EXPLICIT MODELING IN EARLY LITERACY PROFESSIONAL DEVELOPMENT AND INSTRUCTIONAL COACHING

by

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A DISSERTATION

Presented to the Department of Special Education and Clinical Sciences and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

June 2020

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Title: Explicit Modeling in Early Literacy Professional Development and Instructional Coaching

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Degree awarded June 2020

DISSERTATION ABSTRACT

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Doctor of Philosophy

Department of Special Education and Clinical Sciences

June 2020

Title: Explicit Modeling in Early Literacy Professional Development and Instructional Coaching

Despite federal legislation and funding support to increase student literacy rates, students continue to fail to learn to read in early elementary school. The most recent National Assessment of Educational Progress (NAEP, 2017) documents that 63% of 4th grade students read below a proficient level. This lack of adequate reading outcomes is particularly alarming because there are abundant research-based instructional strategies available for teaching students to read (e.g., Gersten et al., 2009; NRP, 2000; Vaughn, Wanzek, & Murray, 2012). One area with the potential to positively impact implementation of evidence-based reading instruction is professional development (Demonte, 2013; Desimone, 2009; Desimone & Garet, 2015). However, professional development practices have failed to have the intended impact because they are typically disconnected from teachers' everyday practice, too generic and unrelated to curriculum, infrequent, short, and episodic; and often delivered by external consultants who conduct no follow-up visits or support. The current study seeks to examine explicit modeling as a potential active ingredient of high-quality early literacy professional development. This project investigates the impact of explicit modeling in professional development on preservice educators conceptual and procedural knowledge of effective early literacy instruction.

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Book Chapters

Carlson, S., Siepel, B., & **Masser, J.** (in preparation) Theories of Learning and Instruction*. Chapter in Theoretical Foundations of School Psychology Research and Practice.* New York, NY: Routledge. Book chapter under contract.

Non-Peer Reviewed

Baker, S. K., **Masser, J.,** Santiago, R. T., Nelson, N. J., & Turtura, J. (2018). *Moving from phonological awareness to reading words: The critical role of the alphabetic principle*. Washington, DC: U.S. Department of Education, Office of Elementary and Secondary Education, Office of Special Education Programs, National Center on Improving Literacy. Retrieved from http://improvingliteracy.org.

Masser, J. Oregon's New Dyslexia Legislation (May, 2017). *Oregon Association of School Psychologists Newsletter.*

ACKNOWLEDGMENTS

I wish to express sincere gratitude to my entire dissertation committee for their relentless guidance, advice, and wisdom. I want to express special thanks to Roland—I cannot imagine a better advisor and mentor throughout this entire dissertation process and my graduate school career. You will never stop inspiring me. In addition, Laura Lee, thank you for your unwavering support, organization, and willingness to make this possible. I am so grateful. Lastly, to Nancy, you are fierce, strong and brilliant. You are my role-model. It is not an overstatement to say that I would not be half the scientist, practitioner, or woman I am today without you. I am forever grateful for everything you have done for me. I will never stop learning from you.

This investigation was supported in part by the Dynamic Measurement Group Dissertation Award from the University of Oregon College of Education. Thank you Roland, Ruth, and initial the DIBELS early literacy team for your legacy and support.

To my mother, Kate, father, Phil, and brother, Andrew—I would not have completed this process without you. Mom, thank you for the unconditional love and support; and the ability and inspiration to work tirelessly to help others. Dad, thank you for instilling in me a unrelenting desire to understand objective truth, empiricism, and methodology. Andrew, for teaching me how to fight for what I believe in and help everyone access free, appropriate, and effective public education.

To my fiancé, Brendon—I could never put into words how grateful I am for your selflessness over the last 5 years. Thank you for giving up your life in Idaho to support me in this career ambition. Thank you for constantly building me up and sharing in my struggles and joy. I would have not made it through my dissertation, or any of graduate school, without you.

To Anna Ingram—this dissertation would not be possible without you. Thank you for the endless hours you spent on Articulate building my dissertation modules and feeding me dinner, and *wine*, in your home. Thank you for sharing your family with me. You are so integral to this final product. I would not have a dissertation without you. I admire your work-life balance, laughter and sarcasm, and strength as a mother.

To Jess Surles—thank you for inspiring this entire dissertation topic. You are the most talented instructional coach and professional development leader I have ever met. I admire the way you build relationships with teachers and the power you have to change student lives. I am grateful that you were willing to watch endless videos and code them for my 'expert mean,' but you are so much more than that to my dissertation process. You embody all that I imagine when I dream of best practice, implementation science, and literacy coaching. You are the model that I built my theory of change and future directions of research around. Thank you for being *you.*

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CHAPTER I

Despite federal legislation mandating increases in student literacy rates, such as the No Child Left Behind Act (NCLB, 2001), students continue to fail to learn to read in early elementary school. The most recent National Assessment of Educational Progress (NAEP, 2017) documents that 63% of 4th grade students read below a proficient level. This failure to learn to read by 3rd grade is associated with a large number of negative outcomes, such as high school dropout, antisocial behavior, and incarceration - often referred to as the ‘school to prison pipeline’ (McIntosh et al., 2014). This issue is further compounded for students from diverse backgrounds and students with disabilities. While the initial iteration of the Individuals with Disabilities Education Act (IDEA, 2004), the Education of All Handicapped Children Act (EHA, 1975), guaranteed the right to a Free and Appropriate Education for all students, there continues to be a lack of wide-spread, evidence-based instruction in public schools (Demonte, 2013). The most recent reauthorization of NCLB (2001), the Every Student Succeeds Act (ESSA, 2015), continues to call for scientific, research-based instruction and increased accountability in teacher competence and improved student outcomes. However, despite the increase in rigorous research and available evidence-based early literacy practices, student achievement has only marginally improved.

This lack of evidence-based instruction is particularly alarming regarding early literacy because there are abundant research and instructional strategies available for teaching students to read (e.g., Fien et al., 2015; Gersten et al., 2009; NRP, 2000; Vaughn, Wanzek, & Murray, 2012). Decades of rigorous empirical research have documented the importance of highly-systematic, explicit phonics-based instruction in improving reading outcomes (Archer & Hughes, 2011; Baker, Fien, Baker, 2010; Coyne, Kame'enui, & Carnine, 2011; Fien et al., 2015; Gersten et al., 2009; Nelson-Walker et al., 2013; NRP, 2000; Smith et al., 2016; Vaughn, Wanzek, & Murray, 2012). For over twenty years, scientists and educators have known that instruction in phonemic awareness, the alphabetic principle, fluency, vocabulary, and comprehension (i.e., The *Big Five*) improves reading outcomes (NRP, 2000). When these big ideas are taught with conspicuous strategies and mediated scaffolding, such as modeling with guided practice and immediate corrective feedback (i.e., I do, We do, You do), student outcomes improve (Archer & Hughes, 2011; Englemann & Carnine, 1982). Furthermore, as defined by Coyne and colleagues (2011), in combination with Archer and Hughes (2011), systematic and explicit instruction involves more than just teaching big ideas, with conspicuous strategies and mediated scaffolds, but also integrating background knowledge, and giving students a high rates of opportunities to respond (i.e., judicious review) with immediate corrective feedback (Archer & Hughes, 2011; Coyne, Kame'enui, & Carnine, 2011; Englemann & Carnine, 1982).

When explicit early literacy instruction is studied in rigorous, externally-valid, randomized control trials, scientists repeatedly document that this form of reading instruction works (Gersten et al., 2009). However, despite this overwhelming evidence, explicit reading instruction is not widely adopted in schools. When it does occur, it often does not occur with high treatment integrity (Durlak & Dupre, 2009; Harn et al., 2013). Consequently, research effects are rarely replicated in public schools (Demonte, 2013; NAEP, 2017).

The Potential Impact of Professional Development

One area with the potential to positively impact implementation of evidence-based reading instruction is professional development (Demonte, 2013; Desimone, 2009; Desimone & Garet, 2015). Desimone (2009) provides a strong theoretical overview of the logic of professional development for improving student outcomes (see Appendix A); noting that *effective* professional development focuses on specific content, with active learning opportunities, which increase teacher knowledge *and* skills, which changes instruction, and then ultimately improves student learning. However, Desimone highlights that this logic lacks strong empirical evidence. Furthermore, the leap from increasing *teacher knowledge* to increasing *teacher skill*, or implementation of evidence-based reading instruction, likely requires ongoing, in-building, professional support and additional research on the active ingredients of effective professional development (Desimone, 2009).

While Desimone (2009) does not specifically differentiate teacher *knowledge* from teacher *skill*, in the context of this research the distinction is critical. Teacher conceptual content-based knowledge of effective explicit instruction is separate from a teacher's skill-based procedural knowledge necessary to carry out effective explicit instruction in her classroom. A teacher may have objective knowledge of a concept but that may not translate to the individual being able to teach that content to others (Veal & Makinster, 1999). Additionally, a teacher having knowledge of a specific pedagogical technique (i.e., the importance of modeling) may not directly translate to that individual being able to perform the technique, or procedural skill, as designed (Bloom, Englehart, Furst, Hill & Krathwohl, 1956; Veal & Makinster, 1999). For example, a teacher may understand what phonics instruction is, and the importance of implementing in one's classroom, and still be unable to implement the instruction with fidelity (Moats, 1998). It is not enough to simply be fluent in the content and pedagogical knowledge of early literacy instruction, one must also have the *skill* to carry out the instruction in a classroom environment with the intended fidelity.

Bloom's Taxonomy and Teacher Knowledge

Critical to this research is the distinction between teacher *knowledge* and teacher *skill*. Prior theoretical models for the effectiveness of professional development fail to isolate nuanced differences in teacher conceptual content-based knowledge and teacher procedural skill-based knowledge. Additionally, professional development focused on just content may fail to lead to effective implementation of explicit instruction in contextually relevant classroom settings (Moats, 1988; Desimone, 2009). Bloom and colleagues' (1956) taxonomy of types of knowledge is highly related to the distinction between teacher knowledge and skill, as well as the importance of teacher expertise in both content and pedagogical knowledge.

Bloom's original taxonomy was designed to be cumulative and hierarchal; and also focused on methods for assessing student learning. Bloom and colleagues (1956) note that lower levels of discrete knowledge (i.e., not skill-based procedural knowledge), ranging from recall or recognition of basic facts to content or conceptual knowledge, require less expertise than higher levels of knowledge, such as skill or procedural knowledge, which can range from evaluating others to performing an action. Additional iterations of Bloom's taxonomy to various disciplines also emphasize the distinction between knowledge-based and skill-based learning goals (Bloom et al., 1956).

Knowledge-based goals focus on the basic facts and competencies, while skill-based goals focus on teaching students to perform a specific skill or action (Bloom et al., 1956). Within this knowledge and skill-based distinction, other revisions to Bloom's taxonomy emphasize the difference between conceptual and procedural forms of knowledge (Amer, 2006). Conceptual knowledge focuses on content and may require an individual to recall basic theories or ideas. Alternatively, procedural knowledge focuses on teaching students an action or skill, and at higher levels requires being able to carry out a skill. Procedural skill-based knowledge is not only carrying out an action, but also, at novice levels, being able to recognize a skill when performed by others.

Various types of knowledge are also best assessed with different techniques. While conceptual or content knowledge is assessed through traditional methods, such as a multiple-choice test, skill-based procedural knowledge is better assessed through watching others and evaluation, or performing the task one's self (Bloom et al., 1956). This method for assessing differing forms of knowledge can be extrapolated to any learner, including teachers in professional development. While conceptual content-based knowledge might be easily measured through a multiple choice recognition test, procedural skill-based knowledge is better assessed through evaluation or performance, depending on the learner's level of expertise (Amer, 2006).

Lacking Evidence for the Effectiveness of Professional Development

While the theoretical basis for professional development changing teacher behavior and improving student outcomes might be well reasoned, there is minimal empirical evidence to support this assertion (Desimone & Garet, 2015). There is very little evidence that current professional development efforts increase implementation of evidence-based early literacy instruction (Demonte, 2013; Guskey & Yoon, 2009). And more alarmingly, there is very little evidence for changes in child literacy outcomes despite increases in teacher knowledge about the effectiveness of explicit reading instruction. Demonte (2013, p. 1) laments, “professional development in education has gotten a bad reputation, and for good reason. Everyone on all sides of the education reform and improvement debate agrees that what most teachers receive as professional opportunities to learn are thin, sporadic, and of little use when it comes to improving teaching.” Professional development is criticized as disconnected from teachers’ everyday practice, too generic and unrelated to curriculum, infrequent, short, and episodic; and often delivered by external consultants who conduct no follow-up visits or support (Demonte, 2013).

Explicit and systematic early literacy instruction is critical for teaching diverse learners (Archer & Hughes, 2011; Coyne et al., 2011); however, the ways in which these skills are transmitted to teachers is frequently ineffective (Desimone, 2009; Desimone & Garet, 2015). Teachers not only fail to build critical conceptual background knowledge in these instructional strategies, but they do not develop the *skills* necessary to implement this instruction and change student reading outcomes (Demonte, 2013). Given the lack of empirical evidence for a theoretical model of professional development, minimal change in teacher behavior, and especially a lack of increase in student academic outcomes, professional development appears to be a target of opportunity for applied research.

Due to the strong theoretical and empirical support for explicit early literacy instruction (Archer & Hughes, 2011; Coyne, Kame’enui, & Carnine, 2011; Englemann & Carnine, 1982), a wide variety of professional development practices have targeted encouraging teacher use of these practices (Davis, 2011; Houston, 2015; Moats, 1998; 1999). However, while research and professional development has led to an overall national emphasis on evidence-based explicit early literacy instruction, these instructional practices are not widely adopted. Without wide, high-fidelity implementation, a meaningful increase in student outcomes is unlikely (NAEP, 2017). The lack of change in student outcomes is particularly alarming given the empirical and federal financial educational support targeting evidence-based reading instruction (Gersten et al., 2009). The lack of change in student outcomes may be because current early literacy professional development sessions are brief, one-day exposures to the content that are not directly tied to a teacher's specific curriculum or daily practice, which leads to a lack of sustained, efficacious implementation (Demonte, 2013).

Curriculum-specific early literacy professional development that includes important background knowledge and opportunities for teacher practice, leads to increased use of these strategies in practice (Dissen et al., 2015; Fien et al., 2014, Moats, 1999). However, this form of professional development often occurs within the context of a tightly monitored, randomized-control efficacy trial (Fien et al., 2014). Within this expensive applied research, participation in intervention groups is often incentivized, professional development leaders are experts in early literacy instruction with typically 10-15 years of teaching experience, and professional development includes more than episodic one-day trainings, frequently emphasizing ongoing professional support in the form of instructional coaching (Fien et al., 2015; Dissen et al., 2015).

Within the context of tightly controlled research there *appears* to be positive effects of professional development on teacher implementation and child outcomes, but there is little empirical evidence specifically studying the impact of professional development on teacher instructional behavior (Desimone, 2009). Intervention efficacy trials include professional development and coaching, but these studies are designed to test the impact of an intervention, delivered with high treatment integrity, on student outcomes; not to test the impact of professional development or instructional coaching on teacher behavior (i.e., teacher implementation of the intervention).

Instructional Coaching

In order for professional development to be more effective, it is desirable to combine initial training *with* follow-up coaching support (Denton, Swanson, & Mathes, 2007; Guskey, 2009; Knight, 2009; Reinke, Stormont, Herman, & Newcomer, 2014; Yoon et al., 2007). However, "coaching" can refer to a wide range of behavior, from activities such as observations, feedback, and models to macro-level leadership involving systems-wide data entry or school-wide behavior management (Denton et al., 2007; Knight, 2009; Rock et al., 2014). While coaching is ambiguously defined throughout the literature, there is general agreement that the goal of coaching is "to facilitate the implementation of evidence-based interventions in a contextually appropriate manner" (Garbacz et al., 2015, p. 264). While the use of evidence-based interventions is critical to improving student outcomes, it is the job of the coach to build teacher skills and increase effective implementation. The coaching role is not only powerful, it is critical because evidence-based practices are less valuable to students if teachers cannot implement them with integrity (Harn, Parisi, & Stoolmiller, 2013; Sims & Melcher, 2017).

Knight (2009) presents a model of instructional coaching that highlights the importance observations, models, feedback, practice, and goal setting. Knight (2009, p.

43) operationalizes common instructional coaching activities writing, “instructional coaches spend a great deal of time in classrooms modeling lessons, watching teachers teach, and having conversations.” Knight’s theory of instructional coaching also highlights ongoing practice involving models, role-plays, and immediate corrective feedback. He advocates for repeated reflection and the use of data to guide feedback conversations with goal setting, which is often collected through using “checklists of critical teaching behaviors [that] can help coaches clarify and synthesize their understanding of teaching practices.” (Knight, 2009, p. 44).

The essential components of Knight’s (2009) theory of instructional coaching are represented throughout the literature. Harn and colleagues (2013, p. 5) articulate, “coaches conduct regularly scheduled fidelity observations with follow-up meetings focused on jointly developed goals to support implementation and positive student outcomes.” Similarly, Garbacz et al. (2015) explain that improving teacher implementation may involve more than observation and general feedback, including the use of scripted evidence-based interventions, skill building with multiple practice opportunities or live prompting, and teacher reinforcement. It is evident from these converging representations of Knight’s (2009) model of instructional coaching that effective coaching requires frequent observations, feedback, models, practice, and goal-setting. In this study, the importance of *instructional coaching* with the purpose of increasing teacher implementation of evidence-based early literacy instruction in classroom contexts is examined.

Instructional coaching with modeling and immediate feedback is receiving increasing support within the field of applied behavior analysis (Cooper et al., 2007;

Horner, Jones, & Williams, 1985). Nearly all behavior analytic applied intervention research, aimed at increasing school personnel use of evidence-based practices, includes instructional coaching as a component of professional support (Garbacz et al., 2015; Gilbertson et al., 2007). Additionally, a variety of behavior analysis work on parent-use of function-based interventions for children with developmental delay focuses on coaches delivering immediate performance feedback (Lequia, Machalicek, and Lyons, 2013; Ruppert, Machalicek, Hansen, Raulston, & Frantz, 2016). Cornelius and Nargo (2014) reviewed several single-case studies evaluating the impact of instructional coaching with performance feedback on preservice special education teacher implementation of evidence-based behavioral interventions. They found that teacher fidelity of implementation was increased when coaches delivered immediate performance feedback (Cornelius & Nargo, 2014). Cornelius and Nargo articulate that instructional coaching with performance feedback is typically goal oriented, intended to close the gap between current and desired performance, and provide information to hopefully change current behavior.

Applied behavior analysis research on coaching primarily focuses on the feedback dimension of coaching, which is a necessary but not sufficient component of instructional coaching. And while this empirical behavior analytic work is promising and related to literacy coaching, there is a need for research on other possible active ingredients in instructional coaching such as initial explicit models, type of corrective feedback, frequency of observations, observations forms, and goal setting on teacher instruction.

While there is strong theoretical support for Knight's model instructional coaching, and emerging evidence for its effectiveness in the context of applied behavior analysis, research is needed to investigate the impact of instructional coaching on teacher implementation of evidence-based early literacy instruction (Desimone, 2009; Knight, 2009; Kertlow & Bartholomew, 2010). In particular, it is unclear which components of instructional coaching are the active ingredients of an instructional coaching framework. However, this work must begin by examining components of a conceptual model of effective instructional coaching. This study examines a potentially vital component and first step, modeling.

Explicit Professional Development

Within early literacy professional development, there is strong theoretical and empirical evidence for *what* to teach (i.e., Big 5, NRP, 2001), and *how* teachers should teach (i.e., explicit instruction, Archer & Hughes, 2011; Carnine et al., 2009). However, there is little evidence on *how* to communicate this necessary information and *skills* to educators through professional development. A plausible approach is to employ the same explicit instruction principles that enhance the effectiveness of instruction for students, to enhance the effectiveness of professional development for educators.

When teaching students with evidence-based practices, experts advocate for the use of *clear and concise explanations* of the big ideas in a daily lesson in order to set behavioral expectations and learning goals (Archer & Hughes, 2011). This allows students to know what is coming and what they are expected to learn with minimal teacher talk in order to maximize student engagement. Teachers then immediately provide *models* of what they want students to do, including not only the academic behavior, but also when and how they want them to respond (i.e., choral responding and signaling). After providing models (i.e., I do), students are asked to get involved, providing *opportunities to respond* where students can be accurate and successful. Students are successful when instruction is appropriately *scaffolded*, meaning that teacher support is high when learning a new skill and then systematically faded once learning is demonstrated (Archer & Hughes, 2011; Coyne et al., 2011). Students are given a high number of opportunities to respond throughout this mediated scaffolding. Students are asked to demonstrate the skill or knowledge in prompted steps from the teacher (i.e., We do). Students are asked to independently complete a multistep process only after they are accurate with individual steps. For example, in systematic evidence-based reading instruction, examples are scaffolded as students are initially asked to read sounds in isolation, then blend words, then read words in isolation/lists, and eventually read connected text with known sound-spelling patterns (Fien et al., 2014; Moats, 1998). In blending instruction, teachers often request that students blend with them when learning to hook initial consonant sounds to medial vowels (i.e., /c/ to /a/ in cat). This "We do" scaffold is critical to increasing accuracy in the "You do" stage.

The teacher repeats these 'We do' steps multiple times with varying *examples and non-examples* with increasing difficulty and faded support in order to give students multiple opportunities to respond. The teacher provides immediate *corrective feedback* when necessary. The teacher uses conspicuous strategies, such as *signaling*, which further *scaffolds* instruction and creates *choral responding*, throughout this process in order to maximize opportunities to respond and success for the entire class. Then, when students are highly accurate, the teacher encourages *independent practice* (i.e., You do).

These same principles of explicit instruction might be applied to good effect in professional development (PD) for educators. Professional development organized around these principles may be considered explicit professional development. Explicit professional development includes: (a) teaching the big ideas of good instruction to PD participants, (b) using conspicuous strategies, such as models and guided practice with immediate corrective feedback (c) using mediated scaffolds to fade PD leaders support and increase difficulty of examples (d) selecting meaningful examples and non-examples of instructional delivery, (e) systematically integrating PD participant's background knowledge, and (f) including large numbers of opportunities to respond and review content.

In an early literacy PD on explicit phonics instruction, for example, PD leaders set manageable, meaningful, learning goals for PD participants on instructional routine fidelity, such as learning to appropriately teach children to blend or unitize consonant-vowel-consonant words (i.e., CVC; Cat). First, PD leaders repeatedly model blending instruction to PD participants through live models, where the PD leader acts as the teacher and the PD participants act as students, and/or through watching videos of explicit blending instruction being done with real children. After an initial model, the PD leader reprises the model, pausing to highlight the conspicuous strategies at play, such as brief teacher explanations, scripting, models, and signaling. After providing multiple models of blending instruction (i.e., I Do), the PD leader asks the PD participants to get involved, providing opportunities to respond scaffolded to the PD participants' level of skill. For example, the PD leader might ask PD participants to chorally read the script in an engaging manner while he or she still demonstrates the physical signals, such as tapping or sliding (i.e., We do). This puts some of the teaching behavior on the PD participants, but allows them to focus on performing the script, not the entire teaching behavior. This mediated scaffold allows PD participants to perform portions of the skill with a high degree of accuracy and receive immediate corrective feedback from the PD leader when necessary. After multiple 'We do' opportunities with increasing difficulty (i.e., more difficult words to blend or error correct) and a high degree of PD participant accuracy, the PD leader encourages PD participants to independently practice the entire blending instruction routine with peer partners ('You do'). The PD leader provides immediate corrective feedback, which may include repetition of models, when necessary (i.e., "Remember, wait two full seconds for think time before signaling for a response"). This independent practice, or You do step, replicates aspects of instructional coaching, where a coach provides corrective feedback to a teacher as he or she teaches his or her students to read in a classroom context.

One potentially pivotal component of explicit professional development is modeling. While an examination of the entire explicit professional development package is important, it is unclear which individual components or ingredients within this conceptual model of professional development most impact teacher implementation of evidence-based early literacy instruction. Modeling may be a critical feature of explicit professional development and effective instructional coaching. The current research seeks to examine the active ingredient of modeling, a component potentially important in both explicit professional development and theory-driven effective instructional coaching.

While modeling is often discussed within instructional theory, it is critical to define what one means by modeling within the context of explicit professional development. Related to the field of applied behavior analysis, modeling is used to demonstrate a desired behavior to the learner (Cooper et al., 2007). Cooper and colleagues (2007, p. 402) draw on a helpful sports analogy when describing this instructional technique, "modeling is an easy, practical, and successful way for a coach to show a player an appropriate form of shooting a basketball through a hoop." Akin to a coach showing a player how to shoot, a teacher can show a student how to blend a decodable word. In turn, an instructional coach can show a teacher how to teach blending to a student by modeling the skill. Thus, with tongue in cheek, instructional coaching may involve *models of modeling*.

Explicit Modeling

Archer and Hughes (2011) describe an approach to modeling which I will refer to as *Explicit Modeling.* While Archer and Hughes (2011) articulate modeling as an instructional delivery technique for teachers to use with their students, I will describe this technique as it could be employed by PD leaders with PD participants. Explicit modeling includes an example of the instructional behavior at the appropriate pace, then a reprise of the model of the instructional behavior at a slower pace with a verbal description of the critical teaching behaviors, followed by opportunities for professional development participants to become involved in the model, and finally a repeated model of the instructional behavior at the appropriate pace (Archer & Hughes, 2011; Dissen et al., 2015).

Archer and Hughes (2011, p. 29) note that with children, the "best way to begin instruction is to show students what they are supposed to do." Archer and Hughes emphasize that good models include (a) clear, consistent, and concise language, (b) several demonstrations of the behavior, and (c) involve students (i.e., incorporate student responding) throughout the demonstration. Therefore, with PD participants, explicit modeling includes a demonstration of the skill at the target rate, followed by a clear and concise description of what is being done (i.e., "I am providing think-time for my students by waiting two-seconds to tap, or signally for a response."), and then including PD participant involvement in the multiple examples (i.e., having PD participants read the script while the PD leader signals, or vice versa) (Archer & Hughes, 2011).

For example, many direct instruction early literacy programs include a signal when a student is to respond. An explicit model of *how* to signal in word reading routines would include an example of the signaling procedure for word reading at appropriate instructional pace (i.e., the slide or tap for the first row of 5-6 words with appropriate scripted language and think time), a second model of the behavior slowed down with verbal description of behavior and rationale (i.e., "Watch as I touch to the left of the word. That is my focus. Then I wait two seconds. That is my think time. Then I slide my finger. That is the signal for students to respond."). Then the professional development leader involves participants in the examples (e.g., "Now you read the scripted language as I demonstrate the signal slide"). Participants chorally script while leader shows the target behavior. Alternatively, the PD leader might articulate, "Now you practice sliding your finger and read the script. I will be your student." Participants chorally read the script and signal on their example page with the professional development leader playing the role of student. Then the professional development leader would conclude the modeling portion of the professional development by repeating the model at appropriate instructional pace (i.e., "Watch again as I model signaling for word reading.") before having participants engage in guided practice. Inherent in the PD leader providing explicit modeling to PD participants is (a) a high number of opportunities to respond, (b) using examples with increasing complexity or difficulty, and (c) faded PD leader support as PD participants display a high degree of accuracy (Archer & Hughes, 2011). When PD participants are successful throughout "We do" examples, PD leaders encourage independent practice ("You do").

Theory of Change for Explicit Professional Development and Explicit Modeling

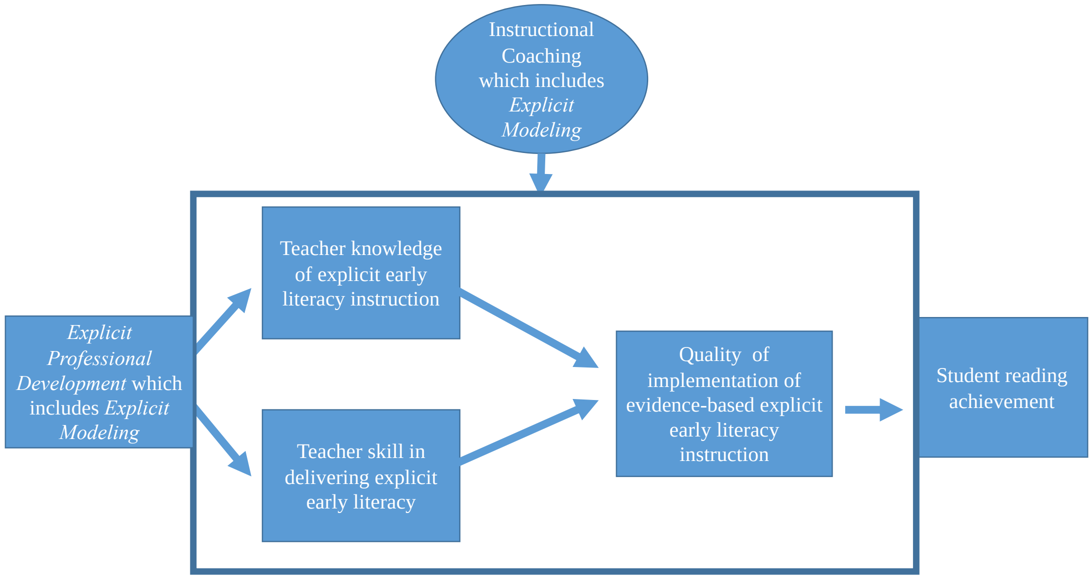


Figure 1. Theory of change for the impact of Explicit Professional Development and Explicit Modeling on teacher and student outcomes.

Figure 1 represents my theory for connecting explicit professional development and explicit modeling to teacher knowledge, skill, and contextual classroom implementation of evidence-based reading instruction to change student outcomes. I hypothesize that effective teacher implementation of evidence-based explicit early literacy instruction will have a direct impact on student reading achievement. There is ample empirical evidence to support this assertion (e.g., Gersten et al., 2009).

Additionally, I hypothesize that teacher knowledge of explicit instruction, and skills in implementing explicit reading instruction, will each have an indirect impact on student reading achievement via the direct impact on teacher instructional implementation. I hypothesize that both are required for implementation. I also think this relationship will be bidirectional, as increases in effective implementation in real classrooms will build teacher understanding and skills in delivering evidence-based explicit literacy instruction. Substantial theory and assumptions support these steps in the model, as professional development is built entirely on the premise that it will improve teachers' teaching. (Garbacz et al., 2015; Knight, 2009). Unfortunately, there is limited empirical evidence to support the relationship between professional development and increases in teacher skill in implementing instruction in classrooms.

Importantly, instructional coaching is included in this model, as it includes explicit modeling as a necessary ongoing support for translating teacher knowledge and skill to effective implementation of evidence-based reading instruction in classroom settings. Instructional coaching is essentially a continuation of the I do, we do, you do sequence for teachers, with mediated scaffolding, prompts and corrective feedback, within a live classroom environment.

Finally, I hypothesize that explicit professional development will have an indirect impact on teacher contextually-relevant classroom implementation of evidence-based reading instruction via the direct impact on teacher knowledge and teacher skill. This study specifically aims to examine the active ingredient of explicit modeling, present within both explicit professional development and instructional coaching, on: (a) teacher procedural skill-based knowledge of explicit early literacy instruction (initial teacher skill), and (b) teacher conceptual knowledge of explicit early literacy content and pedagogy (teacher knowledge). Explicit modeling was selected as the alterable independent variable because of its potentially critical role in professional development, instructional coaching and corrective feedback for adults; and the use of explicit modeling in all explicit instruction techniques for teaching children, including early literacy instruction.

Research Aims

This project examined the impact of explicit modeling, a potential active ingredient of both explicit professional development and instructional coaching, on preservice teacher knowledge of explicit early literacy instruction. This dissertation work focuses on teacher knowledge of explicit early literacy instruction, which includes both content, conceptual knowledge-based goals and pedagogical, procedural skill-based goals. This integration of a complex dependent variable and outcome of interest calls for a nuanced methodology to measure teacher knowledge. Additional information on the various measures for teacher knowledge will be provided in the method section, however, understanding the differing forms of taxonomies of teacher knowledge (Amer, 2009; Bloom et al., 1956) is critical to understanding the theory of change for explicit modeling on teacher knowledge and related research questions.

Participant acceptability of professional development content was also measured in order to understand initial teacher attitudes towards this PD design and format (See Appendix B; Lyon, Stirman, Kerns, & Burns, 2011). However, a rigorous usability trial is beyond the scope of this current research.

Research Questions

(1) Does explicit modeling affect teacher skill-based procedural knowledge of explicit early literacy instruction?

(2) Does explicit modeling affect teacher conceptual content-based knowledge of explicit early literacy pedagogy?

CHAPTER II

Empirical research on the effectiveness of instructional coaching on increasing teacher use of explicit early literacy instruction is sparse (Lignugaris-Kraft & Marchand-Martella, 1993); however, investigations into factors that impact teacher use of a variety of evidence-based practices continues to grow (Kertlow & Bartholomew, 2010). Coaching is pervasive throughout the education intervention efficacy and effectiveness literature with scientists investigating the impact of coaching on both behavioral and academic interventions in contextually-appropriate school settings (Sims & Mechler, 2017). However, despite this increased interest in coaching to sustain evidence-based intervention, coaching continues to be ambiguously defined, often conflated with initial professional development; and empirically examined as a component of an implementation 'intervention' package, not as the primary or distinct independent variable (Desimone, 2009; Gallucci et al., 2012; Garbacz et al., 2015; Purdy, 2017; Rush & Sheldon, 2008). When coaching is empirically examined as the primary independent variable, it includes a variety of procedures such as repeated observations, feedback with explicit modeling, and goal setting (Kertlow & Bartholomew, 2010), which makes it difficult to discern the active ingredients in coaching packages. The current study attempts to narrow this focus and examine explicit modeling as an active ingredient in both initial professional development and instructional coaching.

Modeling in Early Literacy Instructional Coaching

While discussions of the importance of literacy coaching continue, little empirical evidence exists to examine the effectiveness of modeling as a theoretically-supported instructional coaching practice (Brownell et al., 2017; Kertlow & Bartholomew, 2010;

Kretlow, Cooke, & Wood, 2012). In a meta-analysis of coaching packages to increase a variety of evidence-based practices, Kertlow & Bartholomew (2010) review components of efficacious coaching packages that increase teacher use of evidence-based practices, and in some, increase positive student outcomes. Aligned with prior literature, Kertlow & Bartholomew (2010) again emphasize the need for explicit models in initial training, multiple observations of teachers in practice, feedback that includes explicit models, procedural integrity forms, and reflection with goal-setting. Specifically, when discussing modeling, Kertlow & Bartholomew (2010, p. 281) write, "if a teacher tries a new practice but makes some errors, the coach might model the strategy correctly and then prompt the teacher to try it again." In modeling, "coaches frequently provided modeling of specific instructional skills, followed by immediate opportunities for teachers to practice the skill again" and "a majority of studies identified a few components of instruction as salient: (a) presentation of new skills, including modeling and systematic prompting; (b) guided practice, including multiple opportunities to respond; and (c) active engagement" (Kertlow & Bartholomew, 2010, p. 292-293). While Kertlow & Bartholomew's (2010) meta-analysis reviews the importance of explicit modeling in professional development and instructional coaching package, it does *not* provide empirical evidence to support explicit modeling as an isolated active ingredient in changing teacher content knowledge or implementation.

Additionally, Brownell et al. (2017) investigated the impact of 'Literacy Learning Cohorts' on in-service teachers' content knowledge of early literacy instruction. However, these professional learning communities focused on *what* to teach, not pedagogical techniques of *how* to teach (Foorman & Moats, 2004). Brownell and colleagues (2017), pulling from Desimone (2009), emphasized components of initial professional development training such as content-focus, active learning opportunities, collective participation, duration, and coherence. Although Brownell et al. (2017, p. 145) provided limited empirical evidence for instructional coaching components, when discussing active learning opportunities, they emphasized modeling for teachers to help them "understand what effective practice looked like using video models or in classroom models." They also emphasized modeling in collective participation in initial training noting the importance of "observations of effective instruction…and feedback on his or her instruction" (Brownell et al., 2017, p. 146). While this study did *not* provide empirical evidence for the effectiveness of explicit modeling on teacher implementation of early literacy instruction, it did examine skill-based procedural knowledge as a step toward implementation.

Modeling in Applied Behavior Analysis Coaching

Unlike the conceptual papers reviewed in literacy coaching, applied behavior analytic intervention research and practice *has* empirically investigated the role of modeling in teaching adults to implement function-based interventions for students with challenging behavior (Catania et al., 2009; Macurik et al., 2008; Vladescu et al., 2012). Catania and colleagues (2009) investigated the impact of video modeling with voiceover instruction on interventionists' implementation of discrete trial training (DTT) with students with developmental disabilities. The authors pulled from previous research on the use of video modeling to teach individuals to conduct functional analysis and describe the benefits of the procedures as, "video modeling is a tool used to model skills the viewer is expected to imitate and exhibit in the appropriate situations" (Catania et al., 2009). Use of video modeling in this capacity has numerous benefits, including demonstration of desired skills in relevant contexts, use of multiple stimulus and response exemplars, and standardization of the presentation of training that permits consistency" (Catania et al., 2009, p. 388). Furthermore, through single-case design and visual analysis, Catania et al. (2009) documented that demonstrations of DTT in videos results in staff's rapid acquisition of procedural integrity of DTT with clients in practice. Vladescu and colleagues (2012) also documented the effectiveness of video modeling with voiceover instruction in increasing staff's fidelity of implementation of DTT in practice. However, Vladescu et al. (2012) expanded on Catania et al.'s (2009) work by also demonstrating an increase in student outcomes when interventionists treatment integrity of DTT increased, demonstrating multiple functional relations.

Beyond specific studies of video modeling, the behavior analytic field also provides empirical evidence to support the use of modeling in immediate feedback to interventionists implementing function-based interventions (Cornelius & Nargo, 2014; Schles & Robertson, 2017). In Schles and Robertson (2017) meta-analysis, they argue that performance feedback, delivered through coaching, is essentially an evidence-based practice for teachers to implement evidence-based practices with students. "Understanding pedagogy is important for teachers to effectively teach content to students; in essence, how to teach is just as, if not more important than, what to teach" (Schles & Robertson, 2017, p. 2). Additionally, Cornelius and Nargo, (2014) meta-analysis emphasized that performance feedback must be specific and corrective; and that corrective feedback is essentially only possible with immediate models or demonstrations of the appropriate teaching behavior.

Theoretical and conceptual conversations continue about the importance of explicit modeling in instructional coaching, but limited empirical evidence exists to support this assertion. The field of applied behavior analysis provides strong empirical evidence for the importance of follow-up coaching and explicit models in immediate feedback on interventionists' implementation of function-based interventions. There is a need for empirical research on the use of explicit modeling present in early literacy professional development and instructional coaching on teacher knowledge and delivery of evidence-based explicit early literacy instruction.

CHAPTER III

METHOD

The purpose of this study was to examine the impact of explicit modeling on preservice educator's conceptual and procedural knowledge of explicit early literacy instruction. Explicit modeling was examined in an online module intervention context, where participants were randomized to condition (e.g. explicit modeling/treatment or comparison module). The impact of explicit modeling on preservice educator's procedural skill-based knowledge was measured by examining participants pre and post module evaluation ratings of explicit early literacy instruction. These evaluation ratings were compared to a meaningful criterion, a mean of expert ratings. The mean Euclidean distance score from expert at pre and posttest was calculated for each experimental group. The impact of explicit modeling on preservice educator's conceptual content-based knowledge was measured by examining post-module number of correct responses to a multiple-choice quiz on explicit early literacy content covered in the modules. Participant acceptability of modules was also assessed. Description of project design, participants, modules, measures, and procedures are summarized below.

Project Design

The current study examined the impact of explicit modeling on preservice educator's conceptual and procedural knowledge of explicit early literacy instruction. Explicit modeling was examined using a pretest-posttest control group design (Campbell & Stanley, 1963). While this design provides strong control of threats to internal validity, it fails to control for nested data. However, this project was not designed to examine the impact of nested data, as the sample size for each program were modest, not all participants reported their university program or licensure affiliation, and there were not enough participants in each condition to use a multilevel model analytic approach. Data were collected from participants at multiple colleges of education in the Pacific Northwest. Participants were in both special education and general education licensure programs. This design did not examine the differential impact of training program on teacher knowledge of early literacy instruction.

Participants and Setting

Seventy-three preservice education students were included in this study. All participants were graduate or undergraduates enrolled in a general education or special education licensure program at accredited colleges of education in the Pacific Northwest. Sixty participants were female, 11 were male, and two were non-binary. Thirty participants were graduate students and 43 were undergraduate students. Not all participants reported their university affiliation or licensure program, so some licensure emphasis is unknown. However, for those participants who did report their program, and/or major, there were 30 participants in a general education licensure program, nine participants in a special education licensure programs, and six participants in a combined elementary education and special education licensure program. Due to the small sample size, data was not analyzed based on participant's status as graduate or undergraduate, nor program affiliation as special education, general education, or dual licensure.

Participants background knowledge in explicit early literacy instruction was examined by asking participants about the number of reading method courses they have taken, their prior experience teaching in schools, and their opinions on the best way to teach students to read. These demographic questions were adapted from prior research examining teacher's content knowledge in early literacy instruction (Appendix H, Foorman & Moats, 2004; Nelson-Walker et al., 2013). Forty-two participants had taken no reading courses prior to participating in this research. Sixteen participants had taken one reading course, six participants had taken two reading courses, and eight participants had taken three or more courses prior to participating in this research. Additionally, fifty-five participants had no experience teaching prior to participating in this research. Seventeen participants reported they did have experience teaching prior to participating in this research. Ten participants indicated that they were currently working in a school as an instructional assistant, and one participant indicated that she was currently working as a Title 1 certified teacher.

Finally, in order to indirectly measure participant's pedagogical approach to teaching reading, participants were asked to answer the following multiple choice question: "What is the best way to teach reading?" (a) Child led instruction, (b) Child led cooperative instruction, (c) Teacher led explicit instruction, or (d) Teacher led cooperative learning. The following was reported: 34 participants indicated teacher led cooperative learning was the best way to teach reading, 14 participants reported teacher led explicit instruction was the best way to teach reading, 13 participants indicated child led cooperative instruction was the best way to teach reading, and 3 indicated child led instruction was the best way to teach reading.

The information available on background knowledge and pedagogical approach to teaching indicate that the study sample was a relatively naive group of preservice educators with limited background knowledge on evidence-based approaches to teaching reading. Approximately one-third of the study sample had experience teaching in schools prior to participating in this research, but very few had taught as licensed classroom teachers, and only two participants indicated they focused on Title 1 or reading intervention instruction. Furthermore, only 16 participants selected teacher led explicit instruction as the best way to teach reading, indicating an overall lack of background knowledge in evidence-based approaches to explicit early literacy instruction.

Comparison Professional Development Module

Both professional development modules included content on evidence-based explicit instruction for K-1st grade students. The comparison professional development module focused on teacher explanations, the importance of providing models to students, describing signaling, pacing, correcting student errors, and checks for understanding in evidence-based reading instruction. However, the comparison module did *not* include explicit models of instruction to teachers (i.e., demonstrations of instruction). The comparison module included written descriptions of blending pedagogical techniques, and a written description of what the teacher action should look like, but there were no video models, and especially no explicit models. Instead, this module included slides with auditory and visual lecture content, using Articulate, about early literacy instruction without demonstrations of the target teaching behavior (see Appendix C). The comparison module also included content on phonological awareness, the alphabetic principle, fluency, vocabulary, and comprehension. While this content is related to the selection of appropriate materials for teaching reading, it does not focus on *pedagogy*, the primary variable of interest in this study. This content allowed the comparison module to be a similar length to the explicit modeling module, despite the lack of teacher demonstrations. The comparison module allowed us to examine the impact of explicit modeling on preservice teacher knowledge of explicit early literacy instruction. The module lasted approximately 35-40 minutes.

Explicit Modeling Professional Development Module

The explicit modeling professional development module included all pedagogical content included in the comparison module (i.e., not extraneous content on the 'Big Five'), with the *addition* of explicit modeling. The module began with identical content and audio lecture overview of teacher explanations, providing models to students, signaling, pacing, correcting student errors, and checking for understanding within evidence-based early literacy instruction delivered in the comparison PD module (see Appendix D). The lecture content was then followed with an explicit model, including demonstrations of the reading instruction by the principal investigator. The explicit modeling included (a) an example of the instructional behavior at the appropriate pace, (b) a reprise of the model of the instructional behavior at a slower pace with a verbal description of the critical teaching behaviors, (c) opportunities for professional development participants to become involved in the model, and (d) a repeated model of the instructional behavior at the appropriate pace (Archer & Hughes, 2011; Dissen et al., 2015).

For example, explicit modeling for signaling began with the PD leader modeling evidence-based instruction in real time with participants as students for approximately 20 seconds (8 stimulus words). Next, the PD leader reprised the instructional model at a slower pace with concise verbal description (i.e., "Watch as I touch to the left of the word. That is my focus. Then I wait two seconds. That is my think time. Then I slide my finger. That is the signal for students to respond."). The module then encouraged participant involvement by pausing and asking participants to answer questions or identify specific components of the signal (e.g., “Where should the teachers finger be during the focus?”; “How long is wait time in this routine?”). This gave study participants a chance to get involved in the model and provided an opportunity to respond on this newly learned content. Study participants were also asked to practice the physical teaching behavior and scripting throughout the examples, such as tapping on the table in front of them to get used to the rhythmic pace of signaling. The explicit modeling signaling portion of the module content then concluded with a reprisal in real time of a signal model.

The prior paragraph provided an example of the detailed components of explicit modeling used for each explicit instruction element in the treatment module. The level of explicit modeling described for signaling, in the previous paragraph, was used for all seven explicit instruction elements. The entire module also lasted approximately 40-45 minutes. Module duration estimates were calculated based on pilot data collected in July 2018. Both module conditions (i.e., comparison and explicit modeling) were piloted with a group of 15 graduate students naive to study purpose and module condition. Pilot data showed that the initial modules lasted 65-70 minutes. Due to concerns about participant drop out due to lengthy duration, the modules were modified by decreasing some examples and practice opportunities. The final modules were designed to last 35-45 minutes.

Measures

The dependent variable in this study is teacher knowledge of evidence-based explicit early literacy instruction. This dependent variable is broken up into two relevant knowledge variables: (a) skill-based procedural knowledge, specifically the ability to recognize effective early literacy pedagogy when implemented by someone else; and (b) conceptual or content-based knowledge of effective early literacy pedagogy. The primary dependent variable in this study is procedural knowledge of explicit early literacy instruction. The secondary dependent variable is the content knowledge of explicit early literacy instruction These differing forms of knowledge will be measured using different methodological techniques.

Skill-Based Procedural Knowledge

The primary dependent variable in this study is the correspondence of a preservice educator's evaluation of an interventionist's implementation of explicit early literacy instruction with expert evaluation. Recognizing the skill or action in another is an initial step in the development of skill-based procedural knowledge of explicit early literacy instruction. Skill-based procedural knowledge is best measured through a variety of untraditional methods, such as evaluation or observation, rather than traditional methods such as a multiple-choice test requiring only basic recall or recognition of facts (Bloom et al., 1956). Participants in this study were novice preservice educators with limited background knowledge on early literacy instruction. While a brief 45-minute professional development module does not adequately prepare a novice teacher to implement early literacy instruction, the module is intended to begin the development of skill-based procedural knowledge. Procedural knowledge begins by allowing the learner to recognize the skill or action in another individual, before increasing to a higher level of procedural knowledge where the learner is the implementer (Amer, 2006). The primary dependent variable of preservice educator novice skill-based procedural knowledge was measured by having participants evaluate an interventionist's implementation of explicit early literacy instruction.

The reading instruction videos rated in both pre and posttest were roughly equivalent, as rated by instructional experts, and were counterbalanced in order to control for video and order effects. The videos were designed to illustrate moderate fidelity of implementation of explicit early literacy instruction. Moderate fidelity of implementation of reading instruction was selected in order to limit both ceiling and floor effects. It is hypothesized that even with limited background knowledge in evidence-based reading instruction, participants were likely to be able to identify strong and weak instruction based on other indicators of both child and teacher behavior (e.g. student accuracy and engagement). Therefore, there was an attempt to limit the impact of participant background knowledge in general components of engaging instruction on pretest and posttest ratings.

Additionally, it is hypothesized that moderate fidelity of implementation videos gave us the best chance of detecting an effect of explicit modeling. Participants generally had limited background knowledge in early literacy explicit reading instruction. At pretest, participants were likely to view even moderate implementation as quite good, but be unclear on why. However, at posttest, participants exposed to the comparison professional development module condition may recognize many of the core components of explicit instruction and rate the moderate instruction as better. In contrast, participants exposed to the explicit modeling professional development module condition would hopefully recognize that the moderate implementation includes adequate explicit instruction design elements, but that the video incorporates only moderate quality of implementation leading to a decrease in rating. It is hypothesized that this comparison of pretest and posttest ratings by study condition would provide the best estimate of the effects of explicit modeling.

Expert ratings of instruction served as the desired competency, or criterion for skill-based procedural knowledge. The dependent variable is an examination of the extent to which the participant's evaluation/rating of reading instruction at pre and posttest correspond with expert evaluation/ratings of reading instruction. The extent of alignment with expert was measured by calculating the Euclidian distance score between each participant's rating and the mean expert rating. Mean expert ratings for the researcher-adapted tool were calculated by taking the average rating on each individual component (e.g. explanations, models, etc.; see Appendix E) of two expert raters. The Euclidean distance score was then calculated by taking the square-root of the sum of individual distance ratings squared for pre and post-test. For example, a participant's rating of an interventionist's use of appropriate pacing is directly compared to an expert's rating of an interventionist's use of appropriate pacing. The difference is then the distance between these two raters ratings of pacing. In order to account for negative distance scores (i.e., participant gives pacing a 2 and expert gives pacing a 3, results in 2-3 = -1), the distance score for each item is then squared ($-1^2 = 1$) before being summed with other sub-items (i.e., pacing distance + signaling distance). The square root of the sum of squared distance scores for each sub-item on the researcher-adapted tool is the total Euclidean distance score for that individual participant. The Euclidean distance score for participants in each module condition, treatment and comparison, was the dependent variable for the analysis (see Appendix G).

A pretest measure was used to evaluate the impact of professional development module condition on participants change in alignment with expert ratings. For example, a participant in the experimental explicit modeling professional development condition at pretest may look nothing like an expert, with ratings far away from the desired expert competency. However, at posttest, I hypothesized the participant would look more like the expert, with ratings of moderate quality instruction more closely aligned with experts.

Participants rated videos of explicit reading instruction using adapted relevant components of the Quality Explicit Instruction (QEI; Doabler et al., 2014; Nelson-Walker et al., 2013) and Ratings of Classroom Management and Instructional Support scales (RCMIS, Doabler & Nelson-Walker, 2009) (see Appendix E for experimenter created rating form). Strong inter-observer reliability data supports the internal consistency and stability of items on the QEI as a strong measure of quality of explicit instruction (intraclass correlation coefficient (ICC) = .86)) (Nelson-Walker et al., 2013). The internal consistency of the RCMIS is high with a Cronbach's alpha of .92 (Doabler et al., 2014). The RCMIS is also a relatively stable measure of instructional quality (ICC = .33) (Doabler et al., 2014). Finally, Smith et al. (2016) reports moderate predictive validity of the RCMIS for reading and math measures ranging from .26 to.42. However, there is unknown reliability and validity of the experimenter adapted rating of evidence-based reading instruction tool.

Conceptual Content-Based Knowledge

In addition to skill-based procedural knowledge (i.e., the correspondence of preservice educator's evaluation of an interventionist's implementation of explicit early literacy instruction with expert evaluation), participants' conceptual content-based knowledge of explicit early literacy pedagogy was also measured. Aligned with Bloom's (1956) initial conceptualization of knowledge hierarchies and evaluation methods, this was measured with a traditional multiple-choice format. Conceptual content-based knowledge of explicit early literacy instruction was measured using an experimenter-created nine question quiz at the conclusion of the module (see Appendix I). This evaluation tool required participants to recognize and recall key evidence-based early literacy pedagogy content presented throughout the module. Initial reliability statistics, based on the 56 person analysis sample, yielded a Cronbach's alpha of .62. There is unknown validity of this experimenter created tool.

Participant Adherence

While formal direct observations of fidelity of implementation of the professional development module were not necessary because the independent variable was delivered with 100% fidelity through the online module, participant adherence data was examined. The initial design for measurement of participant adherence data was to examine pages viewed and duration of time spent viewing the module. However, due to limited funding, official learning management software (LMS) was not obtained or used to distribute the module. Therefore, pages viewed and participant duration data were not available. However, participants were asked to self-report the time they spent viewing the module. Modules were designed to last approximately 35-45 minutes based on user-interface. Self-report of time spent on modules ranged from 20 to 60 minutes. The mean self-report of time spent on the module was 45 minutes with a standard deviation of 16 minutes. Forty participants indicated it took them between 35-45 minutes to complete the module. Additionally, four participants indicated it took them 60 minutes to complete the module, and 17 participants indicated it took them 20-30 minutes to complete the module. This limited self-report adherence information indicates that all participants engaged with the module for a minimum of 20 minutes, and a majority of participants participated in the module for the designed duration.

Acceptability of Module

While a full usability trial was outside the scope of this research project, participant acceptability of the professional development modules was also measured. The Training / Practice Acceptability Scale (see Appendix A; Lyon et al., 2011) was used to measure participant acceptability. While Lyon and colleagues (2011) initially developed this scale to evaluate training in therapeutic techniques, the scale can be used to evaluate acceptability on training of a variety of evidence-based practices.

Procedures

Participants completed pretest ratings, professional development modules, and posttest ratings via an online format using Articulate and Qualtrics. Participants were directed to complete all stages of this experiment in one sitting lasting approximately 35-45 minutes. Participants often completed the module as an at-home assignment for course credit. However, participation in the research portion of the module was entirely voluntary.

Pretest

After consenting to participate, preservice educators began participation by completing a pretest rating of an interventionist's implementation of explicit early literacy instruction. The pretest video observation lasted approximately 3-minutes. The reading instruction was rated by all participants and two explicit early literacy instruction experts. Ratings were completed using the expert-reviewed researcher created observation tool (see Appendix E).

Professional Development Condition

Participants were randomly assigned to receive either the treatment professional development module with explicit modeling, or the comparison professional development module without explicit video models of the target teaching behavior (see Appendix F for participant assignment and procedures).

Posttest

After completing the professional development module, participants watched another equivalent reading instruction video of an interventionist's moderate implementation of explicit reading instruction. The early literacy instruction was rated by all participants and explicit early literacy instruction experts. Ratings were again completed using the researcher created observation tool (see Appendix E). After completing posttest video ratings, participants took a short nine question examiner-created conceptual knowledge quiz on early literacy content covered in the module. Finally, participants provided training acceptability ratings for the module.

Summary

This study was designed to measure the impact of explicit modeling on preservice educator's conceptual and procedural knowledge of explicit early literacy instruction. This pretest-posttest control group design allowed us to isolate and test explicit modeling as a potential active ingredient of online professional development. An initial step in the development of skill-based procedural knowledge was measured through participant evaluation of an interventionist's early literacy teaching, as compared to an expert benchmark. Conceptual content-based knowledge was measured through a traditional multiple choice test on module content. Participant acceptability of training was also measured through a self-report form. The results and implications of this intervention study are summarized below.

CHAPTER IV

RESULTS

The current study examined the impact of explicit modeling, a hypothesized active ingredient of professional development and instructional coaching, on preservice teacher conceptual and skill-based knowledge of explicit early literacy instruction. This was examined by testing the impact of explicit modeling in an online module on preservice teachers' knowledge. The primary research questions were: (1) Does explicit modeling affect teacher skill-based procedural knowledge of explicit early literacy instruction? (2) Does explicit modeling affect teacher conceptual content-based knowledge of explicit early literacy pedagogy? Additionally, participant acceptability of the training module was examined. Results are summarized below.

Participant Attrition

There were three participant analysis samples for this project: (a) pre and posttest skill-based procedural knowledge, (b) acceptability of module, and (c) conceptual content-based knowledge. All data available for each unique research question (e.g., skill knowledge pre-to-post, acceptability, & conceptual knowledge) were included in the corresponding analytic sample. This created the largest possible sample for analysis. Therefore, there are participants in the pretest-posttest analysis who did not complete the conceptual knowledge quiz or acceptability survey. However, these participant responses were included in the pre and posttest analysis because the analysis does not depend upon participant responses to the knowledge quiz or acceptability survey.

There are two equally plausible explanations for the missing data in each analysis sample. Both modules progressed chronologically from pretest, to informational content, to posttest, to acceptability, to the conceptual knowledge quiz. It is possible that as participants progressed from pretest to knowledge quiz, they simply dropped out of the study by exiting the online module, despite the promise of a financial incentive for completion. If this is the case, attrition for the pre-posttest skill-based knowledge analysis sample is 9%, attrition for the participant acceptability analysis sample is 28%, and attrition for the conceptual content-based knowledge quiz analysis sample is 26%.

Alternatively, it is possible that participants did not dropout of the study by quitting the module, but rather failed to correctly submit their data and their responses were lost. Each of the assessments were embedded in the Articulate modules with separate Qualtrics links (e.g. pre and posttest, acceptability, and knowledge quiz). This means that as individuals progressed through the module, they were directed to submit their responses via a Qualtrics submission button or arrow before continuing the Articulate module. However, participants may have inadvertently chosen to progress through the Articulate module without clicking the submit button for the Qualtrics survey. If individuals did not submit all of the Qualtrics links, their data would be lost leading to differing analysis sample sizes.

Consistent with the alternative hypothesis, there was initially a high rate of incomplete data during the first month of data collection. To reduce confusion, a screenshot was added detailing how to accurately submit responses to receive the financial incentive (i.e., Amazon gift card email submission) (see Appendix J). It is unclear if the additional instructions resulted in increases in complete responses. Future research integrating Articulate modules and Qualtrics surveys may consider clarifying data submission under one procedure. Additionally, it would be helpful if participant access to the financial incentive could be linked to complete submissions.

Missing Data

Eighty-three individuals initially entered the module; however, only 73 of the 83 participants submitted any data or appeared to engage the module in any meaningful way. The ten participants who did not engage in the module were not included in the sample and were not considered participants in the study. Seventy-three participants engaged in the modules in a meaningful way and served as the analysis sample for this study. These 73 participants make up the three analysis samples: (a) skill-based knowledge pre to posttest (n = 66), (b) acceptability (n = 54-56), and (c) conceptual content-based knowledge (n = 54). The impact of missing data on studying findings is discussed for each individual analytic sample.

The primary analysis of preservice teachers' skill-based procedural knowledge was conducted with 66 of the 73 participants in the study sample. Sixty-six participants had complete data for both the pre and posttest procedural knowledge variable. Seven participants in the 73 person sample only provided pretest ratings. However, there was no significant difference in pretest ratings between those participants who provided pre and posttest ratings (n = 66, M = 4.98, SD = 1.15) and those participants who provided only pretest ratings (n = 7, M = 5.06, SD = 0.55), t(12.61) = -0.27, p =.790. While more participants in the explicit module condition (11%) failed to complete posttest ratings than participants in the comparison condition (7%), the difference was not significant, χ^2 = .314, p = .576. Thus, the data appear to be missing at random.

The participant acceptability analysis was conducted with 54 to 56 of the 73 participants in the study sample with complete data for *any* module acceptability questions. There was no statistically significant difference in pretest ratings between those participants who provided both pretest and module acceptability ratings (n = 56, M = 5.03, SD = 1.05) and those participants who provided only pretest ratings (n = 17, M = 4.85, SD = 1.31), $t(22.55) = -0.530$, p =.601. A larger number of participants in the explicit module condition (26%) than the comparison condition (18%) failed to complete module acceptability ratings, but the difference was not significant, $\chi^2 = .750$, $p = .387$. Again, the data appears to be missing at random.

The conceptual knowledge quiz analysis was conducted with 54 of the 73 participants in the study sample with complete data for the conceptual knowledge variable. There was no statistically significant difference in pretest ratings between those participants who provided both pretest and conceptual knowledge data (n = 54, M = 4.99, SD = 1.12) and those participants who provided only pretest ratings (n = 19, M = 5.00, SD = 1.10), $t(31.95) = -0.014$, p =.989. A large number of participants in the explicit module condition (24%) and comparison condition (29%) failed to complete the conceptual knowledge variable, but there was no statistically significant difference between module conditions, $\chi^2 = 0.153$, $p = .696$. The data again appears to be is missing at random.

Skill-Based Procedural Knowledge/ Primary Analysis

To evaluate my primary research question on skill-based procedural knowledge, data were analyzed using a two-way, mixed-effects analysis of variance (ANOVA). The between-subjects independent variable was experimental condition with two levels, explicit modeling professional development condition (treatment) and comparison professional development condition (comparison). The within-subjects independent variable was time with two levels, pretest and posttest.

The quantitative dependent variable is the extent to which participants' implementation ratings aligned with expert ratings using the researcher-created observation tool (see Appendix E). The distance of participant ratings from expert ratings at pre and posttest was determined by calculating a Euclidean distance score. Expert ratings for the researcher-adapted tool were calculated by taking the average rating on each individual component (e.g. explanations, models, etc.; see Appendix E) of two expert raters. The Euclidean distance score was then calculated by taking the square-root of the sum of individual distance ratings squared for pre and post-test. These total Euclidean distance scores were the dependent variable for the analysis (see Appendix G).

The two-way, mixed-effects ANOVA was conducted in SPSS using the general linear model repeated measures procedure. The researchers examined descriptive statistics, effect sizes, and compared means for both main effects and the interaction effect. The effect of interest is the time-by-condition interaction effect.

Descriptive statistics for the primary analysis of participant rating of explicit early literacy instruction by time and treatment condition interaction effect are presented in Table 1. As noted in the method section, the primary analysis sample included 66 participants with complete pre and posttest data from the 73-person initial study sample. As discussed in the method section, data appeared to be missing at random.

To provide context for these Euclidian Distance (ED) scores, the ED between the two experts who comprised our comparison benchmark were examined. Experts were

2.12 ED points apart on the videos used for pre and posttest ratings. This means that even experts had somewhat different perceptions on the experimenter-adapted QEI rating tool. However, the mean ED score for the comparison group and the treatment/explicit group were approximately 5.00 ED points away from the benchmark comparison at pre and posttest and were substantially farther away from the expert benchmarks then the two experts were from each other.

Table 1

Descriptive Statistics for Euclidean Distance Rating by Experimental Condition and Time

	Euclidean distance pretest			Euclidean distance posttest		
Experimental condition	*n*	*M*	*SD*	*n*	*M*	*SD*
Comparison	26	5.08	1.12	26	5.46	1.66
Explicit	40	4.93	1.18	40	4.89	1.28
Total	66	4.99	1.15	66	5.12	1.46

Note. The distribution of Euclidean Distance (ED) ratings was roughly symmetrical and unimodal.

The bivariate correlation between pre and posttest Euclidian Distance (ED) scores for the whole analysis sample, and by module condition (treatment and comparison) were also examined. Results of the Pearson correlation indicated that there was a significant positive correlation between pretest and posttest ED scores for the entire analysis sample, $r = .424$, $p < .001$. The Pearson correlation between pre and posttest ED scores for the treatment/explicit modeling condition and the comparison condition were also examined. Results of the Pearson correlation for the explicit modeling condition indicated that there was a significant positive correlation between pretest and posttest ED scores, $r = .461$, p

< .01. Results of the Pearson correlation for the comparison condition indicated that there was no significant correlation between pretest and posttest ED scores, $r = .378$, $p = .057$. Finally, the difference between the ED pre and posttest correlations for the explicit modeling and comparison PD groups were examined. The difference between the correlations was not significant, $z = -0.38$, $p = .704$.

The two-way, mixed-effects analysis of variance results are reported in Table 2. I hypothesized that at posttest participants in the treatment/explicit professional development (PD) condition would have a smaller ED rating score than participants in the comparison condition. I hypothesized that the difference between pretest and posttest ED rating score would be significantly different for the explicit and comparison professional development groups. However, the difference between pretest and posttest ED rating score is not significantly different for the explicit and comparison PD groups, $F(1, 64) = 1.37$, $p = .247$, $\eta_p^2 = .021$. Main effects of experimental condition and time were examined because the interaction effect was not significant. The main effect of experimental condition on ED rating was not significant, $F(1, 64) = 1.72$, $p = .194$, $\eta_p^2 = .026$. Additionally, the main effect of time was not significant, $F(1, 64) = 0.93$, $p = .338$, $\eta_p^2 = .014$.

The presence of explicit modeling in a professional development module did not significantly increase preservice educators' skill-based procedural knowledge of explicit early literacy instruction. Participants in the treatment condition did not align more closely with expert ratings at posttest than those in the comparison condition. Explicit modeling did not appear to affect an individual's evaluation of a teacher's skill in delivering explicit early literacy instruction. My hypothesis that individuals in the treatment condition would look more like experts in their evaluation of a teacher's reading instruction at posttest was not supported. There was no empirical evidence to support the importance of explicit modeling in increasing preservice teacher skill-based procedural knowledge of explicit early literacy instruction.

Table 2

Two-Way, Mixed-Effects Analysis of Variance Summary Table for the Effects of Experimental Condition and Time on Euclidean Distance Rating

Source	*df*	*SS*	*MS*	*F*	*Partial eta squared*
Between subjects					
Experimental condition	1	4.16	4.16	1.72	.026
Error between	64	154.46	2.41		
Within subjects					
Time	1	0.94	0.94	0.93	.014
Time * condition	1	1.38	1.38	1.37	.021
Error within	64	64.70	1.01		
Total	131	71.18			

Conceptual Content-Based Knowledge/ Secondary Analysis

To evaluate the secondary research question on participants' conceptual content-based knowledge, data were analyzed using a one-way, between-subjects analysis of variance (ANOVA). The between-subjects independent variable was experimental condition with two levels, explicit modeling professional development condition (treatment) and comparison professional development condition (comparison).

The quantitative dependent variable was the total number of correct responses to the nine-question experimenter created knowledge quiz (see Appendix I). Scores on the knowledge quiz can range from a minimum 0 correct to a maximum of 9 correct responses.

The one-way, between-subjects ANOVA was conducted in SPSS using the general linear model univariate procedure. The researchers examined descriptive statistics and compared means for the main effect of treatment condition on post-module knowledge of early literacy instruction. Results are depicted below.

Descriptive statistics for the conceptual content-based knowledge analysis are presented in Table 3. As noted in the method section, the conceptual knowledge analysis sample included 56 participants with complete data. As discussed in the method section, data appears to be missing at random.

The one-way, between-subjects effect analysis of variance results are reported in Table 4. I hypothesized that the difference in post-module conceptual knowledge quiz scores would be significantly different for the explicit and comparison professional development groups. We hypothesized that participants in the treatment/explicit professional development (PD) condition would have a higher number of correct responses on the conceptual knowledge quiz than participants in the comparison module. However, the difference in knowledge quiz scores was not significantly different for the explicit and comparison PD groups, $F(1, 52) = 0.231$, $p = .633$, $d = 0.13$.

Table 3

Descriptive Statistics for Conceptual Knowledge by Experimental Condition

	Conceptual knowledge		
Experimental condition	*n*	*M*	*SD*
Comparison	20	7.80	1.67
Explicit	34	8.00	1.35
Total	54	7.93	1.46

Note. Conceptual knowledge score is the sum of correct responses to a nine-question examiner-created quiz based on module content, with possible scores ranging from a minimum 0 correct to a maximum of 9 correct responses.

The conceptual knowledge quiz score is the sum of correct responses to a nine question examiner-created quiz based on module content, with possible scores ranging from a minimum 0 correct to a maximum of 9 correct responses. The conceptual knowledge quiz was only given at posttest. There is no pretest rating of participant conceptual knowledge of explicit early literacy instruction. The comparison condition participant mean score was 7.80 correct responses. The explicit modeling condition participant mean score was 8.00 correct responses. Additionally, comparison participant mean scores ranged from 2-9 correct responses, while the explicit modeling participant scores ranged from 5-9 correct responses. While there was more variability in comparison participant correct responses, creating a larger standard deviation for the comparison condition scores, as compared to the explicit condition scores, this difference was not significant, $F(19, 33) = 0.12$, $p = .731$.

Table 4

One-Way, Between-Subjects Effect Analysis of Variance Summary Table for the Effects of Experimental Condition on Teacher Conceptual Knowledge

Source	*df*	*SS*	*MS*	*F*
Experimental condition	1	0.50	0.50	0.23
Error	52	113.20	2.18	
Total	53	113.70		

In conclusion, there was no significant difference between groups on the conceptual knowledge quiz. This means that participants in the explicit modeling module did not outperform participants in the comparison module on an experimenter-created measure of conceptual knowledge of explicit early literacy instruction. The explicit modeling online professional development module did not significantly affect participants conceptual knowledge of effective reading instruction above and beyond their peers who received an online professional development module without explicit models. Additionally, participants in both professional development conditions appeared to leave the modules with adequate knowledge of explicit early literacy instruction. The total score on the quiz was 85% correct for the comparison group, and 88% correct for the explicit modeling group.

While there is no empirical evidence to support our hypothesis that preservice teachers in the treatment condition would outperform individuals in the comparison condition on the post-module conceptual knowledge of early literacy instruction quiz, it does appear that all participants learned important information about explicit early literacy instruction.

Participant Acceptability Analysis

While not a primary research question, I also examined participant acceptability of professional development condition. The participant acceptability analysis included 56 participants with complete acceptability data. As discussed in the method section, data appeared to be missing at random.

To evaluate participant acceptability of the modules, an independent samples *t*-test for participant acceptability by experimental condition was conducted. The between-subjects independent variable was a categorical variable with two levels, explicit modeling professional development condition (treatment) and comparison professional development condition (comparison).

The quantitative dependent variable was acceptability rating ranging from 1= extremely dissatisfied to 5 = extremely satisfied (see Appendix B). Participants acceptability of a variety of aspects of the module were examined including training, content, complexity, practice, organization, and comfort. Descriptive statistics for participant acceptability ratings are summarized in Table 5.

The results of the independent samples *t*-test for participant acceptability by experimental condition are summarized in Table 6. There were no significant differences in participant acceptability by experimental condition for any of the acceptability categories.

These results mean that there was no significant difference in participant acceptability of module between the explicit modeling and comparison PD conditions. While participants in both conditions indicated that, overall, they were highly satisfied by the content presented in the training modules, there were no significant differences between treatment and comparison participant responses. Participants in the experimental explicit modeling module condition were hypothesized to find the modules more acceptable than participants in the comparison module condition. However, there were no significant differences in acceptability between groups. Therefore, there is no evidence to support our hypothesis.

Table 5

Descriptive Statistics for Participant Acceptability by Experimental Condition

Acceptability rating	Explicit			Comparison			*Cohen's d*
	n	*M*	*SD*	*n*	*M*	*SD*	
Training	33	4.76	0.44	23	4.52	0.90	0.34
Content	33	4.76	0.44	23	4.65	0.71	0.19
Complexity	32	4.63	0.50	22	4.41	0.73	0.35
Practices	33	4.79	0.42	23	4.43	0.90	0.51
Organization	32	4.72	0.46	23	4.65	0.88	0.10
Comfort	33	4.73	0.45	21	4.38	0.74	0.57

Note. Acceptability ratings range from 1 = extremely dissatisfied, 2 = somewhat dissatisfied, 3 = neither satisfied nor dissatisfied, 4 = somewhat satisfied, 5 = extremely satisfied. See Appendix B for direct acceptability questions.

While there is no evidence that the explicit modeling module was found to be more acceptable than the comparison module, the small to medium effect sizes in Table 5 indicate that participants show initial acceptability and comfort of using these explicit instruction principles and practices in their future classrooms.

Table 6

Independent Samples t-Test Summary Table for the Effects of Experimental Condition on Participant Acceptability

Source	*df*	*SE*	*t*	*p*
Acceptable	29.25	0.21	1.17	.252
Content	33.33	0.17	0.63	.532
Complexity	33.78	0.18	1.21	.236
Practices	28.64	0.20	1.76	.089
Organization	30.45	0.20	0.33	.743
Comfort	29.59	0.18	1.93	.064

Overall participants found the training modules highly acceptable. Possible acceptability ratings included: 1 = extremely dissatisfied, 2 = somewhat dissatisfied, 3 = neither satisfied nor dissatisfied, 4 = somewhat satisfied, 5 = extremely satisfied. Most mean acceptability ratings for all categories, and both module conditions, are above 4.50. This means that participants found the modules at least ‘somewhat satisfying’ and closer to ‘highly satisfying.’ Participants in both module conditions were satisfied with the content and practices covered and could see themselves using it in their future classrooms. Participants also found the organization of the modules highly acceptable. The difference between explicit modeling and comparison module participant acceptability ratings was small and not significant (e.g., differences only range from .06 to .35).

Summary

The purpose of this study was to examine the impact of explicit modeling on teacher conceptual and procedural knowledge of explicit early literacy instruction using a pretest-posttest control group design intervention study. Participants were randomly assigned to one of two professional development module conditions, treatment/explicit modeling or comparison module condition.

Teacher skill-based knowledge was examined by measuring participants pre and posttest ratings on an examiner-adapted early literacy instruction observation tool. Ratings on this tool were compared to a desired benchmark created by early literacy experts. There were no statistically significant differences between the treatment and comparison group skill-based knowledge ratings. Compared to the no modeling condition, explicit modeling did not appear to increase teachers' skill-based knowledge of effective early literacy instruction.

Conceptual knowledge was examined using a post-module quiz on early literacy content. There was no statistically significant difference between groups on the number of correct responses to the post-module content knowledge quiz. The explicit modeling module did not appear to increase teachers' conceptual knowledge of early literacy instruction more than the comparison module without explicit models. Acceptability of professional development module was also measured and there were no statistically significant differences between groups on acceptability ratings. This study does not provide empirical evidence that explicit modeling is an active ingredient to effective professional development to increase teacher knowledge of explicit early literacy instruction.

CHAPTER V

DISCUSSION

This study investigated the impact of explicit modeling on preservice teachers' conceptual content-based and procedural skill-based knowledge of explicit early literacy instruction. Preservice teachers were randomized to one of two module intervention conditions: (a) modules with explicit models and (b) modules without explicit models. Employing a pretest-posttest, control-group design, participant ratings of explicit early literacy instruction before and after the PD module were measured. Participant ratings were compared to a meaningful benchmark, composed of the mean of two expert ratings. Distance between participant rating and the expert benchmark was examined as a measure of participants' skill-based procedural knowledge of explicit early literacy instruction. Participant content-based conceptual knowledge was measured using a post-module multiple choice quiz. The primary purpose of this study was to examine explicit modeling as a possible active ingredient in effective professional development and instructional coaching for educators. There appear to be five conclusions that can be drawn from this study. Study findings, implications, limitations, and future directions are summarized below.

Skill-Based Procedural Knowledge

First, the use of explicit modeling in this online 45-minute professional development module did not meaningfully increase preservice educators' *skill-based* procedural knowledge compared to a comparison condition without explicit modeling. Participants in the treatment condition, which included a module with explicit modeling, did not significantly differ from participants in the comparison condition, which included a module without explicit models, on a measure of skill-based procedural knowledge of early literacy instruction. Participants who received explicit modeling in their professional development module did not improve in their ability to recognize important differences in the moderate implementation of explicit early literacy instruction compared to high-quality implementation.

Second, preservice educator participants, *in general*, did not meaningfully increase in their *skill-based* procedural knowledge after participation in a 45-minute online module. In general, neither participants in the explicit modeling condition, nor participants in the comparison condition, were more like expert instructional coaches after participation in the module.

Expert instructional coaches were able to identify important differences in the interventionist's skills that are likely to affect the implementation of explicit early literacy instruction. For example, expert coaches rated an interventionist's pacing as inadequate if there was extra teacher talk irrelevant to the script or instructional scaffolding. This is a critical element of effective explicit instruction, as inadequate pacing and excess teacher talk leads to decreased opportunities for student practice, a key active ingredient of effective instruction (Archer & Hughes, 2011). However, it appears that participants did not attend to these important differences before or after participation in the modules. Participants may have heard the presence of teacher explanations, models, and signals and assumed this indicated strong pacing, when in actuality it did not. Participants in neither the explicit modeling condition nor the comparison condition were more like expert instructional coaches on ratings of explicit early literacy instruction after participation in the module.

Preservice educators' skill-based procedural knowledge may not have increased as a result of explicit modeling because the length of the module was not sufficient. Preservice educators may need more exposure to the explicit models to be able to evaluate key features of high-fidelity implementation. The current modules may not have been sufficient for participants to evaluate explicit instruction design elements "in action."

Alternatively, it is possible that explicit modeling by itself is not sufficient to increase skill-based procedural knowledge in instruction. Learners may also need multiple practice opportunities with corrective feedback in order to learn a new complex skill. Explicit modeling by itself is only one step of the proposed model of explicit professional development. In order to increase teacher knowledge and move towards changing teaching behavior, professional development likely requires increased duration, more modeling, more practice, and corrective feedback.

Similarly, explicit modeling may have been more effective if followed by examples and non-examples. Explicit instruction design principles often emphasize the need for non-examples when teaching children a new skill (i.e., what is an /a/ and what is not an /a/) (Archer & Hughes, 2011; Engelmann & Carnine, 1982;). Explicit professional development would benefit from this same structure (i.e., what is adequate pacing and what is not adequate pacing). Non-examples could also show strong and poor examples of signaling and how only consistent, accurate signaling leads to choral responding. Non-examples allow the learner to see important elements of accurate explicit instruction by highlighting what is *not* present in the non-example. Increasing the number of models, or positive examples, juxtaposed with non-examples may have increased participants initial skill-based procedural knowledge.

Importantly, this study was carefully designed to measure *initial* skill-based procedural knowledge, not intermediate or advanced skill-based procedural knowledge. The 45-minute professional development modules did not meaningfully increase initial skill-based procedural knowledge of early literacy instruction in novice preservice educators. Intermediate skill-based knowledge is often assessed by asking individuals to perform a task and using a rubric to rate their accuracy; advanced skill-based knowledge is assessed through complex scenarios where individuals are asked to adapt procedures to new or unexpected difficulties (Amer, 2006; Bloom et al., 1956). However, initial skill-based knowledge cannot be assessed through action and expert evaluation, as novice learners are not proficient enough to perform skill-based tasks without multiple errors and the need for corrective feedback (Bloom et al., 1956). Initial forms of skill-based knowledge are best assessed through recognition of other's performing actions or demonstrating the readiness to act by accurately articulating planned behavior (Bloom et al., 1956).

In order to measure participants' initial skill-based procedural knowledge, I designed a recognition of 'skills in action' measure using an explicit instruction observation and evaluation tool. This study did not require novice participants to perform a newly learned skill, but rather asked them to evaluate another individual performing the skill. This evaluation task required participants to identify procedural skills in action, an initial component of demonstrating readiness to act, or in this case teach reading. However, even on this measure of *initial* skill-based procedural knowledge, participants were not more similar to experts' ratings of early literacy instruction after the modules. It appears that even changing novice preservice educators' initial skill-based procedural knowledge requires greater intensity of professional development. Therefore, it follows that increasing skill-based procedural knowledge to a level of mastery, where one can implement with intended fidelity and adapt instruction fluently based on unexpected student behavior (i.e., advanced skill-based knowledge), likely will require even more models, examples and non-examples, guided practice, and neutral corrective feedback.

Conceptual Content-Based Knowledge

Beyond an investigation into skill-based procedural knowledge, this study examined participant conceptual, content-based knowledge. A third conclusion from this study is that the professional development modules both appeared to result in appropriate conceptual content-based knowledge of explicit early literacy instruction. However, a related fourth conclusion from this study is that the use of explicit modeling in an online 45-minute professional development module did not meaningfully increase preservice educators' content-based conceptual knowledge *beyond* the effects of the comparison module without explicit modeling.

Preservice educators in this study appeared to have minimal content-based conceptual knowledge of explicit early literacy instruction prior to participation in the professional development modules, as evidenced by their responses to questions about the best way to teach reading. After the modules, participants in both conditions performed well on the post-module quiz, on average getting a score of approximately 8 out of 9 questions correct. However, due to the lack of pretest measure of participant content-based conceptual knowledge of early literacy instruction, increases in knowledge from pre to post module were not evaluated directly.

Both participants who did receive explicit models and participants who did not receive explicit models performed well on the post-module content quiz. This finding shows that it may not be necessary to include explicit models if one's goal is to increase teachers' content-based conceptual knowledge. However, skill-based knowledge is more directly aligned to teacher implementation or behavior in contextually relevant classroom settings (Amer, 2006, Gersten et al., 2009). If the goal is to increase skill-based procedural knowledge, then limited professional development modules, with or without models, are likely not sufficient.

Ideally, professional development trainings would target both content and skill knowledge (Foorman & Moats, 2004). However, a majority of professional development trainings only target content-based conceptual knowledge (Demonte, 2013). Yet, limited measures of pre and post professional development content knowledge are used in research or practice. Thus, it is unclear if typical professional development changes content-based knowledge of effective instruction, let alone skill-based knowledge. This study may indicate that content-based conceptual knowledge can be changed by a short-duration professional development module with or without models. However, this level of professional development was not sufficient to change preservice educators' skill-based knowledge. Future research would benefit from empirical methodology that distinctly measures content-based and skill-based knowledge of early literacy instruction. This research would inform the field on which form of professional development changes which type of teacher knowledge or behavior.

Skill and Content-Based Early Literacy Knowledge

The fifth and final conclusion from this study is that changes in content-based early literacy knowledge may not be sufficient to change preservice educators' skill-based procedural knowledge of early literacy instruction. Participation in either module appeared to be sufficient for participants to acquire adequate content-based conceptual knowledge, however, participant skill-based procedural knowledge was not meaningfully increased after participation in either modules. Thus, it appears that changes in content-based knowledge may not be sufficient to change preservice educators' skill-based procedural knowledge of early literacy instruction.

For example, the hypothetical positive impact of expertise in conceptual and procedural knowledge can be demonstrated through a teacher's use of sound error-corrections in explicit phonics instruction. In order to respond to student errors during decoding-based explicit reading a teacher must have content knowledge about type of error the student made, such as a substitution or hesitation error, as well as a possible underlying deficit causing the inaccurate word reading, such as struggle with a vowel team such as "ai", and inaccurate reading of words such as /pain/, /rain/, or /paint/. The teacher must also have the skills to fluently and effectively correct the student error and provide a delayed test to check for student understanding (Archer & Hughes, 2011). Carrying out the appropriate procedural explicit instruction technique for error corrections is skill-based procedural knowledge. The appropriate procedures for error corrections often involve scripted phrases with minimal teacher-talk, repetition of the model, and delayed test. These appropriate procedural steps also involve important intangibles, such as neutral tone and efficient pacing, to minimize the impact of disruption to instruction every time an error is made. Teacher skill in appropriately providing error correction typically builds from models, practice opportunities with the script, and feedback from an instructional coach (Garbacz et al., 2014). Knowing what to do, or which component of the word to correct for what purpose, is a content-based conceptual skill and may not be sufficient for the skill-based procedural elements of effective word-reading error corrections on sound-spelling patterns.

Similar to the analogy by behaviorists Cooper, Heron, and Heward (2006) regarding the need for modeling in coaching one on how to shoot a basketball, conceptual and procedural knowledge are distinct forms of teacher knowledge. It is very different to know the steps of *how* to shoot a basketball (e.g., where to place your hand, where to aim, the objective of scoring a basket by placing the ball through the netted hoop), and *being able* to accurately shoot the basketball (e.g., the procedural skill of actually shooting the ball and scoring). Akin to shooting a basketball, a teacher may know the steps of an error correction or that she should look out for sound errors on “ai” during blending instruction of words like “paint” or “rain,” but be unable to carry these out in practice by actually helping the student to master the word (i.e., make the basket). Knowing the conceptual steps on how to shoot a basketball, without the procedural skill on how to do it, does not lead to scoring more points during the championship game. Similarly, knowing the conceptual steps of phonics sound error corrections, without the procedural skill, does not lead to increased student reading achievement.

Limitations

While the findings in this project do not support explicit modeling as a potential active ingredient for effective professional development and instructional coaching, there are a variety of limitations that should be considered when interpreting these findings.

First, the small sample size in this study is a limitation. The small sample size for each data analysis sample, skill-based procedural knowledge, content-based conceptual knowledge, and participant acceptability, make it unlikely to detect a small effect for explicit modeling. Specifically, if explicit modeling has a small effect (i.e., $\eta_p^2 = .01$) on participant skill-based procedural knowledge, than a sample size of 66 participants would have power of only .32 to detect the effect. Thus, the study does not allow confidence that there is not a small effect of explicit modeling as an isolated component of professional development. However, with a sample size of 66, the study has power of .80 to detect an effect size of $\eta_p^2 = .035$, about halfway between a small and medium effect. In addition, the study has power of .96 to detect a medium effect size of about $\eta_p^2 = .06$ (Cohen, 1988). Thus, the study allows reasonable confidence that there is not a small to medium effect, and a high degree of confidence that there is not a medium effect of explicit modeling on participant skill-based procedural knowledge.

Additionally, if explicit modeling had a small effect (i.e., $d = 0.20$) on participant skill-based procedural knowledge, then a sample size of 54 participants would have power of only .07 to detect the effect. Thus, the study does not allow confidence that there is not a small effect of explicit modeling on participant content knowledge. If explicit modeling had a medium effect (i.e., $d = 0.50$) on participant skill-based procedural knowledge, then a sample size of 54 participants would have power of only

.41 to detect the effect. Thus, the study also does not allow confidence that there is not a medium effect of explicit modeling on participant content knowledge. However, with a sample size of 54, the study has power of .80 to detect a large effect of $d = 0.80$. Thus, the study allows a high degree of confidence that there is not a large effect of explicit modeling on participant content-based conceptual knowledge, but a small or medium effect is plausible.

Second, there is limited reliability and validity evidence for the examiner-adapted ratings of explicit instruction tool as a measure of skill-based procedural knowledge. The examiner-adapted evaluation tool for skill-based procedural knowledge (Appendix E) is based upon a fidelity of implementation tool used to evaluate effective explicit early literacy instruction. A sub-sample of items from this fidelity tool were chosen to examine effective early literacy pedagogy (e.g., signaling, pacing, opportunities to respond, behavior management, etc.). However, adaptations to this fidelity tool, such as decreasing the number of items, may have impacted the psychometric properties of this observation instrument. The explicit instruction observation tool was designed to help instructional coaches and administrators attend to active ingredients of effective explicit instruction when supervising school-wide reading instruction (Doabler & Nelson-Walker, 2009; 2014). The tool was not designed to be a measure of teacher's initial skill-based procedural knowledge. The tool was adapted as an experimental measure of initial skill-based knowledge, but there is unknown reliability and validity evidence for this purpose. The observation tool only includes one item for the quality of each of the explicit instruction elements (e.g., signaling, pacing, opportunities to respond, behavior management, etc.), which may have made it difficult to detect minimal changes in participant's ratings of quality of explicit instruction. Increasing the number of items for specific sub-skills of explicit instruction may have increased the ability to detect small increases in participant skill-based knowledge. Future research may consider adaptations of explicit instruction observation tools as measures of initial skill-based procedural knowledge in preservice and in-service educators.

Third, the Amazon/incentive Qualtrics links were not tied to participant completion of data. Institutional Review Board (IRB) reviewers indicated that participant identifying information should not be connected to participant data in any way. This constraint made it impossible to connect the incentive to completed data, which lead to the principle investigator regularly paying participants with incomplete data. Future research would benefit from connecting access to incentives based on completion of study data. This could be accomplished by linking Qualtrics modules and providing informed consent to participants of the connection between their name, email, and study data.

A fourth limitation is the limited measures of participant adherence. Participant adherence was measured by asking participants to self-report their time spent viewing the module. Pages viewed and duration of time spent in Articulate was the initial proposed plan for a measure of participant adherence. However, this was not possible. While the modules were built in Articulate, they were dispersed to participants via a personal webpage, not a Learning Management Software (LMS). Due to limited funding, an LMS was not available. Future research would benefit from a more direct behavior observation of participant adherence to module condition in order to best interpret study findings. With limited participant adherence data, it is difficult to be certain that participants truly engaged with active learning and opportunities to respond in the explicit modeling module condition.

A fifth limitation is the possible confounding effect of module modality on preservice educator acceptability of module training. The explicit modeling module included video demonstrations of the explicit instruction pedagogical principle. The comparison module was also delivered through an electronic learning management software, Articulate, but there were no video models in this condition. Instead, participants navigated the comparison module by reading slides and listening to lecture. There were no videos in this comparison condition. Therefore, module modality introduces a potential confounding variable that may have impacted participant acceptability of training. This is of particular interest for this preservice population of undergraduate and graduate students who likely access a large amount of education, society, and culture via social networking, media, and various online technology. Future research should investigate the impact of modality on trainee acceptability of training.

Implications and Future Directions

The primary implication of this study is that impacting the skill-based procedural knowledge most critical to changing student reading outcomes appears to be difficult. A well-designed 45-minute professional development module with multiple models and some practice, but with no feedback or error corrections, was not sufficient to increase teachers' initial skill-based procedural knowledge. Naive preservice educator participants in this study demonstrated high and adequate levels of content-based conceptual knowledge on a multiple-choice quiz after participating in the modules. However, it appears that having content-based conceptual knowledge may not be sufficient to increase skill-based procedural knowledge of early literacy instruction.

Implications for Theoretical Models of Professional Development and Teacher Knowledge

Bloom and colleagues (1956) initial conceptualization of a taxonomy of knowledge articulates that many forms of knowledge are hierarchal and cumulative. However, recent adaptations of Bloom's taxonomy of knowledge indicate that conceptual and skill knowledge may not be hierarchal, but rather distinct and complementary (Amer, 2006). The professional development and instructional coaching literature often fail to differentiate teacher content-based *knowledge* of a teaching technique, from teacher *skill* in implementing the instruction in a classroom setting (Desimone, 2009). Therefore, it is unclear what the professional development is designed to change, or what impact the professional development has on content or skill knowledge. Professional development is intended to change teacher practice, but it is unclear how this change occurs, or whether changes in *knowledge* result in changes in *behavior* during instruction (Demonte, 2013; Desimone, 2009; Desimone & Garet, 2015). There is no agreement on a theoretical model for the design of effective professional development, nor a strong methodology for empirically measuring change in teacher behavior.

While this study provides initial evidence that skill and content knowledge are distinct, it is unclear if content-based conceptual knowledge and skill-based procedural knowledge of early literacy instruction are hierarchal or complementary. It is possible that content-based conceptual knowledge of reading instruction is necessary to developing skill-based procedural knowledge in carrying out effective explicit early literacy instruction, making these forms of instructional knowledge hierarchal. However, it is also possible that content-based knowledge and skill-based knowledge of explicit instruction are complementary, meaning that conceptual content knowledge is not necessarily a precursor skill to skill-based procedural knowledge, but rather complementary. Furthermore, it is possible that the steps involved in building content and skill knowledge are separate and distinct. The pedagogical or training formats implemented by professional development leaders and instructional coaches may differ based on the learning goal. For example, if the purpose of professional development is to improve teachers background knowledge in advanced morphemic word analysis critical to explicit instruction for multisyllabic word reading, this training might differ from training designed to improve a teacher's use of signaling to elicit choral opportunities to respond. Future research should investigate not only the hierarchal or complementary nature of content and skill knowledge, but also the design and delivery of professional development aimed at these distinct teacher skills.

If content-based and skill-based knowledge are not hierarchal, it is possible that it would be effective to concurrently build teacher's conceptual content-based knowledge and procedural skill-based knowledge. This approach would have implications for preservice teacher training and professional development design and purpose. Perhaps it is not necessary to wait until an educator has conceptual knowledge to build his or her skill. Instead, these forms of knowledge may be built at the same time—with teacher education that builds conceptual content-based knowledge and skill-based procedural knowledge throughout training. Clearly, though, it is not enough for professional development to increase teacher conceptual content-based knowledge of effective instruction, and then *hope* for changes in skill-based knowledge or pedagogy in the classroom. Instead, professional development must increase and measure both content and pedagogical knowledge. This approach might lead to increased exposure to procedural elements of explicit instruction principles, which may increase teachers' skill-based knowledge and translate to effective classroom implementation.

The hierarchal or complementary nature of content and skill knowledge has implications for the theoretical model of effective professional development. Minimal empirical literature exists on the effectiveness of professional development, but theoretical models postulate that training must include instruction for teachers in both important conceptual content and skill pedagogy (Foorman & Moats, 2004). The theoretical model for explicit professional development proposed in this study (see Figure 1), highlights the difference between teacher knowledge and teacher skill. While the findings of this study indicate that content-based and skill-based knowledge are distinct, it's unclear if they are hierarchal or complementary. Teacher content-based knowledge may come before skill-based knowledge, or these two forms of knowledge may develop concurrently (see Figure 2). Future research could investigate types of instructional knowledge, the nature of the relationship between these forms of knowledge (i.e., hierarchal vs. complementary), the impact of professional development on teacher content and procedural knowledge, and the impact of these types of knowledge on quality implementation of explicit instruction in classroom settings.

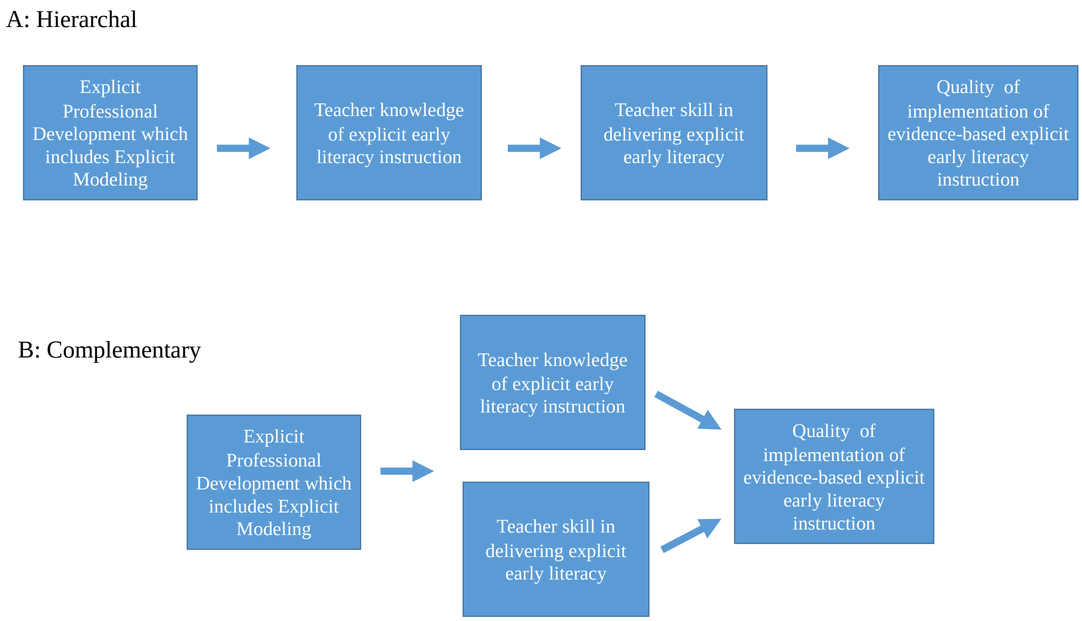


Figure 2. Theoretical model for impact of professional development on teacher knowledge and skills.

Implications for Professional Development in Practice

This study indicates that a 45-minute online module is not sufficient professional development to change skill-based procedural knowledge. It is likely that changes in skill-based knowledge cannot be accomplished in a short-duration, online professional development. The treatment professional development module in this study was based in strong instructional theory, including models and some practice opportunities (Archer & Hughes, 2011). However, the amount of modeling and practice in the module was limited by the brief 45-minute duration. It is likely that this limited exposure to models, minimal practice opportunities, few examples and non-examples, and absence of corrective feedback decreased the impact of the module on teacher skill-based knowledge.

Researchers speculate that in order to increase the use of evidence-based pedagogy in classrooms, professional development must be sustained and long-term, involve coaching and corrective feedback, and last a minimum of 40 hours (Yoon &

Guskey, 2009). Changing quality of implementation of in-service teachers in classroom settings likely requires extensive initial professional development training and multi-day high-quality follow-up instructional coaching. This study investigated only the impact on *initial* skill-based procedural knowledge for *preservice* educators. This study asked naive preservice educators with minimal skill-based procedural knowledge to observe and rate an interventionist's quality of instruction. It is reasonable to assume that the initial or first step in acquiring a skill is to recognize the skill when performed correctly. This study indicates that a 45-minute professional development module did not increase educator's ability to identify adequately what they were watching. It appears, in general, that preservice educators did not recognize when explicit instruction principles were implemented correctly. If preservice educators cannot recognize an instructional or pedagogical explicit instruction skill in another individual, it is very likely that they are not ready to implement the instructional skill as intended. This finding contributes to the professional development literature by indicating that a well-designed 45-minute professional development module is likely not of sufficient duration, type, or intensity to change teacher skill-based knowledge or applied practice.

Conclusion

Louisa Moats (1999, p. 4) writes, "teaching reading is rocket science." In this now dated, but still relevant call to action, Moats notes that advances in research on what and how to teach students to read have not translated to classroom settings. This may be due in large part to a lack of awareness in teacher preparation programs or professional development leaders on how to adequately prepare teachers with the *skills* needed to teach reading in school settings (Moats, 1999). Two decades of research since this publication continue to highlight the same research to practice gap (Archer & Hughes, 2011; Baker, Fien, Baker, 2010; Coyne, Kame'enui, & Carnine, 2011; Fien et al., 2015; Gersten et al., 2009; Nelson-Walker et al., 2013; NRP, 2000; Smith et al., 2016; Vaughn, Wanzek, & Murray, 2012). There continues to be a need for high quality effective professional development and instructional coaching in today's schools.

Numerous federal and state-funded technical assistance centers and professional development grants seek to ameliorate this ongoing implementation problem. Despite all of this investment, the problem persists, as evidenced by the lack of meaningful changes in the most important dependent variable, student reading achievement (NAEP, 2017). There have only been marginal improvements in the translation of evidence-based reading instruction to classroom settings. Outside of the context of effective sustained professional development and instructional coaching, often only available during high-quality research studies or technical assistance centers, teachers rarely implement evidence-based explicit reading instruction with the necessary skills to change outcomes.

This study provides additional evidence that teaching reading *is* rocket science. Teaching reading is a highly complex skill that takes hours of instruction in how to teach, continual supportive and corrective feedback, and years of practice to master the skill. The current level of resources provided to teachers preservice or through in-service professional development and instructional coaching appears to be insufficient to develop expertise in a skill as complex as 'rocket science.'

This study showed that a 45-minute professional development session was not enough to increase even a low level of skill-based knowledge in teaching reading. Implementation of effective explicit early literacy instruction is complex and is likely to require multiple hours of training, practice, and corrective feedback. Adam Urbanski (2018), president of the American Federation of Teachers states, “everyone believes that to be a good teacher all you need is to love to teach, but no one believes that to be a good surgeon all you need is to love to cut.” Learning to teach reading to young children is not a simple skill one can learn purely through the ‘joy of teaching.’ It cannot be taught in a ‘one and done’ professional development module, in-person training, or a single instructional coaching visit. In order to provide teachers with the level of training and professional support necessary to carry out this complex skill, coaching and resources must be allocated to this meaningful goal.

APPENDIX A
DESIMONE (2009, p. 185)

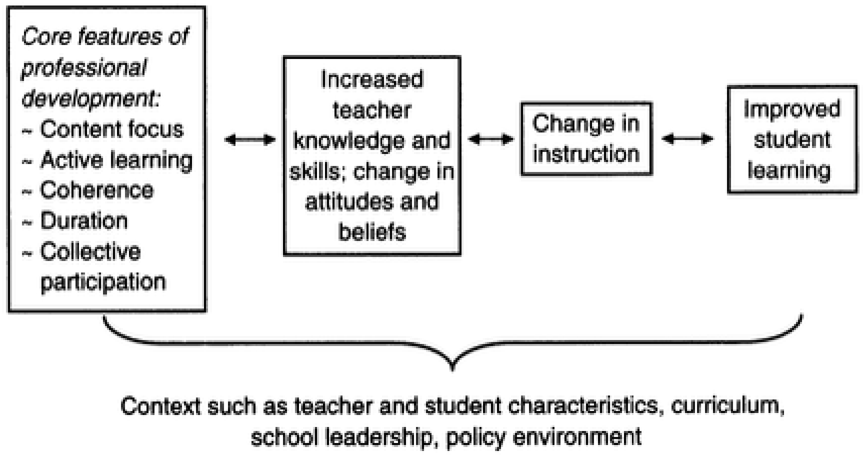


FIGURE 1. *Proposed core conceptual framework for studying the effects of professional development on teachers and students.*

APPENDIX B

TRAINING / PRACTICE ACCEPTABILITY SCALE

(ADAPTED FROM LYON ET AL., 2011)

1) To what extent are you satisfied with the training you received and the practices covered?

Not at all		Moderately		Extremely
1	2	3	4	5

2) How well organized and executed do you believe the training program to be?

Not at all		Moderately		Extremely
1	2	3	4	5

3) How satisfied are you with the content of the training and the practices covered?

Not at all		Moderately		Extremely
1	2	3	4	5

4) How satisfied are you with the complexity of the training and the practices covered?

Not at all		Moderately		Extremely
1	2	3	4	5

5) To what extent are you satisfied with the training you received and the practices covered?

Not at all		Moderately		Extremely
1	2	3	4	5

6) How comfortable are you with the practices contained within the training?

Not at all		Moderately		Extremely
1	2	3	4	5

APPENDIX C
COMPARISON MODULE SAMPLE

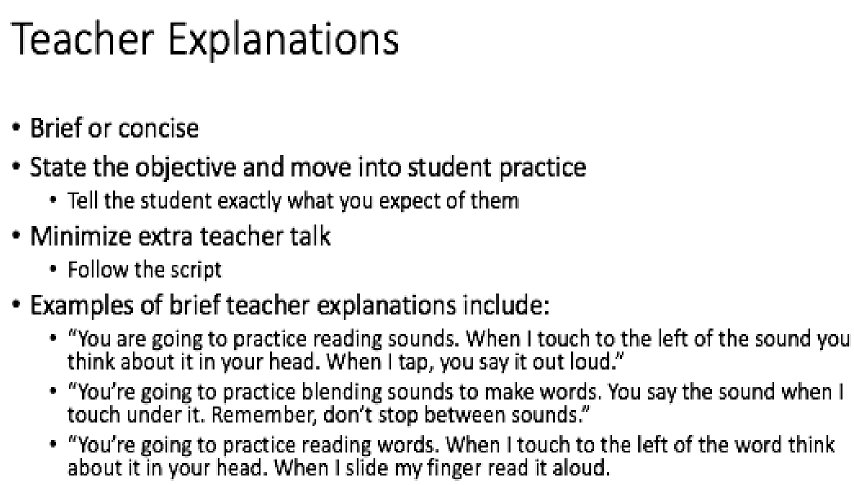


Figure 3. Example comparison condition professional development module content (teacher explanations).

To experience the full comparison module please visit: http://explicitmodeling.org/comparison_3-1/story_html5.html

APPENDIX D
EXPLICIT MODELING MODULE SAMPLE

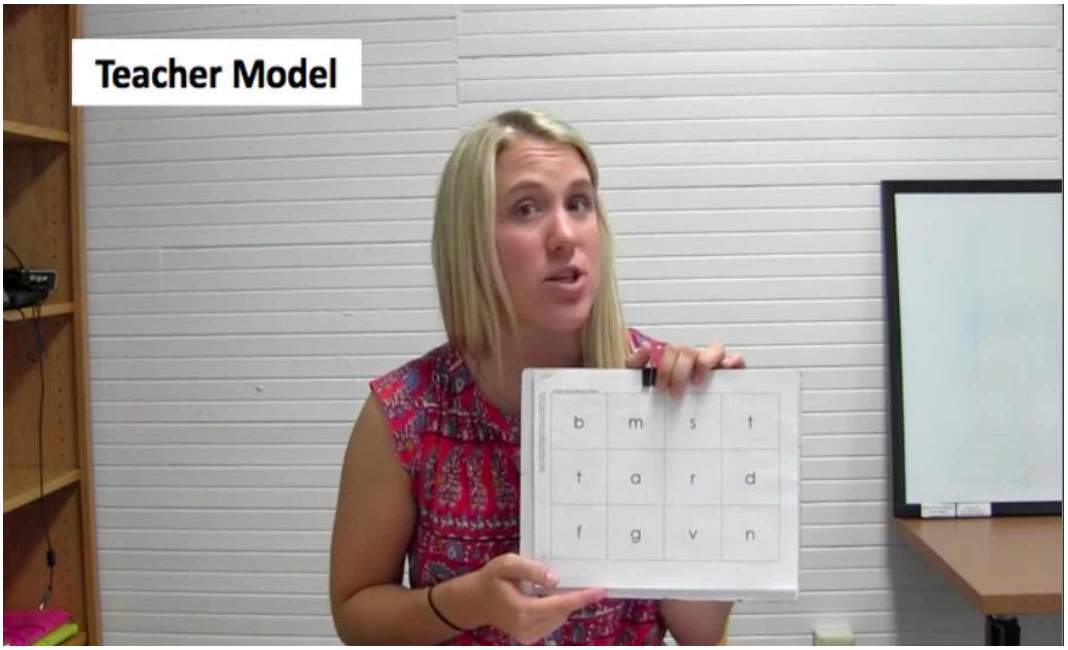


Figure 4. Example video demonstrations for explicit professional development module content (teacher models).

To experience the entire explicit modeling treatment module please visit: http://explicitmodeling.org/explicit_3-1/story_html5.html

APPENDIX E

RATING OF EXPLICIT EARLY LITERACY INSTRUCTION OBSERVATION TOOL

ADAPTED FROM QEI (DOABLER & NELSON-WALKER, 2014) AND RCMIS (DOABLER & NELSON-WALKER, 2009)

1 = Not present. 2 = Occasionally present (1-50%). 3 = Frequently present (51-85%). 4 = Consistently present (>85%)

General Procedural Components of Effective Explicit Instruction	
Adequate explanations:	**1 2 3 4**
Adequate teacher models skills/strategies to introduce an activity	**1 2 3 4**
Appropriate signaling (focus, cue, think time, signal):	**1 2 3 4**
Appropriate pacing: teacher systematically modulates lesson pacing/provides adequate think time	**1 2 3 4**
Adequate student practice:	**1 2 3 4**
Frequent checks for understanding (2-3 students):	**1 2 3 4**
Consistent error correction (my turn/your turn):	**1 2 3 4**
Important Evidence-Based Instructional Practices	
Community of positive learning:	**1 2 3 4**
Frequent student participation and engagement:	**1 2 3 4**
Sufficient instructional scaffolding:	**1 2 3 4**

Overall Intervention Delivery Overall effectiveness takes into consideration quality of delivery, understanding of the program, and student engagement and management.									
Ineffective		***Needs Improvement***		***Proficient***		***Effective***		***Highly Effective***	
1		**3**		**5**		**7**		**9**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

APPENDIX F
PARTICIPANT ASSIGNMENT AND MEASUREMENT PROCEDURES

Pretest	**Professional Development Module Condition**	**Posttest**
Pretest using video 1		**Posttest using video 3**
X_1 (rating/alignment with expert = Euclidian Distance)	Explicit Modeling Module	Y_1 (rating/alignment with expert = Euclidian Distance)
X_2 (rating/alignment with expert = Euclidian Distance)	Comparison Module	Y_2 (rating/alignment with expert = Euclidian Distance)
Pretest using video 3		**Posttest using video 1**
X_1 (rating/alignment with expert = Euclidian Distance)	Explicit Modeling Module	Y_1 (rating/alignment with expert = Euclidian Distance)
X_2 (rating/alignment with expert = Euclidian Distance)	Comparison Module	Y_2 (rating/alignment with expert = Euclidian Distance)

Note. Video 1 and video 3 were roughly equivalent moderate quality of implementation as rated by instructional experts. Videos were counterbalanced across and within study conditions.

APPENDIX G
EUCLIDEAN DISTANCE SCORE FORMULA

Euclidian distance score at pretest = Square root of the sum(participant explanation rating- expert mean of explanation rating)^2, (participant model rating- expert mean of model rating) ^{2}, (participant signal rating- expert mean of signal rating)^2 , (participant pacing rating- expert mean of pacing rating)^2, (participant student practice rating- expert mean of student practice rating)^2, (participant check for understanding rating- expert mean of check for understanding rating)^2, (participant error correction rating- expert mean of error correction rating)^2, (participant positive learning rating- expert mean of positive learning rating)^2, (participant instructional adjustments rating- expert mean of instructional adjustments rating)^2, (participant student participation rating- expert mean of student participation rating)^2, (participant overall rating- expert mean of overall rating)^2.

Euclidian distance score at posttest = Square root of the sum(participant explanation rating- expert mean of explanation rating)^2, (participant model rating- expert mean of model rating) ^{2}, (participant signal rating- expert mean of signal rating)^2 , (participant pacing rating- expert mean of pacing rating)^2, (participant student practice rating- expert mean of student practice rating)^2, (participant check for understanding rating- expert mean of check for understanding rating)^2, (participant error correction rating- expert mean of error correction rating)^2, (participant positive learning rating- expert mean of positive learning rating)^2, (participant instructional adjustments rating- expert mean of instructional adjustments rating)^2, (participant student participation rating- expert mean of student participation rating)^2, (participant overall rating- expert mean of overall rating)^2.

Note. This Euclidean Distance analysis was used at pre and posttest for every individual participant. These Euclidean Distance scores were the averaged for each experimental group (treatment and comparison). A two-way mixed effect analysis of variance was then used to analyze the impact of professional development condition on Euclidean Distance scores from pre to posttest.

APPENDIX H
DEMOGRAPHIC QUESTIONS

1. Gender: __Male __Female __Non-binary
2. Date of birth: _______
3. Year in program:
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. First year masters student
    f. Second year masters student
4. If undergraduate, what is your major?
5. If graduate/masters student, what is your program?
6. How many readings methods courses have you had prior to this term?
    a. 0
    b. 1
    c. 2
    d. 3+
7. Including this year, total years teaching:
    a. ____ General Education
    b. ____ Special Education
    c. ____ ELL
8. Current position (select all that apply):
    a. Certified teacher
    b. Special education teacher
    c. ESL teacher
    d. Title 1 teacher
    e. Title 1 instructional assistant
    f. Instructional assistant/classified teacher
    g. Literacy coach
9. Years in current position, including this year: ____
10. Areas of specialization (select all that apply):
    a. Elementary Education
    b. Special education
    c. Early Childhood Education
    d. Reading
    e. English as a second language
    f. Other: _______
11. Education Degrees (select all that apply):

a. AA
b. B.S./B.A./B.Ed.
c. Early Childhood Ed.
d. M.S./M.A./M.Ed.
e. Ed.S.
f. Ed.D./Ph.D.

12. ?What is the best way to teach reading?
    a. Child-led instruction
    b. Child led cooperative instruction
    c. Teacher-led explicit instruction
    d. Teacher-led cooperative learning

APPENDIX I

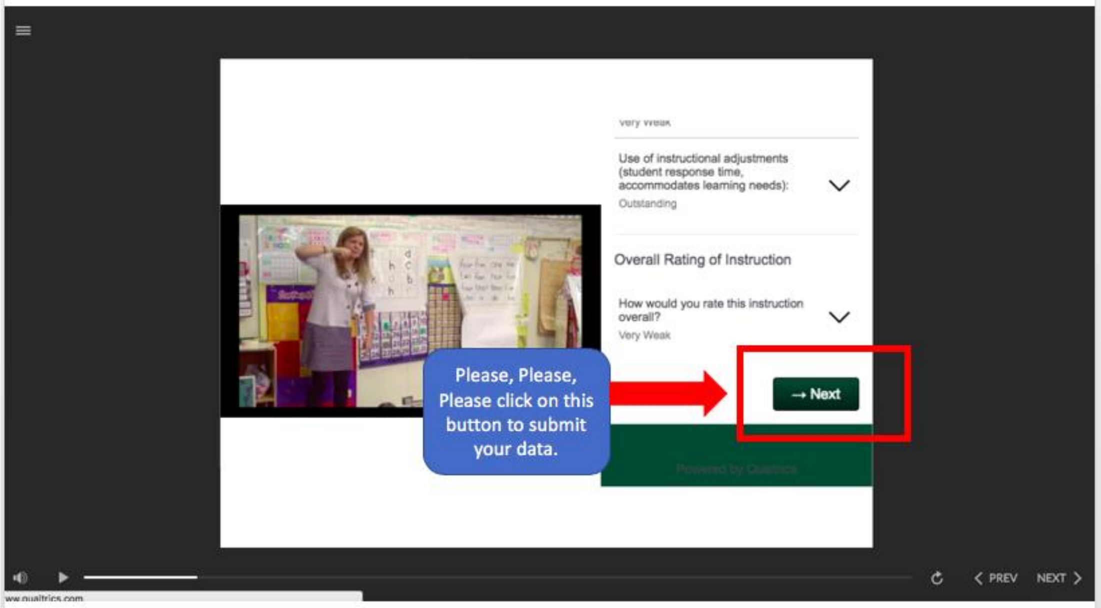
CONCEPTUAL CONTENT-BASED KNOWLEDGE QUIZ

1. Explicit early literacy instruction is…
    a. Drill and kill and should be avoided
    b. Structured, systematic, and direct.
    c. Unnecessary except for the lowest performing students.
2. Which of the following is true about explicit early literacy instruction?
    a. There is minimal evidence to support the effectiveness of explicit early literacy instruction.
    b. There is ample evidence to support the effectiveness of explicit early literacy instruction.
    c. There is evidence to support what to teach in reading instruction, but not how to teach it.
    d. There is evidence to support how to teach students to read, but not what content to cover.
3. Which of the following is not an explicit instruction element?
    a. Teacher Models
    b. Error Corrections
    c. Sustained Silent Reading
    d. Multiple practice opportunities
4. Which of the following statements is true?
    a. Teacher explanations are brief and to the point.
    b. Teacher explanations are detailed and extended.
5. "I'll show you how to do it. My turn." This is the phrase a teacher uses when he or she indicates a _____ is coming.
    a. Model
    b. Explanation
    c. Signal
    d. Sound
6. The four parts of a signal are?
    a. Focus, cue, wait time, signal
    b. Tap, slide, swoop, hold
    c. Focus, explanation, model, signal
7. Explicit instruction should be delivered…
    a. At a slow pace to make sure that your students understand what you are talking about.
    b. In a monotone so that students are not distracted by your tone.
    c. With a perky pace to maximize engagement.
8. Which of the following is true about opportunities to respond in explicit instruction?
    a. Explicit instruction includes lots of opportunities for students to respond individually. You should make sure that all students get an individual turn on all words.

b. Explicit instruction includes lots of opportunities for students to respond together, or as a group. Individual turns are only used at the end of a routine, as a check for understanding.
c. Explicit instruction includes opportunities for students to respond as a group on sounds, but for whole word reading students should respond individually.
d. Explicit instruction includes opportunities for students to respond as a group on whole words, but for sounds students should respond individually.

9. Error Corrections are delivered in a…
    a. Neutral, non-punitive tone. We expect students to make an errors during instruction.
    b. A direct and punitive tone. We do not want students making errors.
    c. You do not error correct in explicit instruction. We want students to learn to recognize their own errors.

APPENDIX J
SCREENSHOT FROM AMAZON GIFT CARD MODULE



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