness. The current study embedded practice opportunities that replicate

real world scenarios. In this way, the CAP-TVP follows portions of the cognitive apprenticeship model by offering situated learning within the CAP-TVP (Collins, 1988).

Collins (1986) developed the cognitive apprenticeship model to aid classroom teachers in instructing K-12 students in reading and mathematics coursework. The model has also been applied to TPP student learning (Peeples et al., 2019; Romig et al., 2018) in which coursework utilizes declarative and pedagogical knowledge alongside practice opportunities with coaching. While coaching is not a piece of the current study, declarative and pedagogical knowledge are used alongside situated learning (I.e., learning that occurs through practice within the context of real-world applications). Collins (1988) specifically attributes computer-enhanced technology as vehicle for situated learning. Collins asserts that situated learning allows the learner to deepen understanding through context and application validation. Furthermore, Collins advances that situated learning fosters invention and generalization. Therefore, the embedded pedagogical application scenarios in the current study rely on components of the cognitive apprenticeship model.

Cognitive Theory of Multimedia Learning

Recently, Mayer (2020) expanded the principles of multimedia learning from 12 to 15. Five principles align with limiting extraneous processing: 1) *the coherence principle* limits information to essential points, 2) *the signaling principle* highlights the essential information, 3) *the redundancy principle* prioritizes words and graphics over text, 4) *the spatial contiguity principle* matches text to graphics, and 5) *the temporal contiguity principle* syncs narration to graphics.

Three principles align with managing essential processing: 1) *the segmenting principle* breaks the information into sequenced sections, 2) *the pre-training principle* front loads essential terminology, and 3) *the modality principle* supplants printed text with narration.

The final seven principles align with fostering generative processing: 1) *the multimedia principle* prioritizes dual-code learning (I.e., visual and auditory) over auditory only, 2) *the personalization principle* calls for narration with a conversational tone, 3) *the voice principle* requests a human voice, 4) *the image principle* places the instructor on screen, 5 and 6) *the embodiment principle* and *the immersion principle* dissuade the use of augmented reality, and 7) *the generative activity principle* calls for embedded engaging activities.

Hypotheses

The first research question for the present study asks whether there is a difference in participant declarative knowledge by condition (CAP-TVP vs. traditional online narrated slide lecture). The second question asks if there is a difference in participant applied/procedural knowledge by condition. The third research question addresses social validity.

Hypothesis 1: **The CAP-TVP condition would produce strong effects for declarative and procedural/ pedagogical knowledge at posttest.** This prediction is based on past CAP literature in which CAP conditions outperformed in-person live lecture conditions with small to medium effects (Green et al., 2020; Hirsch et al., 2015; Kennedy, Wagner, et al., 2016; Romig et al., 2018).

Hypothesis 2: Participants would find the CAP-TVPs an informative tool for developing skills in detecting and correcting decoding errors. Several CAP studies have socially validated their use in comparison to live lectures. Romig et al, (2018) found small to medium effects comparing CAPs to live lecture on learning preferences, activity appropriateness, perceived confidence in knowledge acquisition, effectiveness of format, and speculation that teachers would find the medium useful. In 2015, Hirsch et al. found that the CAP and live lecture conditions scored similarly in TPP student scoring. In 2020, Hirsch et al. replicated the social validity survey from Hirsch et al. 2015, but compared CAP-T with OTRs to CAP-T conditions and again found conditions to scored similarly.

The current study asks participants to score their perceived declarative as well as pedagogical knowledge in addition to scoring learning preferences, typicality of instructional presentation, and desire to see future iterations of assigned condition. Previous studies have not questioned participants perceived pedagogical skills. Through embedded OTRs that follow the cognitive apprenticeship theory, the CAP-TVP is hypothesized to perform well on TPP student perceived pedagogical knowledge.

Chapter 3: Methodology

The purpose of this study was to determine the effectiveness of a CAP-TVP for improving graduate level education students' ability to effectively detect and correct oral reading errors in beginning readers and readers experiencing struggle. The research questions were:

1. Are CAP-TVPs effective for improving participants' knowledge of effective decoding practices?
    a. Are CAP-TVPs effective for improving participants' ability to identify oral reading errors?
    b. Are CAP-TVPs effective for improving participants' ability to select the appropriate correction procedure for identified oral reading errors?
2. How does prior knowledge and experience impact participants' knowledge of effective decoding practices?
3. How do TPP students rate the effectiveness of CAP-TVP for their learning and rate their enjoyment of the approach?

The study used a non-experimental pre/posttest design. Participants were invited to participate in a module within a online introductory to special education summer course. Twenty-nine participants completed a demographic survey and pretest, watched a CAP-TVP, and completed a posttest and social validity survey. The study occurred on a voluntary participant basis within two introductory online courses on special education that is taken by graduate education students seeking licensure in a variety of areas. It is

estimated that the entire module took approximately 90 minutes for participants to complete the assessments and view CAP-TVP.

Participants

Participants were graduate level college students taking summer courses. A demographic survey gathered data on student status, previous teaching experience, years of education coursework, among other information (see Appendix A). Inclusion criteria for participation included: (a) enrolled in an education course within a university teacher preparation program; (b) had the ability to access and complete coursework online and stream video content; and (c) consent through completed participation to data collection for the study. Data for students who did not meet inclusion criteria were not used in analyses.

TPP student Demographics

A demographic survey was completed by participants at the start of the CAP-TVP module (see Appendix F). Participants were graduate level students enrolled in an introductory special education course. The course covered special education topics such as disability characteristics, basic law knowledge, and instructional practices for students with disabilities. The course is required for special and general education concentrations, but open to the university population as an elective course. Of those enrolled in the course, 42 students completed the demographics survey (n = 6 males, n = 36 females), however, only 29 participants (n = 4 males, n = 25 females) also completed pre- and post-testing requirements for full participation and inclusion in the study. Descriptive statistics for the 29 full participants are displayed in Appendix E.

Setting

The intervention and assessments occurred online and materials were made available through an online course management system, Canvas. Providing materials through Canvas was appropriate as at the participating university used Canvas for both online coursework.

Study Condition

CAP-TVP Module

The independent variable in this study was a CAP-TVP video lecture designed to teach participants enrolled in a summer education course to identify 3 common oral reading errors (I.e., beginning sound, medial sound, final sound), and to provide appropriate feedback based on error type. The CAP-TVP intervention used the present study extended the CAP research literature (e.g., Kennedy et al., 2012; Kennedy et al., 2014) with the addition of procedural/ pedagogical practice using video models.

In the current study, the CAP-TVPs provided instruction in declarative (fact-based) information about types of reading errors and a practice component designed to improve participants' procedural/pedagogical knowledge of how to implement effective oral reading correction procedures. The CAP-TVP adhered to all 15 CTML principles (see Appendix C; Mayer, 2020). The CAP-TVP runs for 23:15 minutes. There were pause and reflect prompts at minutes 6:02, 8:56, 13:23, 16:14, and 22:11. The teaching video models occurred at 16:59. Six multiple-choice questions occurred at 19:53 (two questions), 21:08, 21:10 (two questions), and 21:11. Because the embedded practice was forced choice, the participants likely took a few seconds if not a minute to answer each question before proceeding. There were 48 slides with an average of 12 words per slide.

The CAP-TVP can be accessed and viewed here https://edpuzzle.com/media/629fef2a1d3d2e415222b888.

The CAP-TVP began by presenting background on reading theory emphasizing the importance of decoding skills. Next, the CAP-TVP gave information about oral reading errors for closed syllables (typically the first syllable type taught to beginning readers and readers experiencing decoding difficulties). Essential components for detecting and correcting oral reading errors are listed in Appendix B. The bulk of the CAP-TVP presented a 2-prep and 3-step process to correct oral reading errors (I.e., Prep 1- Create a reading goal; Prep 2- Use decodable text; Step 1- Give correction immediately; Step 2- Focus on the sound-symbol relationship; and Step 3- Engage the student). Three brief example video models presented a student making an oral reading error and a teacher using the detect and correct process for correction.

Next, the CAP-TVP showed 2 examples videos of a student making a reading error and a teacher prompted in the correction process. Participants were then prompted to engage by viewing two videos with embedded practice opportunities. The first video showed a student making a reading error and being stopped by the teacher. The participants were prompted to choose the next teaching move through a forced choice response. A second practice video only showed a student making an error. Participants were prompted to identify the missed word, where the error in the word happened (I.e., beginning sound, medial sound, or final sound), and what teaching moves are necessary to help the student. The forced choices practice items were multiple choice. The CAP-TVP ended with a review of the information on closed syllables and the 2-prep/ 3-step correction process.

Dependent Variables

The dependent variables included performance on a researcher created pre/posttest designed to assesses (a) knowledge of oral reading errors and feedback/correction procedures; (b) ability to apply knowledge of oral reading errors and feedback/correction procedures; and (c) outcomes on a social validity questionnaire.

Pretest and Posttest

A researcher-created assessment was used to assess participant declarative and procedural/pedagogical knowledge at pre/posttest (see Appendix D). The assessment was aligned with the content delivered in the instructional module (CAP-TVP). Items on the assessment draw on the reading acquisition literature (Allington, 1983; Brown, 2003; D'Agostino et al., 2019; Hattie & Timperley, 2007; McCoy & Pany, 1986; Singleton, 2005; Spear-Swerling, 2019) and the feedback literature (Archer & Hughes, 2011; Heubusch & Lloyd, 1998). Additionally, three reading experts, including a professor of special education and literacy, reviewed the measure and provided feedback, which was incorporated into revisions. Each expert was given a personal link to an online form that contained the assessment questions and answers. Reviewers left comments and suggestions on the form. I reviewed each expert's comments and adjusted the assessment accordingly. For example, one expert noted a question was too broad and confusing. Another expert suggested shortening the amount of answer choices to four or fewer. Items were adjusted in light of these suggestions.

The final measure included 22 questions, 15 open-ended and seven multiple-choice items (see Appendix D). Eleven items assess declarative knowledge such as "(Decoding) is breaking words into individual sounds or syllables to read unfamiliar

words" and "Choose all the closed syllable words [from the list]". Eight items assessed application of procedural knowledge in detecting a reading error (5 questions, items 15, 16, 20, and 21; see Appendix D) and describing the appropriate correction procedure (6 questions, items 9, 11, 13, 17, 19, 22; see Appendix D). Eight application items ask participants to view videos of students making oral reading errors (items 15-22; see Appendix D). The videos were created using teaching model video in which a teacher and a student appear on screen. The teacher asks the student to read a sentence and the student does so making an oral reading error on one word as they read a sentence aloud (see Appendix D). After viewing a teaching model video, the participant was prompted to identify which word was misread, identify the type of error (i.e., beginning sound, medial sound, or final sound), and describe the appropriate feedback/correction procedure to remediate the specific error that was made. In this way, the application items provided practice and assess pedagogical/procedural knowledge.

The pre/posttest are alternate forms of the same assessment. Both tests were administered through Canvas, the online platform that housed the online courses. Each question appeared singularly on the screen and participants were not able to review previously answered questions. The isolation of each question served to preserve each question's integrity. Having access and review capabilities may have lead participants to use questions and answer choices as teachable moments. In other words, participants may rely on test taking strategies such as using a previous answer to a question to answer the next question that builds on the previous question. In Item Response theory, this helps to ensure what is known as local independence, when an item's answer is not dependent on answering other items (Bichi & Talib, 2018). Following data collection,

the assessment underwent reliability testing using Cronbach's alpha to assess internal consistency.

Each question on the pre/posttest was worth a varied amount points based on the nature of the question for a total of 45 possible points. All pre/posttest were hand scored by the author with 20% double scored by a second rater.

Social Validity

A social validity questionnaire concluded the study (see Appendix H). Participants were asked to answer 6, 5-point Likert scale questions after they completed their posttest assessment. The questions assessed participant agreement with a) learning preferences, b) understandability of presentation, c) typical instructional formatting d), perceived knowledge acquisition (declarative knowledge), e) perceived ability to execute learned skills (pedagogical knowledge), and e) desire to see similar presentation style in future coursework. The social validity measure was distributed via Canvas within the CAP-TVP module. Data generated from the social validity measure was reported descriptively in chapter four.

Procedure

Following permission granted by the Teacher Education Participant Pool and the university's Internal Review Board to access education students, two instructors teaching an introductory special education course were emailed and invited to add modules to their current courses. Once instructors agreed and access was granted to the online course sites, the researcher set up the CAP-TVP modules that included links to an introduction video stating that participation was voluntary. Next, the module lead participants through a sequence of links for the demographic survey, the pretest, the CAP-TVP housed on

edpuzzle.com, the posttest, and the social validity survey. Each link was set to open only after the previous item was completed. After setting up the modules, the researcher interacted with Canvas via course announcements to trouble shoot technical issues. Participant communication was limited to participant-initiated contact. Course instructors and the study's graduate assistant fielded individual questions from participants. Course instructors presented the study module as a participation grade. Participation through data collection was voluntary. Data withdrawal was accepted at any point during the study without any penalty to participants' course grade, but was never utilized by any participants. Study assignments (pre/post tests and social validity survey) were not assigned course grades. To ensure anonymity, a graduate student assigned each student within the class an ID number. ID numbers and matching participant names were kept from the researcher.

Student participants viewed a 4:27 minute introduction video within Canvas that began the CAP-TVP module. The introduction video explained the sequence of participation in completing the demographic survey, the pretest, the CAP-TVP viewing, the posttest, and the social validity survey (see Appendix I). Consent was assumed unless student opt out of data collection. Opting-out of data collection was explained in the introduction video. Participants were instructed to contact the study's graduate assistant via email to opt-out of data collection. No participants opted out of data collection, however participant data was excluded from data analysis due to incomplete assessment participation.

Participants were prompted to take the pretest within the Canvas module prior to being granted access to the CAP-TVP link on edpuzzle.com. They were encouraged to

complete their assigned module within a week of taking the pretest. Student participants could rewind or pause the video as needed. Participants were instructed to complete the entire module within a week of opening access immediately Participants coul complete the study in one sitting or spread the components over a few days.

Treatment Integrity

To ensure the intended instructional content was present in the CAP-TVP a graduate student with experience making and delivering CAPs and online recorded instruction, viewed and evaluated the CAP-TVP. A checklist of essential components (see Appendix B) was used to check that the CAP-TVP contained the essential and relevant information. The CAP-TVP was determined to contain all essential information.

Inter-rater Reliability

All pre/posttests were scored by the author. Forty-five percent of the pre/posttest were double scored by a second rater. The second rater was trained by the author by examining each item and discussing the rating numbers for each answer.

A rubric was used to score open-ended items (see Appendix O). Open-ended questions were scored to match a set of keywords. However, the exact wording was not mandatory. Answers were given credit if the wording matched the meaning of the keyword example. For instance, the correction items 17, 19, and 22 state "Describe an effective error correction procedure." The expected answers' keywords matched the 3-step teaching process of ***stop, focus, engage*** in the CAP-TVP. The rubric further defined these keyword answers such that the term ***stop*** referred to an answer describing stopping the student when an error occurs and refers to timing or immediacy. An answer describing this as "bring the student back to the misread word right away" would get

credit even though the keyword ***stop*** was not used. The ***focus*** keyword referred to answers that mention a letter-sound or sound-symbol match so using a term like ***point out*** rather than ***focus*** would receive credit. The ***engage*** keyword referred to answers that described involving the student in the correction process. For example, a statement such as "have the student repeat the sounds" would be given credit (see Appendix O for rubric keywords, possible accepted answers, and co-scored participant examples).

Points were awarded to open-ended answers based on these keyword examples or close approximations. For each keyword, one point was assigned. For instance, for items 17,19, and 22, the 3-step teaching process ***stop, focus, engage*** was awarded three possible points. Participants could score partial credit for including one or two keyword meanings (see Appendix O for scored examples). The same point allotment held for all open-ended questions. One point was assigned for each keyword in the expected answer (see Appendix O).

Training commenced over Zoom while the author and second rater viewed the same screen. One pretest was randomly selected and reviewed item by item. Discussion around keyword meaning and acceptable answers was valuable with adjustments in possible answers made to the rubric for clearer scoring. Scoring calibration was determined by co-scoring one pretest separately and discussing disagreements until 100% agreement was achieved. Scoring then commenced separately. Following training, the second scorer scored a total of 13 pre and posttests. Both scorers relied on the rubric for administrating points to open-ended questions (see Appendix O. Inter-rater reliability (IRR) was determined by dividing the number of agreements by the sum of the number of agreements and disagreements and multiplying by 100 ((agreements/[agreements +

disagreements]) x 100). IRR for 13 pre and posttest scores was 94.41%. All disagreements were discussed until 100% agreement on scoring was achieved.

Chapter IV: Results

In this chapter, participant demographic data, pre- and post-assessment results, and social validity survey results are reported. Each research question is addressed in turn in the subsections that follow. Pre/posttest outcomes are presented first in response to research questions followed by social validity survey results, internal consistency, and inter-rater reliability.

Research Question 1: Are CAP-TVPs effective for improving participants' knowledge of effective decoding practices?

A paired samples *t*-test was utilized to determine the effectiveness of CAP-TVPs on improving participants' knowledge from pre- to posttest. The *t*-test showed statistically significant results, with participant scores significantly higher at posttest ($M = 35.62$, $SD = 5.82$) than at pretest ($M = 21.17$, $SD = 6.54$), $t(28) = 9.50$, $p < .001$, $d = 1.77$. Cohen's d effect size ($d = 1.77$) is larger than .0, which suggests a large effect (see Appendix J).

Research Question 1a: Are CAP-TVPs effective for improving participants' ability to identify oral reading errors?

An item-level analysis was conducted to understand how CAP-TVPs specifically impacted participants' ability to identify reading errors. This analysis included assessment items that targeted error detection skills, specifically items 15, 16, 20, and 21 (see Appendix K). These four items asked participants to listen to a student read a sentence, choose the word that was misread, then choose where the error occurred in the word (e.g., beginning, medial, or final sound). Items 15 and 20 were scored 1 point or 0 for identifying or misidentifying the misread word. Items 26 and 21 were scored 1 point or 0

for identifying or misidentifying where in the word the error occurred (e.g., beginning, medial, or final). Scores ranged from zero to one for each item. To analyze these four items to provide a holistic view of detection ability, the items' mean scores were averaged and a paired samples *t*-test showed statistically higher scores at posttest (M = .91, SD = .18) than pretest (M = .76, SD = .25), $t(28) = 3.10$, $p = .002$.

Research Question 1b: Are CAP-TVPs effective for improving participants' ability to select the appropriate correction procedure for identified oral reading errors?

The next item-level analysis centered on test items targeting correction procedures. Specifically, items 17, 19, and 22, were selected and scores were averaged for pairwise comparison at pre-test and posttest. All three items asked participants to watch a student read a sentence with an error. Participants were then asked to describe details of a correction procedure. Items 17 and 22 had a possible point value of three, a point was given for each step in the corrective procedure that was named (see Appendix O for scoring rubric). Item 19 had a possible point value of two, the question stem assumed the first step in the correction procedure and participants were asked to detail the next steps. On the averaged mean scores for items 17, 19, and 22, the correction procedure items, participants scored significantly higher at posttest (M = 2.52 SD = .26) than at pretest (M = 1.74 SD = .69), $t(28) = 5.64$, $p < .001$.

Research Question 2: How does prior knowledge and experience impact participants' knowledge of effective decoding practices?

One-way ANOVAs were utilized to determine if specific demographic variables had an impact on participant pre/ posttest scores. First, I compared the number of previous reading related courses taken to posttest scores (Appendix M). Participants

were separated into groups by number of previous reading courses: 0 reading courses (n = 15), 1 reading course (n = 5), 2 reading courses (n = 3), and 3 reading courses (n = 5). One participant did not answer this question resulting in a total of 28 participants for this statistic. There was no statistically significant difference between groups (F (3, 24) = 1.38, p = .27). Second, I ran a one-way ANOVA to determine if having previously taught reading impacted posttest results. Participants were grouped by whether they had previously taught reading: yes (n = 24), no (n = 5). No statistical significance was found between groups (F (1, 27) = 4.25, p = .05). The third one-way ANOVA was run to determine if previous teaching assignments had an impact on posttest results. Participants were grouped by previous teaching assignments: general education classroom (n = 9) special education (n = 5), other (n = 7), none (n = 7), and tutoring (n = 1). No statistical significance was found between groups (F (4,24) = .35, p = .84). One-way ANOVAs were also run for pretest scores and again no statistical significance was found for reported prior knowledge and experience (see Appendix L).

Research Question 3: How do pre-service teachers rate the effectiveness of CAP-TVP for their learning and rate their enjoyment of the approach?

Participants completed a six question Likert-type survey with a scale of 1-5 after completing the posttest (see Appendix N). Overall, participants reported high levels of effectiveness and enjoyment with the CAP-TVP. Participants *somewhat agreed* that the presentation suited their learning preferences (M = 4.17, SD = 1.04), was easy to understand (M = 4.72, SD = .75), and increased their knowledge and skills of identifying reading errors and giving corrective feedback (M = 4.66, SD = .86; M = 4.83, SD = .54). The higher score, *somewhat agree*; M = 4.83, SD, .54, may indicate that

participants felt confident in using the skills presented in the CAP-TVP in their real-world instructional practice. Additionally, participants somewhat agreed that CAP-TVP style presentations should be part of future coursework (M = 4.48, SD = .95). The item that garnered the lowest mean score, *neutral*, stated that CAP-TVP was typical in instruction for education courses.

Internal Consistency

To assess the reliability of the pre and posttest used in this study, Cronbach's alpha was calculated. The pretest showed $\alpha = .803$ across the 22 test items. Posttest showed $\alpha = .801$ across the 22 test items. Cronbach's alpha scores above .7 is considered *good* and indicates reliability of the assessment in this study for pre and posttesting (Tavakol & Dennick, 2011).

Chapter V: Discussion

This study examined the impact of a multimedia online module (Content Acquisition Podcasts- Teacher Video plus Practice; CAP-TVP) designed to aid graduate education students detect and correct oral reading miscues in beginning readers. The Content Acquisition Podcast (CAP) line of research has a strong history of positive effects when instruction using CAP modules is compared to text reading and live lectures (e.g., Kennedy et al., 2016; Peeples et al., 2019). Content Acquisition Podcasts with embedded Teacher modeling Videos (CAPT-TV) also have shown strong effects (Ely et al., 2014; Peeples et al., 2019; Romig et al., 2018). However, embedding rote declarative questions within a CAP has not been as successful as in previous CAP-style studies (Hirsch et al., 2020). The current study reimagined the use of embedded questions within a CAP-TV by using application questions that mimic authentic practice with video models rather than rote questions used in a previous CAP study (Hirsch et al., 2020).

In this study, 29 graduate-level students watched a 23-minute and 15-second CAP-TVP module and answered six embedded, forced-choice questions. The majority of participants in this study were 23-years-old or older (n = 22), White (n = 23), Female (n = 25), had obtained a Bachelor's degree (n = 22) and had some experience in teaching reading related content to a student (n = 24). More than half of the participants had not previously taken reading courses (n = 15). Overall, results showed that the CAP-TVP was an effective tool for improving participant test scores from pretest to posttest. This trend in data aligns with findings from previous CAP-TV studies showing that CAP-TVs can be used effectively to improve pre-service teacher knowledge. However, this study differed from previous CAP-TV studies with the inclusion of forced application

questions. The inclusion of authentic application practice items within CAP-TV modules may prove an effective tool for helping pre-service teachers develop procedural skills in addition to helping improve their knowledge.

Key data trends from this study suggest that the CAP-TVPs may be a promising tool for increasing participant declarative knowledge. Results from pre- and post-assessments of declarative knowledge showed statistically significant impacts with large effect sizes (d = 1.77). Hattie (2011) considers an effect size of 0.6 to be large when analyzing educational outcomes. Additionally, participants grew on average 14 plus points from pretest (21 points) to posttest (35 points). However, due to the small sample size, interpretations from the current study should be taken with caution. Larger sample sizes are needed for more robust statistical analyses and should be a focus for further research.

A second data trend showed the CAP-TVP to be effective for all participants, no matter their prior reported experience and coursework. One-way ANOVAs analyzing demographic data against pretest data revealed that all participants entered the CAP-TVP module with relative similarities in knowledge about teaching reading to beginning readers and readers experiencing decoding difficulties (see Appendix L). One-way ANOVAs examining posttest data by background knowledge revealed that the CAP-TVP produced positive effects no matter the background knowledge achieved through previous reading courses or previous teaching experiences (see Appendix M). One interesting data point that needs further investigation is that those with prior reading teaching experience (n = 24) had no difference in pretest scores (21; p = .88, $\eta 2$ = .00) from those who had not had previous experience teaching reading (n = 5). Caution should

be observed in interpreting these data given the small sample size overall and within demographic subgroups.

A third data trend from the current study suggests that CAP-TVPs were successful in helping participants increase their pedagogical skills, or more specifically, their ability to detect and effectively correct oral reading errors. In chapter 2, the roles of declarative and pedagogical knowledge were discussed as essential components in TPP instruction (Snow et al., 2005). In this study, I addressed both types of learning in the pre-and post-assessment. Declarative items asked participants to give precise, concrete information such as "How would you explain what a syllable is?" and "Choose all the closed syllable words [in the list]." Pedagogical skill items used video clips of students reading as a proxy for applied practice. Participants were asked to view a student reading, note the error, and prescribe a corrective procedure.

The lowest scoring items at pretest (I.e., < 50% of participants scored total points) were items 1, 2, 3, 4, 6, 7, 9, 11, 12, 13, 14, 17, 19, and 22 were a mix of declarative and pedagogical knowledge items. Most of these items asked participants to describe the planning and enacting steps in correcting a student when an oral reading error occurred. Low scores at pretest for these items were expected as participants had not yet viewed the procedures outlined in the CAP-TVP. However, raters scored these items looking for key words and phrases such as "decodable text, sound-symbol, engagement". This broad scoring was meant to capture points for participants who may have had SOR related background knowledge (see Appendix O for scoring rubric). At pretest, answers to the question, "What are important planning steps for teaching a decoding lesson to beginning or struggling readers?" (item 3) varied from "unsure" to "build rapport with students" to

"use decodable text." At posttest, however, answers followed the script of the CAP-TVP instruction with answers giving both planning and correction procedures such as "setting a goal for accuracy, using decodable text, the time you give corrections (timeliness), focus on sound symbol relationship, and engage students."

Interestingly, declarative, open-ended questions had varied results. A straightforward question on lesson planning steps (item 3; "What are important planning steps for teaching a decoding lesson to beginning or struggling readers?") had an increase of 73% in correct responses. On the posttest, 22 participants answered that *setting a goal for accuracy* and *using decodable text* were planning procedures as compared to one participant correctly identifying both planning procedures on the pretest. However, a similar question (item 6; "During reading accuracy, when a student makes an error, the teacher should…") on correction steps during instruction had an increase of only 49% in correct responses listing all three correction steps *stop, focus, engage*. The posttest showed 14 out of 29 participants answered item four ("Define "error correction" for oral reading.") correctly compared to one participant at pretest. Admittingly, 14 participants detailing the correction procedure is concerning.

However, when looking at open-ended questions using video clips of student reading, results indicated strong learning in the correction procedures. Items 17, 19, and 22 asked participants to detail a correction procedure after listening to a video clip of a student making an oral reading error. Item 17 showed an increase from pretest to posttest of 67% with 25 out of 19 participants at posttest highlighting the 3-step components. Item 19 showed an 80% increase in correct scores with 26 out of 29 participants at

posttest earning all possible points. And lastly, item 22 showed 38% increase with 24 out of 29 participants detailing the 3-step correction procedure in their answer.

When comparing the preparation and correction procedure answers at posttest, a need for further study is noted. The assessment provided only one declarative question asking about planning (item 3) and one declarative question asking for correction procedures (item 6), both of which garnered improvement. However, this improvement was not as robust as the application questions (items 17, 19, and 22). The purpose of this study was to determine if CAP-TVPs increased TPP students' ability to apply correction procedure in mock situations. Snow et al. (2005) state that declarative knowledge precedes pedagogical knowledge such that results for the declarative and pedagogical items above are somewhat surprising. However, these scores could be the result of the assessment rather than an indication that participants increased pedagogical knowledge in spite of declarative knowledge for correcting oral reading errors. Item validity is discussed later in this chapter.

Not all pretest items scored low. At pretest, three items that garnered the highest number of correct answers asked participants to name the exact word that was misread in a video clip of a child reading (see Appendix K; item 15: 100%, item 18: 93%, item 20: 97%). However, when asked about the position of the sound in the word that was misread (e.g., beginning, medial, final; items 16, 21), only half (item 16: 55%, item 21: 52%) of the participants identified the position correctly. Fortunately, posttest scores revealed an increase in skill (item 16: 88%, item 29: 79%).

Not all items increased at the posttest. Item 7 remained low at posttest. This item showed a list of one syllable words and asked participants to choose all closed syllable

words. Points were awarded for each correct selection but deducted for each incorrect selection such that if a participant chose the words cat (closed) and car (not closed), they scored zero points. Both words appear to be closed syllables as the vowel "a" is followed by a consonant "t" and "r," respectively. However, the nuance in this question deals with the sound of the vowel in the word. The "a" in "cat" is a short vowel sound, while the "a" in "car" is co-articulated with the "r" such that its sound is neither short nor long, as it is referred to as r-controlled. The CAP-TVP did not review other syllable types beyond the short vowel and closed syllable and may not have been sensitive enough for this grain-sized detection level. As Sayeski et al. (2017) found, TPP students require distributed practice to master letter sound pronunciation. The CAP-TVP did not involve practice and was a one-time introduction rather than distributed. The brief introduction to short vowels and closed syllables may have also contributed to participants' difficulty in selecting the position of the error in the misread words within the video clips for items 16 and 21. This skill may also require distributed practice.

Decodable text during instruction was also elusive for participants at posttest. At pretest, 13 participants identified closed syllable decodable text examples out of a selection of sentences (see Appendix D, item 8). However, when given a written teaching scenario example at pretest (see Appendix D, item 14), no participant identified that the text used in the scenario was not decodable for a closed syllable instruction lesson. Scores for question 14 remained low at posttest, with only three participants (10%) noting that the text was not decodable. Additionally, question nine asked participants to note the effective steps used in a written teaching scenario. At pretest, zero participants noted that the text was decodable and appropriate for use with a student learning closed syllables.

At posttest, this item score remained low, with five participants (17%) identifying the example sentence as decodable.

Low scoring items at both pretest and posttest may be indicators of flawed questioning. Although the assessment's Cronbach's alpha (pretest $\alpha = .803$ and posttest $\alpha = .801$) is considered *good* across the 22 assessment items, individual items may need further tweaking. Items such as item 14 scored low at both pretest and posttest with an increase of only 10% from zero participants at pretest to three participants at posttest scoring correctly. Item 14 asked participants to read a teaching scenario and describe missing components. Correct answers should have included four keyword components ***decodable text, stop, focus, engage***. The teacher in the scenario asks the student to work through a mistake, but the subtlety in the timing of the correction and the lack of focus on the sounds within the misread word may have been difficult for participants to detect. Additionally, because the teacher is engaging the child in the scenario there may have been confusion that the engagement was not focused on the sound-symbol relationship which is taught in the CAP-TVP. Therefore, in future studies, this item should either be removed, scored only for the lack of using decodable text or revised to better align with the item's intended purpose. Furthermore, item seven asked participants to identify all closed syllable words from a list likely needs adjustment. The list contained the word "car" which visually represents the instructed definition of a closed syllable (i.e., a vowel followed by a consonant). However, in the word "car," the vowel sound is subsumed by the "r" following it making an "r-controlled" syllable. The r-controlled syllable type was not mentioned the CAP-TVP and including this word in the assessment may represent confusion for participants.

Demographic data showed that half (n = 15) of the participants had not previously taken a reading course, with an additional five participants having taken only one prior reading course. These two groups scored the lowest average on the pretest (0 courses *M* = 21.33, 1 course *M* = 18.20) and achieved the highest average at posttest (0 courses *M* = 36.87, 1 course *M* = 36.80). Compared to average posttest scores for those who had taken two courses (*M* = 30.67) and those who had had three or more courses (*M* = 33.00), prior coursework may have contradicted this study's instructional content. However, due to the low sample size in this study as a whole, further research is needed to examine how prior reading courses impact growth.

Limitations

While the current study showed a strong effect on growth from pretest to posttest commensurate with the CAP line of research, this study differed from past CAP research in important ways that create limitations for results interpretation:

1. The current study design was a non-experimental pre/posttest. Previous CAP studies predominantly used experimental group pretest-posttest-maintenance designs (see Kennedy et al., 2013).
2. The sample size in the current study was considerably smaller than in past CAP studies. Twenty-nine participants completed the current study, while past CAP studies included at least 70 or more participants (see Romig et al., 2018). The small sample size limits causal relationship determination, such as those revealed by the one-way ANOVAs examining the impact of background knowledge and experience on participant achievement.

3. The current study took place at one university with a convenience sample in two online introductions to special education classes. Past CAP studies have been enacted across university TPP programs (see Peeples et al., 2019).
4. The sample in this study contained a majority of white females.

The convenience sample and the homogeneity of the sample limit generalizability to all graduate-level TPP students, and findings should be interpreted with caution.

Future research should mimic past CAP studies in design and sampling to determine whether CAP-TVPs outperform other means of typical TPP instruction and practice. Specifically, future research that increases the sample size would allow a more precise analysis of how background knowledge influences growth in detecting and correcting oral reading errors.

The current study was also limited by the assessment used to determine participant growth. While the measure showed solid internal consistency, it was researcher created and not tested widely before administration. Future research should include previously validated measures to correlate to this study's assessment. Measures such as the Survey of Basic Language Constructs by Binks-Cantrell et al. (2012) would allow a deeper understanding of language background knowledge and illuminate how declarative knowledge items on the current assessment addressing closed syllables were not mastered by this study's participant group.

The current study aimed to address the need in TPPs for instruction in pedagogical knowledge around detecting and correcting oral reading errors. However, this study is the beginning step in addressing best practices in increasing practice for TPP students. Future research should include real-world practice accompanied by performance

feedback to complete the cognitive apprenticeship cycle and include authentic pedagogical knowledge practice. As Peeples et al. (2019) point out, repeated cycles of learning and practice lead to strong growth for participants.

Technology limitations and issues also limited the current study. First, during implementation, links to the CAP-TVP video did not work seamlessly with the online class portal, Canvas. Some participants could copy and paste the link, thus nullifying tracking from one website to the other. In other words, there needed to be a reliable way to tell when participants successfully opened and connected to the CAP-TVP video. This limited this study's ability to assess growth-related time on task. Assessing time on task has been a standard practice for past CAP research studies. Additionally, while the edpuzzle.com site used to house the video showed the video had been viewed, and questions answered, there was no accurate tracking of individual participant usage. This limited the use of data on the forced-choice answers, which would have helped illuminate posttest performance.

Another aspect of time on task during test completion needed to be reliably tracked through the Canvas portal. Many participants' data showed zero minutes used to complete the pre- and posttests. This glitch in Canvas occurred for over half of the participants and therefore left time on task for test completion, an imprecise data point. This limited this study's ability to determine how long participants needed to complete the assessments, which may have impacted their scores.

The model videos used in the CAP-TVP and the assessments may have also brought limitations to this study. While student faces were visible in the model videos, participants may not have been able to see the shape and movement of the readers'

mouths in order to aid in error detection. For example, when a reader misread “pum” for “pup,” the mouth should remain closed for the “m” sound, but the video may not have been sharp or close enough to utilize mouth shape to support error detection. This aspect of teacher training also needs further research as it aligns with findings by Sayeski et al. (2017). However, sitting beside a student during authentic practice, a teacher must detect oral reading errors with timely accuracy. Overt practice to train the ear may be needed by some participants.

Social Validity

The social validity assessment showed positive results for instruction using the CAP-TV using a Likert-type survey. However, adding open-ended questions would allow for more nuanced answers about how and why perceptions of knowledge and skills changed via the CAP-TVP presentation. Additionally, because this study was a pre-posttest design, social validity would be further enhanced with a question comparing the CAP-TVP presentation and the participants’ interactions with other instructional styles and an open-ended question as to why CAP-TVP inclusion within future coursework would be beneficial.

Future Research

The current study lends itself to a line of future research. First, design and implementation should shift for scalability. A repetition of this study using a larger sample size, random assignment to groups (CAP-TVP intervention and control), and increased control over technological mechanisms for online tracking would significantly improve statistical analysis and give power to statistical results. Second, as the SOR increases across school systems within the US, in-service teachers will need training in

delivering explicit reading instruction, including the precise error correction and feedback used in the current study. Future research should assess in-service teachers' prior knowledge to determine whom CAP-TVPs might play a role in the field as educators enact SOR practices.

Third, an understanding of participants' prior knowledge of basic language constructs would benefit research such as the current study. The items centered on syllable knowledge and decodable text may have been impacted by participants' prior knowledge. Adding a measure assessing basic language constructs may assist instructors and professional development creators in determining the level of dosage needed for participants to gain these skills. Mathews et al., (2022) state that TPP students may require more individually focused programming. This study highlights the need for more investigation when delivering online instruction for grain-sized reading skills.

The current study focused on the decoding factor within the SVR. While data show a promising trend in improving TPP students' pedagogical knowledge to detect and correct oral reading error for beginning readers and those experiencing decoding difficulties, it does not address the language comprehension factor of the SVR. In order to fully integrate all that the SOR offers, future research should include declarative and pedagogical knowledge for best practice in comprehension. It is vital that TPP students understand the equal weight that decoding and language comprehension hold within the SVR and CAP-TVPs assist in providing this important instruction.

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Appendix A

Demographic Survey

1- **What is your gender?**
Male
Female
Non-Binary
Prefer not to answer

2- **What is your age?**
Under 18
18 - 24
25 - 34
35 or Older

3- **Please select your race**.
Caucasian
Black or African American
Indigenous American or Alaska Native
Asian
Native Hawaiian or Pacific Islander
Other

4- **What is the highest degree or level of school you have completed?**
Some college, no degree
Associate degree (e.g., AA, AS)
Bachelor's degree (e.g., BA, BS)
Master's degree (e.g., MA, MS, MEd)
Doctorate or professional degree (e.g., MD, DDS, PhD)

5- **What is your current major?**

_____

6- **Are you enrolled in U.Va.'s School of Education and Human Development?**
Yes
No

7- **Does this course fulfill a requirement in your program?**
Yes
No

8- **Describe your teaching experience…**
None
Tutoring- Reading, Math, General subjects
Classroom Teacher- General Education
Classroom Teacher- Special Education
Reading Specialist
Other _____

9- **Have you even worked with a student on reading related skills (e.g., decoding, phonics, comprehension, essay writing)?**
Yes
No

10- How many Reading Instruction/Diagnostic courses have you taken?

None
1
2
3
4 or more

Appendix B

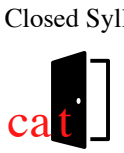
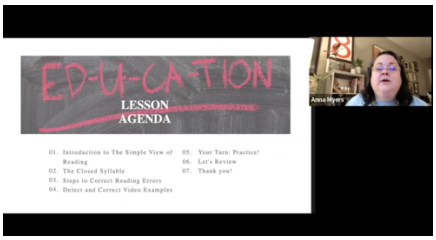
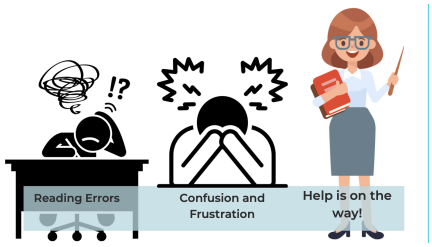
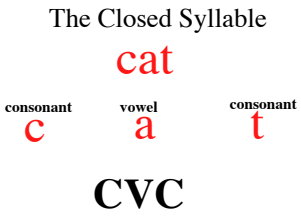
CAP-TVP Essential Knowledge Checklist

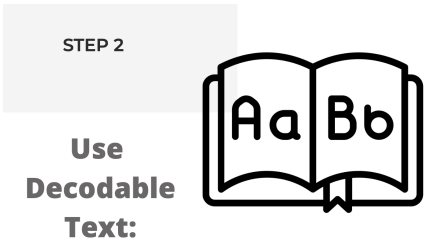
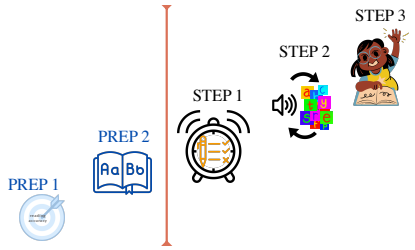
Essential Knowledge

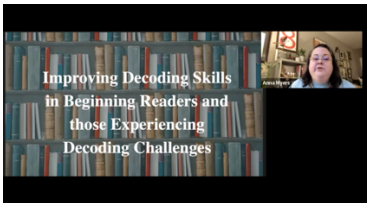
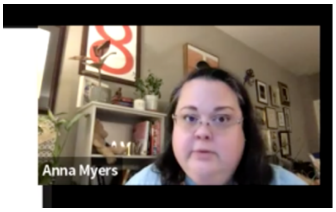
- **Introduction to Reading**
  - Background knowledge in the Simple View of Reading
  - Identifies decoding as an equal component in reading skills
  - Focus is given to decoding skills
  - Provides real world example of oral reading errors
- **The Closed Syllable**
  - Reviews consonants and vowels
  - Describes the closed syllable letter pattern
- **Steps to Correct Reading Errors**
  - Prep 1 Goal setting
    - Identifies accuracy as goal during decoding instruction
  - Prep 2 Use decodable text
    - Provides introduction to decodable text with examples and nonexamples
  - Step 1 Immediate feedback
    - Identifies the need to provide feedback as soon as a reading error is made
  - Step 2 Sound-Symbol relationship
    - Identifies decoding skills as priority through sound-symbol work
    - Reviews vowel sounds
  - Step 3 Engage students
    - Emphasize the need for students to respond in the sound-symbol correction process
    - Give examples of questioning for engagement

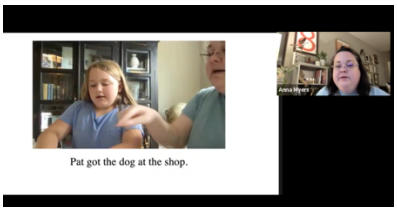
Appendix C

CAP-TVP Adherence to CTML Principles

CMTL Principles	CAP-TPV example slide and script
1. Coherence Principle: Exclude extraneous information.	The background information is limited, but contextual. 
2. Signaling Principle: Essential material is organized and highlighted.	Agenda Slide 
3. Redundancy Principle: Graphics and narration are more powerful than printed text.	Graphics are the primary source of visual information. 
4. Spatial Contiguity Principle: If text appears, arrange it in close alignment with graphics.	Text and graphics are closely aligned. 

5. Temporal Contiguity Principle: Sync narration with corresponding graphics.	Narration is the verbal translation of the graphics on screen. 
6. Segmenting Principle: Essential information is segmented into parts.	Presentation has 7 distinct sections with review with 3 review sections. 
7. Pre-training Principle: Key terms are pre-taught.	Terms are highlighted and reviewed multiple times. 
8. Modality Principle: Present narrated graphics rather than text and graphics.	Graphics are prioritized and the mainstay of each slide. 
9. Multimedia Principle: Narration with graphics is more powerful than narration alone.	Narration is a key component as a complement to graphics. 

	Slide script: "The goal during decoding lessons should be reading accuracy. Setting a purpose for reading gives a focus to the target skills. In reading accuracy, the teacher will provide decodable text that works on current decoding skills.
10. Personalization Principle: Narration uses a conversational tone.	The narrator's tone is informative, but not demanding or telling.
	Listen at: https://edpuzzle.com/media/629fef2a1d3d2e415222b888
11. Voice Principle: Voice narration is pleasing to the ear.	The narrator uses a soft tone much like in-person conversations.
	Listen at: https://edpuzzle.com/media/629fef2a1d3d2e415222b888
12. Image Principle: Instructors should appear on screen.	The instructor appears in the upper right corner of each slide.
	
13. Embodiment Principle: The visible instructor should be conversationally animated and avoid stoicism.	Facial expressions are seen.
	 
14. Immersion Principle: Do not include interactive augmented virtual reality.	Practice opportunities are video based, but do not immerse the learner.
	
15. Generative Activity Principle: Include	Practice opportunities mimic example videos and encourage reflection.

engaging activities that prompt essential knowledge usage.	

Appendix D

Pre and Post Assessment

1. (*Decoding*) is breaking words into individual sounds or syllables to read unfamiliar words.

2. In a (n) (*closed*) syllable, the vowel is short.

3. What are important planning steps for teaching a decoding lesson to beginning or struggling readers?

4. Define "error correction" for oral reading errors.

5. How would you explain what a closed syllable is

6. During reading accuracy practice, when a student makes a reading error, the teacher should:

7. Choose all the closed syllable words:
    a. Car
    b. Cat
    c. Go
    d. Book
    e. Block
    f. It
    g. Drop
    h. Mouth
    i. Stomp
    j. Fly

8. Choose all the sentence that are considered decodable for a beginning reader working on closed syllable knowledge.
    a. The man rode to town on a brown horse.
    b. The bug got hot in the sun.
    c. Find the shoe in the mess.
    d. Cam sat at the seashore selling seashells.
    e. Kim can pop the lid of the top.
    f. Stan makes great cakes.

9. Read the following student and teacher scenario and answer at the end.
    [Student has text in front of them that reads: *Dad had a cut on his leg.*] [Teacher is sitting next to the student. She points to the text].
    T: Please read this sentence.
    S: Dad had a cat on his leg.

T: Great reading. Let's try it again. This time, focus on this word [T points to "cut."]
S: Dad had a cat on this leg.
T: A word is wrong. Can you find the word? Let's look together. You read with me.
T and S: Dad had a CUT on his leg.
T: Which word was wrong?
S: I don't know
T: Let me read it to you. Dad had a cut on his leg.
S: Dad had a cut.
T: That's right, you read "cat" for "cut".

What pieces of an effective error correction procedure are evident in this scenario?

10. Read the follow student/ teacher scenario and answer this question at the end.
[Student has text in front of them that reads: *Dad had a cut on his leg.*] [Teacher is sitting next to the student. She points to the text].
T: Please read this sentence.
S: Dad had a cat on his leg.
T: Great reading. Let's try it again. This time, focus on this word [T points to "cut."]
S: Dad had a cat on this leg.
T: A word is wrong. Can you find the word? Let's look together. You read with me.
T and S: Dad had a CUT on his leg.
T: Which word was wrong?
S: I don't know
T: Let me read it to you. Dad had a cut on his leg.
S: Dad had a cut.
T: That's right, you read "cat" for "cut".

What pieces of an effective error correction procedure are missing?

11. Read the following student/ teacher scenarios and answer this question and answer the question at the end.
[Student has text in front of them that reads: *Jim had a nap on the cot.*] [Teacher is sitting next to the student. She points to the text].
T: Please read this sentence.
S: Jim had a nip.
T: Stop. Look at this word. [T points to "nap."] What is the vowel in this word?
S: A.
T: That's right, what does "a" say?
S: A apple /a/.
T: Great, let's say all the sounds in that word.

S: / n a p/.
T: What's the word?
S: nap.
T: Great, read that sentence again.
S: Jim had a nap on the cot.
T: Awesome, look how you fixed that mistake. Great work.
What pieces of an effective error correction procedure are evident?

12. Read the following student/ teacher scenario and answer the question at the end. [Student has text in front of them that reads: *Jim had a nap on the cot.*] [Teacher is sitting next to the student. She points to the text].
T: Please read this sentence.
S: Jim had a nip.
T: Stop. Look at this word. [T points to "nap."] What is the vowel in this word?
S: A.
T: That's right, what does "a" say?
S: A apple /a/.
T: Great, let's say all the sounds in that word.
S: / n a p/.
T: What's the word?
S: nap.
T: Great, read that sentence again.
S: Jim had a nap on the cot.
T: Awesome, look how you fixed that mistake. Great work.
What pieces of an effective error correction procedure are missing?

13. Read the following student/ teacher scenario and answer the question at the end. [Student has text in front of them that reads: *Meg and Blake ski down the mountain.*] [Teacher is sitting next to the student. She points to the text].
T: Please read this sentence.
S: Mag and Blake ski down the mountain.
T: Good reading, but I heard a mistake. Can you go back and find your mistake?
S: Mag and Blake ski down the mountain.
T: Nice try. There is still a mistake. Try to sound out each word to find the mistake.
S: M-A-G A-N-D
T: Stop. Try the first word again.
S: M-A-G, Mag
T: That's the word that has the mistake. You should say M-E-G. Can you do that?
S: M-E-G

T: Nice job. What's the word?
S: Mag.
T: Let's try again, M-E-G, Meg. You do it.
S: M-E-G, Meg.
T: Great. Now read the sentence again.
S: M-E-G, Meg, and Blake ski down the mountain.
What pieces of an effective error correction procedure are evident?

14. Read the following student/ teacher scenario and answer the question at the end. [Student has text in front of them that reads: *Meg and Blake ski down the mountain.*] [Teacher is sitting next to the student. She points to the text].
T: Please read this sentence.
S: Mag and Blake ski down the mountain.
T: Good reading, but I heard a mistake. Can you go back and find your mistake?
S: Mag and Blake ski down the mountain.
T: Nice try. There is still a mistake. Try to sound out each word to find the mistake.
S: M-A-G A-N-D
T: Stop. Try the first word again.
S: M-A-G, Mag
T: That's the word that has the mistake. You should say M-E-G. Can you do that?
S: M-E-G
T: Nice job. What's the word?
S: Mag.
T: Let's try again, M-E-G, Meg. You do it.
S: M-E-G, Meg.
T: Great. Now read the sentence again.
S: M-E-G, Meg, and Blake ski down the mountain.
What pieces of an effective error correction procedure are missing?

15. 

Listen to the student read the sentence. Chose the word that has an error.
Text: Did the dog jog and run?

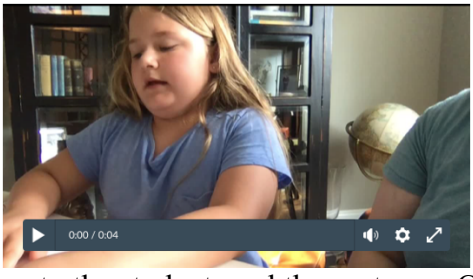
a) Did
b) the
c) dog
d) job
e) and
f) run

16. 

Listen to the student read a sentence. Choose where the error occurred in the word.
Text: Did the dog job and run?
a) Beginning
b) Middle
c) Final

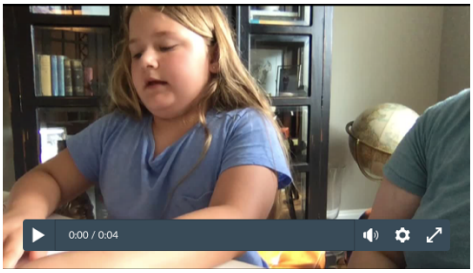
17. 

Listen to the student read a sentence.
Text: Did the dog jog and run?
Describe an effective error correction procedure. You can use bullet point or list.

18. 

Listen to the student read the sentence. Choose the word that has a mistake.
Text: The bum is in the bag.
a) The
b) gum
c) is
d) in

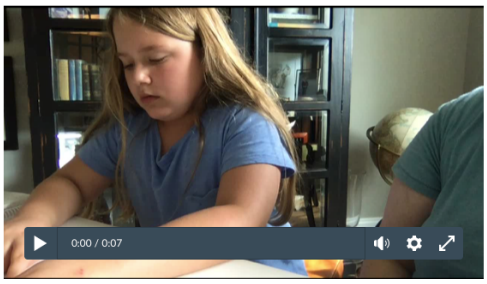
e) the
f) bag

19. 

Listen to the student read the sentence.
Text: The gum is in the bag.
Imagine that the teacher stopped the student after she heard the misread word “game.”
Describe what the teacher should do next. You can use bullet points or list.

20. 

Listen to the student read a sentence. Choose the word that has an error.
Text: The pup will tug on the rug.
a) The
b) pup
c) will
d) tug
e) on
f) rug

21. 

Listen as the student reads a sentence. Choose the type of error in the misread word.
Text: The pup will tug on the rug.
a) Beginning
b) Medial
c) Final

22. 

Listen to the student read a sentence. Describe an effective error correction.
Text: The pup will tug on the rug.

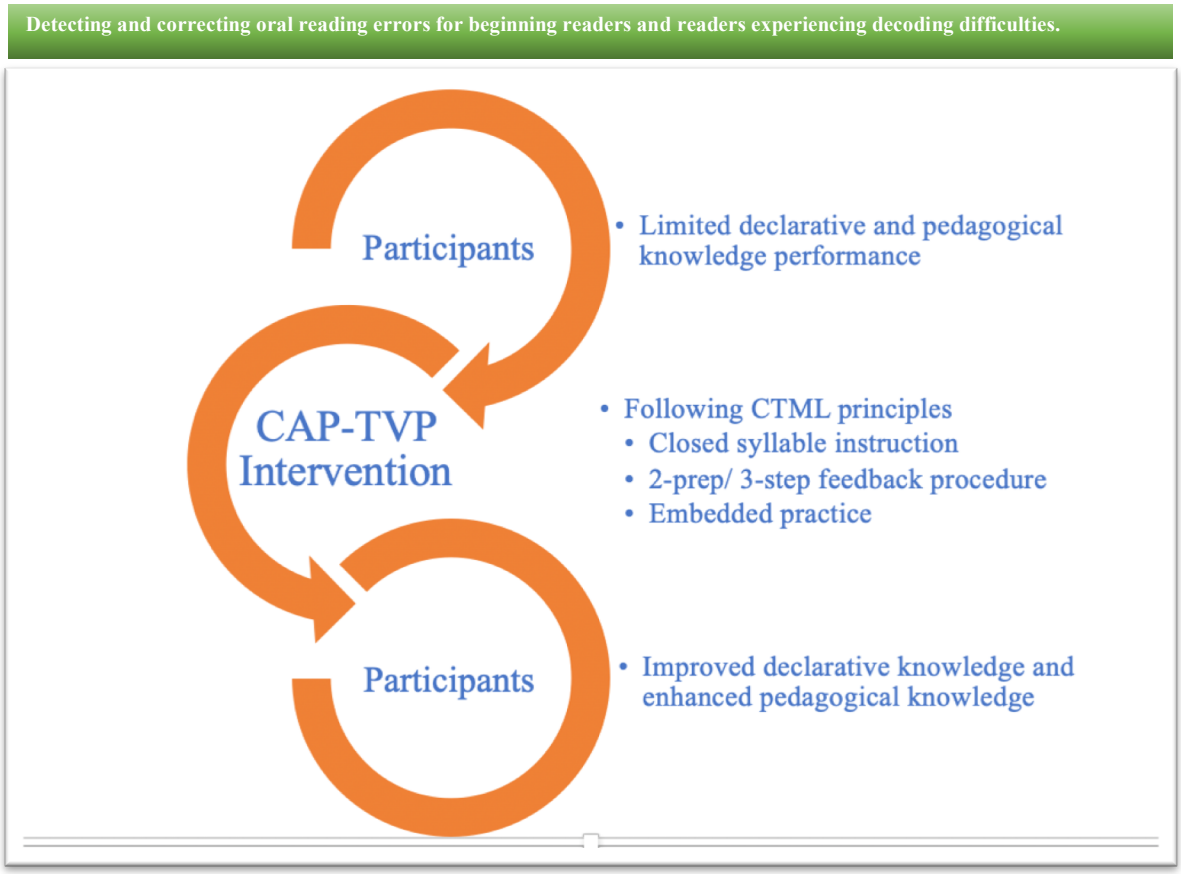
Appendix E

Teaching Model Video Example (Still Frame)

The rag had a rip.

Appendix F

CAP-TVP Process



Appendix G

Participant Demographics

Demographic Variable	***n* = 29 (%)**
Gender	
Male	4 (13.8)
Female	25 (86.2)
Age	
18-22	7 (24.0)
23-34	11 (38.0)
35-older	11 (38.0)
Ethnicity	
Caucasian	23 (79.3)
Asian	2 (6.9)
Not Reported	4 (13.8)
Highest Degree	
Some College	1 (3.5)
Bachelor's	22 (75.9)
Master's	5 (17.2)
Doctorate	1 (3.5)
Program Concentration	
Elementary General Education	7 (24.0)
Special Education K-12	9 (31.0)
English as a Second Language	4 (13.8)
Gifted	1 (3.5)
Not Reported	7 (24.0)
Non-Education	1 (3.5)
Reading Instruction Experience	
Yes	24 (82.8)
No	5 (17.2)
Previous Reading Courses	
0	15 (51.7)
1	5 (17.2)
2	3 (10.3)
3	5 (17.2)
Not Reported	1 (3.5)

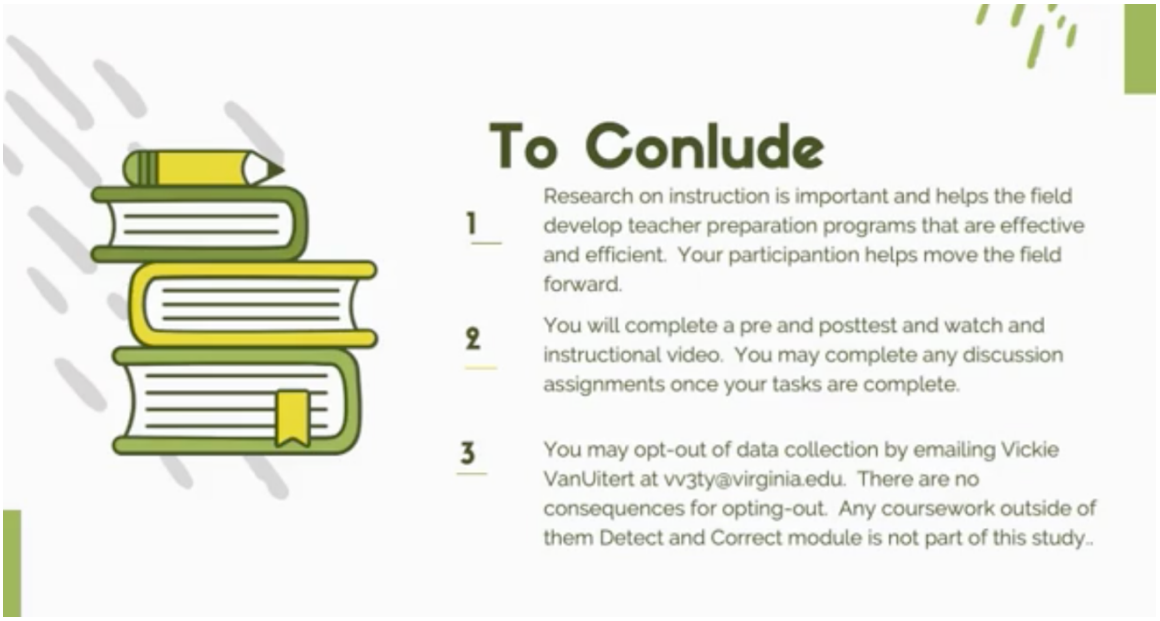
Appendix H

Social Validity Questionnaire

	1= Disagree	2= Disagree Somewhat	3= Neutral	4= Agree Somewhat	5= Strongly Agree
The method of instruction suited my learning preferences.					
The instructional presentation was typical of coursework in education courses.					
The instructional presentation was easy to understand.					
The instructional presentation increased my knowledge of reading errors and corrective feedback.					
I feel that I could use the skills presented giving feedback for reading errors with a student.					
I feel that coursework should include this type of instructional presentation.					

Appendix I

Example Slide from Introduction Video



Appendix J

t-test Results for Pre and Posttest Scores

N = 29

	M	**SD**	***t*-test**	***d***
Pretest	21.17	6.54	9.50	1.77
Posttest	35.62	5.82		

Appendix K

Performance Scores for Each Item on Pre and Posttest

Item #	N	Pretest Correct Answer N (%)	Posttest Correct Answer N (%)	Growth N (%) Increase
1 **____ is breaking words into individual sounds or syllables to read unfamiliar words. (1pt.)**	29	11 (38)	26 (90)	15 (52)
2 **In a(n) _____ syllable, the vowel is short. (1pt.)**	29	13 (45)	27 (93)	14 (48)
3 **What are important planning steps for teaching a decoding lesson to beginning or struggling readers? (2pts.)**	29	1 (3)	22 (76)	21 (73)
4 **Define "error correction" for oral reading. (3pts.)**	29	0 (0)	12 (41)	12(41)
5 **How would you explain what a closed syllable is? (1pt.)**	29	16 (55)	26 (90)	10 (35)
6 **During reading accuracy, when a student makes an error, the teacher should: (3pts.)**	29	1 (3)	15 (52)	14 (49)
7 **Choose all the closed syllable words: (5pts.)**	29	1 (3)	3 (10)	4 (7)
8 **Choose the sentence that are considered decodable for a beginning reader working on closed syllable knowledge: (2pts.)**	29	13 (45)	25 (86)	12 (41)
9 **Read the following scenario…What pieces of effective error correction are evident? (3pts.)**	29	0 (0)	5 (17)	5 (17)
10 **Read the following scenario…What pieces of effective error correction are missing? (1pt.)**	29	11 (38)	25 (86)	14 (48)
11 **Read the following scenario…What pieces of effective error correction are evident? (3pts.)**	29	4 (14)	21 (72)	17 (58)
12 **Read the following scenario…What pieces of effective error correction are missing? (1pt.)**	29	2 (7)	23 (79)	21 (72)
13 **Read the following scenario…What pieces of effective error correction are evident? (2pts.)**	29	7 (24)	18 (62)	11 (38)
14 **Read the following scenario…What pieces of effective error correction are missing? (4pts.)**	29	0 (0)	3 (10)	3 (10)
15 **Listen to the student read the sentence. Choose the word that has an error. (1pt.)**	29	29 (100)	28 (97)	1 (-3)
16 **Choose where the error occurred in the word. (1pt.)**	29	16 (55)	25 (86)	9 (31)
17 **Describe an effective error procedure. (3pts.)**	29	6 (21)	25 (88)	19 (67)
18 **Listen to the student read the word. Choose the word with a mistake. (1pt.)**	29	27 (93)	29 (100)	2 (7)
19 **Imagine that the teacher stopped the student after she heard the misread word "game." Describe what the teacher should do next. (2pts.)**	29	3 (10)	26 (90)	23 (80)
20 **Listen to the student read a sentence. Choose the word that has an error. (1pt.)**	29	28 (97)	29 (100)	1 (3)
21 **Choose the type of error in the misread word. (1pt.)**	29	15 (52)	24 (79)	9 (27)
22 **Describe an effective error correction.**	29	12 (41)	24 (79)	12 (38)
Total Average (45pts.)	29	21.17pts.	35.62pts.	14.45pts.

Note: See Appendix D for complete question examples and answers.

Appendix L

Demographic Data and Pretest ANOVAs

Demographic	*n*	*M*	*SD*	*F*	*p*	η^2
Number of Previous Reading Courses				1.03	.40	.11
0	15	21.33	6.66			
1	5	18.20	7.29			
2	3	26.67	4.04			
3	5	20.80	6.91			
Reading Teaching Experience				.03	.88	.00
Yes	24	21.08	6.62			
No	5	21.60	6.88			
Previous Teaching Assignment				.53	.72	.08
General Education	9	23.67	5.96			
Special Education	5	21.20	6.94			
Other (undefined)	7	19.00	7.55			
None	7	20.14	6.87			
Tutoring	1	21.00	-			

Appendix M

Demographic Data and Posttest ANOVAs

Demographic	*n*	*M*	*SD*	*F*	*p*	η^2
Number of Previous Reading Courses				1.38	.27	.15
0	15	36.87	3.94			
1	5	36.80	3.56			
2	3	30.67	10.12			
3	5	33.00	9.03			
Reading Teaching Experience				4.25	.05	.14
Yes	24	36.58	5.00			
No	5	31.00	7.84			
Previous Teaching Assignment				.35	.84	.06
General Education	9	36.33	7.18			
Special Education	5	36.20	4.44			
Other (undefined)	7	33.43	7.74			
None	7	36.00	2.77			
Tutoring	1	39.00	-			

Appendix N

Social Validity Survey Results

Social Validity Item	Range	Mean	Standard Deviation
The method of instruction suited my learning preferences.	1-5	4.17	1.04
The instructional presentation was typical of coursework in education courses.	1-5	3.69	1.17
The instructional presentation was easy to understand.	2-5	4.72	.75
The instructional presentation increased my knowledge of reading errors and corrective feedback.	1-5	4.66	.86
I feel that I could use the skills presented giving feedback for reading errors with a student.	3-5	4.83	.54
I feel that coursework should include this type of instructional presentation.	1-5	4.48	.95

Note. Participants responded to items given a 5-point Likert-type scale with 5 = agree, 4 = agree somewhat, 3 = neutral, 2 = disagree somewhat, 1 = disagree.

Appendix O

Scoring Rubric and Examples

Question	**Scoring Key**	**Example Answers (with scores from IRR scoring)**	
		Pretest	**Posttest**
3) What are important planning steps for teaching a decoding lesson to beginning or struggling readers? (2pts.)	*1pt. – Accuracy focus* *1pt. – Decodable Text* ***not correct-*** *General answers like "Have materials ready, Pull lists of words, write a lesson plan, etc..."*	*I don't know.* (0pts.)	*1. Goal* *2. Decodable Text* *3.Correction* (2pts.)
4) Define "error correction" for oral reading. (3pts.)	*1pt. - Stop* *1pt. - Focus* *1pt. - Engage*	*Identifying the error and helping the reader decode and pronounce the word*. (1pts.)	*Error correction is when a student is pointed towards a mistake in sound of a read word.* (1pt.)
5) How would you explain what a closed syllable is? (1pt.)	*Accepted answers;* *a vowel followed by one or more consonants,* *CVC,* *VC,* *a consonant closes the vowel*	*a syllable that has a consonant at the end of it* (0pts.)	*A closed syllable has a vowel followed by one or more consonants and the vowel has a short sound. (1pt.)*
6) During reading accuracy, when a student makes an error, the teacher should: (3pts.)	*1pt. - Stop* *1pt. - Focus* *1pt. – Engage*	*During practice, the teacher should tell the student to pause and try again to look closely at the word that was read wrong. If the student is still having difficulty with the word maybe*	*Stop the student immediately, point out the letter that they are mispronouncing and ask the student the sound of the letter. Then ask the student to sound out the letter of the entire*

		the teacher could ask them to skip it and read ahead to see if they can figure out what makes sense in the sentence and if it looks like any other words that they know. It's also possible that the student is reading too fast and simply needs to be told to slow down a little. (2pts.)	*word, and then put it together. After the student pronounces the word correctly, ask them to read the sentence again.* (3pts.)
9) Read the following scenario…What pieces of effective error correction are evident? (3pts.)	*1pt. – Decodable Text* *1pt. – Stop* *1pt. - Engage*	*Beginning with a compliment and then stating what the child did wrong. allowing the child to try again. pointing out the exact error at the end* (1pt.)	*An effective error correction procedure was stopping the student reading and pointing at the word with the error.* (1pt.)
10) Read the following scenario…What pieces of effective error correction are missing? (1pt.)	*1pt. - Focus*	*Instead of pointing to the word "cut", the teacher should have let the student find the error themselves*. (0pts.)	*The student wasn't corrected immediately at the word. They did not have the student pronounce the letter "u" immediately after. Then, they did not have the student re-read the word with the correct vowel sound and re-read the sentence correctly.* (1pt.)
11) Read the following scenario…What pieces of effective error correction are evident? (3pts.)	*1pt.- Decodable Text* *1pt.- Focus* *1pt.- Engage*	*finding the vowel and sounding out, decoding then blending* (1pt.)	*quickly stopped the student, directed their attention to the miscue, and engaged them to read it correctly* (3pts.)
12) Read the following scenario…What pieces of effective error correction are missing? (1pt.)	*<u>Accepted answers:</u>* *Nothing,* *N/A,* *All pieces are present,*	*None* (1pt.)	*None* (1pt.)

	Teacher follows procedures, Etc.		
13) Read the following scenario…What pieces of effective error correction are evident? (2pts.)	*1pt. – Accuracy focus* *1pt. - Engage*	*Stop the reading to start error correction.* *Helped student with the word he didn't know.* *Asked student to read the sentence again.* (2pts.)	*timely stopping the student, engaging them to read it correctly* (2pts.)
14) Read the following scenario…What pieces of effective error correction are missing? (4pts.)	*1pt. - Stop* *1pt.- Focus* *1pt. – Engage* *1pt. – Decodable Text*	*Teacher did not point out to the correct error.* (1pt.)	*the teacher did not intervene immediately after the mistake was made* (1pt.)
17) Describe an effective error procedure. (3pts.)	*1pt. - Stop* *1pt. - Focus* *1pt. - Engage*	*Encourage them, and then tell the student that there is an error.* *Ask the student to find the error.* *If the student has a hard time finding the mistake, go through the sentence word by word.* *When the error is found, ask the student to pronounce each letter and then put it together.* *Ask the student to read the sentence again correctly.* *Encourage them again when they read the sentence correctly.* (2pts.)	*Stop the student from continue reading.* *Point out at the word where the error was made.* *Ask specific question about the letter's sound.* *Have student sound each letter out and say the word.* *Ask student to read the sentence again.* (3pts.)
19) Imagine that the teacher stopped the student after she	*1pt.- Focus* *1pt. - Engage*	*ask student to sound the word out* *notice the letter pattern of the word – cvc* (1pt.)	*Stop the student and point to the u in "gum".* *Ask the student what the sound of "u" is.*

heard the misread word "game." Describe what the teacher should do next. (2pts.)			*Ask the student to sound out all the letters in "gum".* *Ask the student to read the sentence again.* *Encourage the student.* (2pts.)
22) Describe an effective error correction. (3pts.)	*1pt. - Stop* *1pt. - Focus* *1pt. - Engage*	*Tell the student that there is an error and ask them to find it.* *When the student is having a hard time, go through each word and sound it out.* *Make a connection to "tug" and "rug" since they both have the same medial sound as "pup".* *After the error is found, have the student reread the sentence correctly.* (1pt.)	*- stop the student after they say "pum"* *- ask them to read "pup" again* *- ask them what the consonant on the end is and how to say it* *- have them decode the word with the correct ending* *- ask them to read the sentence again with the correct word* (3pts.)

Answers may have varied from the scoring key terms. Accepted answers must have conveyed a close meaning to each key term. Accepted possible answers for each term were:

Accuracy Focus. *Have a goal for accuracy before the lesson. (Answers should indicate success for the student in the taught concept (i.e., closed syllables).*

Decodable Text. *Use text that contains mostly single closed syllable words. (Accepted answers- Text matches taught concepts. Text contains short vowel words.)*

Stop. *Stop the student when the error occurs (must mention timing or immediacy).*

Focus. *Focus on the sound-symbol relationship (Answers must mention sounds or letter sounds and attention to the missed word through a correction process. Accepted possible variations; sound out the word, say the sounds of the missed word, name the letters and sounds, ask guiding questions about the sounds in the missed word, have the student repeat the correct sounds after you)*

Engage. *Have the student give verbal answers to guiding questions (accepted variations- engage the student, have the student work through the process, listen as the student responds, prompt the student, give prompts)*

Note: Accepted possible answers are not exhaustive.

The pre/posttest responses are not matched by participant.