DESIGNING TEACHER PROFESSIONAL DEVELOPMENT TO SUPPORT EVOLUTIONARY CHANGES IN INSTRUCTIONAL PRACTICE

by

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(Under the Direction of Theodore J. Kopcha)

ABSTRACT

Professional development (PD) is crucial for enhancing teachers' pedagogical skills and impacting student learning outcomes. Despite its importance, current PD approaches often fail to achieve desired changes in instructional practices. This educational design research (EDR) project advocated developing purposeful design principles for online PD courses to facilitate evolutionary changes in teaching practices. Drawing on Kolb's Experiential Learning Theory (1983), Guskey's Model of Teacher Change (2002), and Bandura's Social Cognitive Theory (1986), five design principles emphasizing critical reflection were formulated and tested over three separate studies. Study 1 was a75 participant EDR pilot study which evaluated the efficacy of the design principles, revealing that teachers perceived reflection as beneficial and identified changes in instructional practices throughout the learning cycle.

To further understand how the design principles support teachers in making evolutionary changes to their instruction practice, the need arose to understand how ready teachers were to make those changes. Recognizing that readiness for change is pivotal, study 2 introduces the URICA-TEACH survey, adapted from the University of Rhode Island Change Assessment, to

assess teachers' readiness to modify instructional practices. Validated through administration to 191 K-12 teachers, the survey demonstrated reliability and validity in assessing teachers' readiness for change.

Study 3 within the EDR project further tested the design principles. Emphasizing the need for PD to be geared towards specific changes, by focusing on two design principles, center on critical reflection and operationalize critical reflection through a guided process, to support teachers in making evolutionary changes. These principles, as subset of a broader research project, were integrated into a PD course. Using mixed methods analysis, the study assessed the impact of these principles on 12 course participants' levels of reflection, types of changes expressed, and readiness for change. Results suggest that design principles may facilitate evolutionary changes in instructional practices, with implications for future study iterations of the EDR project.

INDEX WORDS: teacher professional development, teacher change, evolutionary change, URICA-TEACH

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DEDICATION

I dedicate this dissertation to my family, as it is because of them, and the sacrifices that they made, that I was able to see this aspect of my life's journey to fruition. To my husband Heath, who provided me with the time, space, and support to focus on my goals. To my children Brady, Andrew, Heath, Olivia, Sophia, and Annabella, who provided me not only with support, but for the inspiration and strength to keep going. And, not only for my children, but my grandchildren, nieces, and nephews, who I love as my own, my hope is that this dissertation shows them that they can do anything, no matter what they have to go through to get it done.

Finally, I also dedicate this dissertation to my parents, Jim and Sherrie Hutchinson, my grandmother Wanda Hutchinson, and my siblings Jim, Sandy, and Brad. They have each supported me and provided inspiration in many ways that are difficult to articulate clearly. I love you all.

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CHAPTER 1

INTRODUCTION

Change and reform are the continued focus of the ever-present improvement initiatives within education, and teacher professional development is essential to the success of any reform effort (Darling-Hammond, 2013; Marzano & Toth, 2013; National Council on Teacher Quality, 2022; Ostinelli & Crescentini, 2024). The overall purpose of professional development is to effect change in teachers' knowledge and skills, teachers' attitudes and beliefs, as well as teachers' instructional practice with the ultimate goal of improving student learning (Asterhan & Lefstein, 2024; Ehlert & Souvignier, 2023; Desimone, 2009). Effecting change through professional development is rooted in the belief that "what teachers know and can do is the most important influence on what students learn" (National Commission on Teaching and America's Future, 1996, p. 10). Therefore, many believe that improving students' learning may be contingent on effective and continuous professional development opportunities for teachers designed to build and increase teachers' instructional quality (Asterhan & Lefstein, 2024; Darling-Hammond, 2013; Desimone, 2009; Ehlert & Souvignier, 2023; Marzano & Toth, 2013; National Council on Teacher Quality, 2013; Surrette & Johnson, 2015).

The importance of teacher professional development is abundant in literature. However, more research is needed regarding the effectiveness and outcomes of current and past approaches to professional development (Asterhan & Lefstein, 2024; Ehlert & Souvignier, 2023; Gavranović & Alčaković, 2023; Guskey, 2021; National Council on Teacher Quality, 2022; Ostinelli & Crescentini, 2024). If the expectation is that changes in teacher practice improve student

learning, the focus on improved effectiveness in teacher professional development may need to shift. It can be argued that the focus needs to shift to examining the type of change sought and the professional development design tasked with actualizing the change.

Researchers have found that many professional development offerings focus on helping teachers make revolutionary changes (Borko, 2004; Boyle et al., 2007; Ostinelli & Crescentini, 2024; Zaki et al., 2013). Revolutionary changes are transformative in that they involve doing something completely new (Chan, 2019). For example, teachers change from a lecture teaching style to a flipped or project-based learning approach (Burke, 2014; Osintelli & Crescentini, 2024). However, the literature suggests that teacher professional development should more strongly emphasize evolutionary change – that is, focus on teachers improving their existing practices through ongoing learning and analysis of their instructional practices that allow sustained incremental changes (Aparicio-Monlina & Sepluveda-Lopez, 2023; Marzano, 2012; National Comprehensive Center for Teacher Quality, 2022; Ostinelli & Crescentini, 2024; Papay, 2012). Professional development strategies to support evolutionary change, such as ongoing facilitated cycles of critical self-reflection, seek to support teachers in making ongoing, sustained, gradual improvements to their existing practice (Asherhan & Lefstein, 2024; Jones & Charteris, 2017; Milner & Scholkmann, 2023; Patton et al., 2015).

One issue with current forms of professional development is that strategies for revolutionary change are employed when evolutionary change is the desired outcome. Revolutionary change is often facilitated through isolated, time-constrained training events that focus on the practice of interest. In contrast, evolutionary change occurs through ongoing, sustained, gradual improvements in teacher practice. Thus, professional development strategies that support revolutionary change are misaligned with the need for long-term, sustained

improvement efforts. Since professional development strategies for revolutionary change remain largely ineffective for evolutionary change (Borko, 2004; Darling-Hammond, 2013; Hargreaves & Fullen, 2012; Marzano & Toth, 2013; McGuinn, 2012; National Council on Teacher Quality, 2013), a new professional development design is needed.

Coupled with the need for a professional development design that addresses evolutionary change is the need to address teachers' satisfaction with professional development opportunities because when teachers are not satisfied, their view is that professional development is ineffective (Dede et al., 2009; Ehlert & Souvignier, 2023; Gavranović & Alčaković, 2023). Ehlert and Souvignier (2023) found that teachers' view of what is effective differs from that of researchers. Ensuring teacher satisfaction is essential because when teachers feel positively about professional development, they are more likely to change their teaching practices (Ehlert & Souvignier, 2023; Emo, 2015). Research has further shown that the effectiveness of professional development is associated with how well the experience aligns with a teacher's individual needs, teaching environment, and professional experiences (Aparicio-Molina & Sepulveda-Lopez, 2023; Deniz & Bagceci, 2023; Ehlert & Souvignier, 2023; Gavranović & Alčaković, 2023; Meyer et al., 2023).

With technological advances, many schools and districts have begun to utilize online programs as an alternative to traditional face-to-face professional development. Both teachers and administrators find online a viable option for face-to-face professional development (Deniz & Bagceci, 2023; Prinadoko, 2022). Beyond being able to address the elements of effectiveness found by teachers, the choice of an online professional development delivery offers several benefits, such as being cost-effective, providing access to more significant numbers of participants, increasing the scope of resources, allowing for flexibility in time and location,

increasing learner control, and ease of dissemination (Bartley & Goleck, 2004; Bill & Melinda Gates Foundation, 2014; Carr, 2010; Deniz & Bagceci, 2023; Michael, 2012; Petrides, 2002; Prinadoko, 2022; Schrum, 1998). While much is known about the benefits of online professional development over face-to-face implementations, additional research is needed to offer insight into how online professional development can support evolutionary change. One issue is that the bulk of research focuses on the viability of the delivery medium (Fishman et al., 2014; Moon et al., 2014). Little is known about the design features of online professional development that maximize its impact on teaching and learning (Dede et al., 2009; Fishman et al., 2014; Moon et al., 2014; Reeves & Pedulla, 2013; Surrette & Johnson, 2015). Further complicating the research is that only some studies distinguish between the types of change addressed in professional development. This gap in the literature makes it difficult to draw on existing research to develop effective, research-based online PD for evolutionary change.

Purpose Statement

This multiple-article dissertation aimed to create a set of design principles to aid in developing online teacher professional development that supports making evolutionary changes to instructional practice. Using educational design research (EDR), five theoretically based design principles were created and refined through two design, development, and research studies. Chapter 2 discusses evaluating a theoretical framework for the design principles through the first study. As part of the EDR project, Chapter 3 discusses the development of a readiness-to-change questionnaire to assess teachers' readiness to make evolutionary changes to their instructional practice. The second EDR study, discussed in Chapter 4, evaluated two specific design principles within the context of an authentic teacher professional development implementation.

Dissertation Structure

This dissertation employs a multiple-article structure that follows the University of Georgia Graduate School (2021) guidelines for a manuscript-style dissertation. Based on the UGA guidelines, this dissertation includes an introduction and literature review chapter, three chapters formatted as articles intended for publication in peer-reviewed scholarly journals, and a concluding chapter that brings together the significant findings of the overall study.

The primary reason for the multiple-article structure is that this dissertation details a three-study educational design research (EDR) project. Educational design research (EDR), as defined by McKenney and Reeves (2012), is:

> A genre of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others. Its goals and methods are rooted in, and not cleansed of, the complex variation of the real world (p. 7).

EDR was chosen for this study because it "seeks to increase the impact, transfer, and translation of education research into improved practice" (Anderson & Shattuck, 2012, p. 2). Table 1.1 shows how each of the three studies that are discussed in chapters 2-4 are connected and how, when combined, lead to a maturation of the design principles presented in this dissertation. As each study was completed the knowledge gained was used to inform the continued development of the design principles. Through the article-based discussion of the individual studies, each article contributes meaningfully to the overall goal of developing and testing a set of design principles for online teacher professional development that supports evolutionary change.

Table 1.1

Three Study Overview and EDR Alignment

Study Number	EDR Iteration	Dissertation Chapter	Study Name	Study Overview
1	1	2	Designing Professional Development to Support Evolutionary Changes in Teaching Practice	Design principles were developed to support evolutionary change. The efficacy of the design principles was tested with 75 K-12 teachers to determine if critical reflection and change were recognized as valued aspects of a course developed using the design principles.
2	1	3	Modifying a Tool to Assess Teachers' Readiness to Make Changes to Their Instructional Practice	The URICA was modified resulting in the URICA-TEACH, to determine if teachers' readiness to change could be assessed prior to them engaging in professional development. 191 K-12 teachers completed the URICA-TEACH to validate the questionnaire.
3	2	4	Supporting Evolutionary Changes in Teaching Practice through Critical Reflection	Two of the five design principles were further study in a new iteration of the EDR project. Twelve K-12 teachers participated in an online professional development course. Their work was analyzed first qualitatively and then quantitatively to investigate the occurrence of evolutionary changes being made to instructional practices.

Chapter 2, entitled *Designing Professional Development to Support Evolutionary Changes in Teaching Practice*, details the theoretical framework for a specific design of online

professional development to support teachers in making evolutionary changes to their instructional practice. This article aimed to create a theory-driven set of design principles that can be applied to professional development given these attributes. The proposed design principles were then operationalized within a professional development model. The evaluative data presented supports the efficacy of the design and principles.

Chapter 3, entitled *Modifying a Tool to Assess Teachers' Readiness to Make Changes to Their Instructional Practice,* details the process and results of the modification of a tool to assess teachers' readiness to change. Researchers have found that many teachers fail to implement the strategies introduced during professional development within their classrooms – even when participating in professional development that adheres to research-based guidelines for effectiveness (Doherty, 2011; Ehlert & Souvignier, 2023; Guskey, 2000; Linn et al., 2010; Meyer et al., 2023). One reason for this lack of change is that teachers are not ready or willing to change (Pelletier, 2006). For a successful change process, individuals must be ready to change (Armenakis et al., 1999; Lizar et al., 2015). Therefore, this article aims to modify and validate a questionnaire that will assist in measuring teachers' readiness to change their instructional practices. Researchers and teacher educators will benefit from the results of this study as it may help establish a relationship between teachers' attitudes about change and the implementation of changes in their instructional practice.

Chapter 4, entitled *Supporting Evolutionary Changes in Teaching Practice through Critical Reflection,* reports the findings of the second EDR study that evaluated the effectiveness of using two design principles grounded in critical reflection in supporting teachers in making evolutionary changes to their instructional practice. The focus study for this article sought to answer the following mixed-methods research questions:

1. What level of reflection can be observed in participants' work on each critical reflection trigger point within the course?
2. What changes in knowledge, beliefs, and instructional practice do participants express in their coursework on each of the critical reflection trigger points?
3. What are the patterns between readiness levels (low, mid, and high) and intent to change as expressed in the reflection prompts?
4. What patterns in intent to change and level of reflection emerged among participants at low, mid, and high levels of readiness to change?

The study's results are reported and meta-inferences are offered regarding the effectiveness of the critical reflection design principles.

Chapter 5 presents an integrated overview of key findings from each EDR study, along with the implications for future research for the continuation of the EDR project undertaken in this dissertation.

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CHAPTER 2

DESIGNING PROFESSIONAL DEVELOPMENT TO SUPPORT EVOLUTIONARY CHANGES IN TEACHING PRACTICES[1]

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Abstract

Professional development provides teachers with the knowledge and skills to build their professional pedagogy and affect student learning. However, research has shown that professional development, in its current form, has yet to reach its full potential, particularly in cases where the desired outcome is some change in teachers' instruction practices. This article proposes a purposeful set of design principles that can be used in developing online professional development courses that support teachers in making evolutionary changes to their instructional practice.

Through the combined theoretical foundations of Kolb's (1983) Experiential Learning Theory, Guskey's (2002) Model of Teacher Change, and Bandura's (1986) Social Cognitive Theory, a set of five design principles focused on critical reflection was created. The efficacy of the design principles was explored through an educational design research (EDR) pilot study. Both qualitative and quantitative data were analyzed, and results suggest that teachers found the act of reflection beneficial to the learning process, and they were able to identify changes that they made to their instructional practice during the learning cycle.

Key Words: Teacher professional development, teacher change, professional development design, online teacher professional development

Introduction

The support for face-to-face workshop-style teacher professional development can be traced back to the mid-1800s. In the Annual Report of the Superintendent of Common Schools of the State of New York it was stated:

> More can be done in one day towards giving teachers of a town a reasonable system of practical teaching and management, when assembled together, than in as many days as there are school, spent in the school room, one day at each school. (Young, 1845,p. 131)

These ideas gave rise to the large face-to-face workshop model that many teachers today still encounter. Historically, such approaches were successful because teachers needed to be taught the content they were to teach along with a set of rules and procedures they were expected to follow while teaching (Adler, 1991). Training on isolated content, rules, and procedures could easily occur outside the classroom, reaching the greatest number of individual teachers in the shortest time.

In more recent years, the focus of teacher professional development has shifted from training on isolated content, rules, and procedures to helping teachers learn how to make instructional decisions within the context of their classroom (Adler, 1991; Ball & Cohen, 1999; Garet et al., 2001). This shift in focus from content to practice resulted partly from expectations for teachers to improvise, conjecture, experiment, and assess their practice as it applies to their students at any given time (Ball & Cohen, 1999). While the beliefs about what teachers need to know and be able to do have changed, the design and delivery of teacher professional development have remained the same. Recent research has indicated that large face-to-face workshops are not necessarily effective at changing teacher practices to meet new instructional

expectations (Borko, 2004; Darling-Hammond, 2013; Hargreaves & Fullen, 2012; Marzano & Toth, 2013; McGinn, 2012; National Council on Teacher Quality, 2013).

Effecting Change through Reform

Providing teachers with opportunities to engage in effective professional development is important because the purpose of professional development has expanded. At one point, the purpose was only to effect change in teachers' knowledge and skills; now, the purpose is also to change teachers' attitudes, beliefs, and instructional practices (Desimone, 2009). One current effort at changing or reforming a teacher's instructional practice in the United States is teacher evaluation reform. One aspect of teacher evaluation reform involves using classroom observations to assess the quality of teachers' instructional practices (National Council on Teacher Quality, 2013). The results of these observations are used for accountability purposes. However, if teacher evaluation reform is to fulfill its ultimate goal of positively impacting teacher practice, observation results need to be used for more than assigning accountability (National Comprehensive Center for Teacher Quality, 2012; Hargreaves & Fullen, 2012). Instead, observation results should be a way for teachers to continuously improve their practice (Papay, 2012). Using observation results as a way for teachers to improve their instructional practice continuously leads to the challenge of supporting those changes through professional development.

Teacher professional development that supports teachers in making continuous changes to their instructional practice is seen by many as a critical determinant in the success of teacher evaluation reform (National Comprehensive Center for Teacher Quality, 2012; Marzano & Toth, 2013; Darling-Hammond, 2013). The National Council on Teacher Quality (2013) has noted that there needs to be more attention paid to what teachers can do to improve their practice when they

receive poor evaluation results. Many current professional development offerings focus on supporting teachers as they learn new instructional practices. While this professional development method may meet some teachers' needs, current teacher evaluation systems measure teacher effectiveness based on implementing current instructional practices rather than new ones. With this in mind, teachers are more likely to benefit from professional development that helps them move their current practice to the next higher level of performance, as opposed to professional development that focuses on replacing teachers' current practice (Borko, 2004; Darling-Hammond, 2013; Hargreaves & Fullen, 2012; Marzano & Toth, 2013; McGuinn, 2012; National Council on Teacher Quality, 2013).

Supporting teachers in moving their instructional practice to the next higher level of performance may also include professional development in which teachers learn to understand the limitations and the strengths of their current teaching practice (Borko, 2004; Boyle et al., 2005; Zaki et al., 2013). To support teachers in making changes to their instructional practices that move them to higher levels of performance, the professional development design should be purposeful towards providing support for that specific type of change.

Designing for Change

Within education and educational reform professional development, the concept of change has focused on teachers' instructional practices. Teacher evaluation systems specifically focus on teachers improving their current practice based on classroom observations and feedback on their instruction. This type of change is evolutionary rather than revolutionary. Evolutionary change builds on teachers' existing knowledge, beliefs, and instructional practice and then gradually supports teachers in changing those over a sustained period (Burke, 2014; Fraser et al., 2007). Revolutionary change, on the other hand, is a type of change that involves making

significant changes, resulting in a completely new approach to instruction (Burke, 2014). Revolutionary change is often facilitated through stand-alone workshops focusing on the primary practice of interest to supplant, rather than build upon, existing practices. Each form of change necessitates a different professional development design.

For professional development to support teachers in making evolutionary changes to their current instructional practices, the design of the professional development should focus on helping teachers gradually align their practice with the research-based indicators of effective teaching and learning. Key to teachers making evolutionary changes to their instructional practice is the development of a self-awareness of their current instructional practice and the ability to identify and understand their instructional practice challenges (Galea, 2012; Loughran, 2002). Research shows that a teacher's knowledge and beliefs about instruction influence their instructional practice (Aguire & Speer, 2000; Clarke & Hollingsworth, 2002; Kuzborska, 2011; Long, 2012; Pajares, 1992). Therefore, in addition to supporting teachers in making evolutionary changes to the strategies employed during instruction, professional development designs should support teachers in making evolutionary changes to their knowledge and beliefs, as well as providing support for teachers in gaining self-awareness of their instructional practice.

Theoretical Framework

Two learning theories are beneficial for addressing the design of teacher professional development that supports teachers in making evolutionary changes to their knowledge, beliefs, and instructional practice. These theories, Experiential Learning Theory and Social Cognitive Theory, are explained and explored below through the teacher's professional development lens. Experiential Learning and Social Cognitive theories were used to develop a set of both practical

and theoretically based design principles that can be used to design teacher professional development that supports evolutionary change.

Experiential Learning Theory

Experiential learning theory suggests that the learner's experience plays a central role in the learning process (Kolb, 1983). Drawing from the experiential learning models of Dewey, Lewin, and Piaget, Kolb (1983) defines *learning* as "the process whereby knowledge is created through the transformation of experience" (p. 38). This transformation occurs through two distinct types of experience: grasping experiences and processing experiences. Grasping experiences are those during which new information and ideas are perceived and take the form of either concrete experiences (e.g., completing an authentic task) or abstract conceptualizations (e.g., reading or watching). Processing experiences are those during which the learner's beliefs and behaviors transform either through reflective observations, watching themselves or others, or through active experimentation in which the learner tries out new ideas in authentic situations (Kolb, 1983; Kolb et al., 2001).

Guskey's (2002) Model of Teacher Change is an experiential learning model that can be used to explain the role that professional development takes within the process of teachers making evolutionary changes to their instructional practice. It is a four-phase model created on the understanding that teachers will not change their attitudes and beliefs about teaching and learning until they see that new practices positively impact their students' learning outcomes. Within his model, Guskey (2002) described the process of teacher change as beginning with some form of professional development, trying out new strategies presented in the professional development, determining the benefits for students, and then, only after seeing a positive impact on students, changing their own beliefs and practices.

This study applied Kolb's (1983) experiential learning through a modified version of Guskey's (2002) Model of Teacher Change as a theoretical framework for designing teacher professional development that supports evolutionary change. In Guskey's model, teachers try out ideas and strategies in their classroom after they have engaged in professional development. In the professional development design of this study, teachers are guided through the experience of trying out ideas and strategies as a part of the professional development experience. Incorporating the trying out of ideas and strategies within professional development allows processing experiences to occur. Kolb (1983) described these experiences as helping transform teachers' beliefs and behaviors.

Social Cognitive Theory

While rooted in experiential learning theory, Guskey's (2002) Model of Teacher Change also supports the integration of Social Cognitive Theory into teacher professional development opportunities. Social cognitive theory focuses on the reciprocal relationship between the environment, the behavior, and the personal internal processes that influence the learner's beliefs and actions. In this model, a person's internal processes (expectations, beliefs, self-perceptions, goals, and intentions) directly impact their behavior, and one's behavior impacts their internal processes. Similarly, the environment impacts personal internal processes, and personal internal processes play a role in eliciting environmental reactions. The same is seen in the relationship between behavior and the environment. A person's environment impacts their behavior, and their behavior elicits a specific response from their environment (Bandura, 1986). The reciprocal relationship between behavior, environment, and personal internal process should be considered when the professional development goal is to support teachers in changing their teaching

practices or behaviors. Integrating Social Cognitive Theory into professional development design may be used to support teachers in making evolutionary changes to their instructional practice. The critical foundation of social cognitive theory is that “learners draw out information from observing the behaviors of others, and then make decisions about which behaviors to accept and perform” (Richey et al., 2011, p. 61). These fundamental observations and decision-making events are brought about through the four key theoretical components, including the behavior model, consequences of behavior, learners’ internal processes, and learners’ perceived self-efficacy.

The behavior model. To learn through observation, one needs a behavior model to observe (Bandura, 1986). Observing the model behavior is not to produce imitation or mimicry but to provide an example of the behavior and its governing principles (Bandura, 2005). The behavior model then serves as a foundation for individuals to "generate new versions of the behavior that go beyond what they have seen or heard" (Bandura, 2005, p. 13). The process of learning by observing the behavior model can be creative and innovative, and what is learned through that observation depends on each individual. Behavior models can be concrete, such as an individual being in the environment and observing the behavior as it is being enacted, or symbolic, such as observing via electronic media (Bandura, 2005).

The consequences of the behavior. The outcome, or consequences, of a modeled behavior plays a role in shaping the perceived value of the behavior for the observer (Bandura, 1986; Shunk, 2008). When individuals find value in the consequences generated by the behavior, they may be motivated to adopt a similar behavior (Bandura, 1986; Richey et al., 2011; Shunk, 2008). The role of the consequences of behavior models can be seen in Guskey's (2002) Model of Teacher Change. In Guskey's model, teachers only change their instructional practice or

teaching behavior once they see that there are positive consequences for their students as a result of an implemented behavior (Guskey, 2002).

The learner's internal processes. Interpretations of, and decisions regarding, a behavior modeled are influenced by the individual. Bandura (2001) viewed social cognitive theory through an agentic perspective. Through this perspective, an individual's actions and decisions to action are influenced by their intentions, forethought, self-reactiveness, and self-reflectiveness. Intentions are plans of action, can either be future or present-directed and will be adjusted and revised as individuals consider new information. Forethought involves an individual's goals and considerations of consequences and may be influenced by past experiences, personal values, beliefs, and knowledge. When exercising forethought, "people motivate themselves and guide their actions in anticipation of future events" (Bandura, 2001, p. 7). Self-reactiveness involves self-monitoring one's actions in relation to the desired consequences and then adjusting one's actions based on those results (Bandura, 2001). Self-reflectiveness is the "metacognitive capability to reflect upon oneself and the adequacy of one's thoughts and actions" (Bandura, 2001, p. 10).

The learner's perceived self-efficacy. Self-efficacy is "the individual's confidence in her or his ability to perform a specific task" (Richey et al., 2011, p. 62). Perceptions of self-efficacy can come from performance accomplishments, experiences, internal persuasions, and physiological reactions that occur during and as a result of behavior consideration and enactment. When individuals perceive enhanced levels of self-efficacy toward a behavior, the underlying principles of that behavior may be transferred to similar situations (Bandura, 1977). For example, suppose an elementary school teacher has high levels of perceived self-efficacy in

their questioning skills during science lessons. In that case, they may, in turn, begin to apply those questioning skills during mathematics lessons.

Four processes make up observational learning of the social cognitive theory: attention, retention, production, and motivation (Bandura, 1986).

Attention. During the attention process, learners perceive their personal meaning in relation to the behavior being modeled. Key to this process is breaking down complex behavior and/or tasks into smaller, more manageable pieces to help ensure success (Bandura, 1986).

Retention. Retention happens when the learner internally transforms the modeled knowledge for storage and encoding into memory. The process is increased by "rehearsing the information to be learned, coding in visual and symbolic form, and relating new material to information previously stored in memory" (Schunk, 2008, p. 86). During this process, teacher-learners begin to transform their beliefs and understandings.

Production. Production involves the learner translating their new understanding into actual behavior, and teacher-learners compare their behaviors and their understanding of the model (Schunk, 2008; Richey et al., 2011).

Motivation. When the modeled behavior is seen as one that the teacher-learner interprets as benefiting their students, motivation for performing the behavior is generated. Further, when teacher-learners see the positive consequences of their own implementation of the modeled behavior, motivation for future change is created, and teacher efficacy is raised (Schunk, 2008; Richey et al.,2011).

Each component of Social Cognitive Theory reinforces the considerations needed for the design of teacher professional development for evolutionary change. The purpose of the behavior model presented within professional development is to serve as a way for teachers to understand

the instruction aspect that is the focus of the intended change. With an understanding of the behavior, teachers may decide how this change will be embodied within their practice. Through that embodiment, changes made during authentic classroom lessons are examined, further changed, or reinforced based on the consequences experienced. These consequences can be measured in terms of the impact on student learning. As teachers experience these consequences, they change their own beliefs and understandings, and when the consequences come in the form of positive reinforcement from students, teacher efficacy is increased. The professional learning process begins with the initial observation of a modeled behavior, and the observational learning process becomes integral to the change process.

Proposed Design Principles

Designing professional development to bring about and support an evolutionary change in the instructional practices of experienced classroom teachers may be informed by applying a purposeful set of design principles. The five design principles developed for use in this study were: centered on critical reflection, active participation through experiential learning, examination from multiple perspectives, providing alternatives, and operationalizing critical reflection through a guided process. These principles drew first on Social Cognitive Theory to better understand how learning happens when environment, behavior, and personal internal processes mutually influence a learner's beliefs and actions. Experiential Learning Theory then informed the types of experiences needed to support learning from a Social Cognitive perspective. Guskey's Model of Teacher Change provided a reference for deciding how to situate the learning experiences within the context of teacher professional development for evolutionary change. Table 2.1 summarizes the design principles, displays the theoretical alignment of individual design principles to either or both Social Cognitive Theory and Experiential Learning

Theory, and shows how the design principles were operationalized within the professional development activities.

Table 2.1

Design Principle Theoretical Alignment

Design principle	Evolutionary change in teachers' knowledge and beliefs happens when…	Professional development activities	Theoretical foundation
Center on critical self-reflection	Goals and activities are centered on critical self-reflection allowing for observations of practice, implementation, and consequences on students' learning through both grasping and processing experiences.	Embedded triggers throughout the course and allow for reflection on current practice, potential alternatives, implementation of alternatives, and changes made to knowledge, beliefs, and/or practice.	Social Cognitive Theory (Bandura, 1986) Experiential Learning Theory (Kolb, 1983)
Active participation through experiential learning	Teachers are actively involved through the context of their classroom and own personal experiences.	Activities in which the teacher works in their classroom to gather data and experiment with alternative strategies.	Experiential Learning Theory (Kolb, 1983)
Examination from multiple perspectives	Teachers examine their instructional practice from multiple perspectives.	Key questions focused on consequences through multiple perspectives with the option to implicitly reflect through the peer lens on the discussion board when examining alternatives.	Social Cognitive Theory (Bandura, 1986)
Provide alternatives	The content of the professional development provides viable and diverse instructional alternatives.	Alternative strategies for consideration presented through videos, instructional cases, and course readings.	Social Cognitive Theory (Bandura, 1986)
Operationalize critical reflection through guided process	Guidance for completing each step of the critical self-reflection to support teacher efficacy aligned to the processes of attention, retention, production, and motivation.	Teachers are guided throughout the process through the course scaffolding and critical reflection triggers.	Social Cognitive Theory (Bandura, 1986) Experiential Learning Theory (Kolb, 1983)

Center on Critical Reflection

Having a design principle explicitly focused on critical self-reflection allows for professional development goals and activities to be centered on and around critical self-reflection. Critical self-reflection, when used as a form of professional development, often utilizes reflection as a way to assess teachers' understanding of what is being taught (Carrington & Selva, 2010; Cornish & Jenkins, 2012; Guskey, 2002, 2014; Long, 2012; Orrill, 2001; Pelgrim et al., 2013). In models that utilize reflection as a form of assessment, the content is the center of professional development. For critical self-reflection to be effective in bringing about change, it must be intentionally and systematically placed at the center of professional development (Adler, 1991; Laprade et al., 2014; Loughran, 2002; Orrill, 2001; Osterman & Kottkamp, 2004). In this study, the first design principle centers on critical reflection because the overarching goal is to assist teachers in changing their knowledge and beliefs around a specific content focus through critical self-reflection. To do that, teachers need support with developing their critical self-reflection skills.

Active Participation through Experiential Learning

Many aspects of the classroom change every year, including the students, content topics, and curriculum taught. Teaching, therefore, continuously changes in order to meet the needs of students. Much of the professional development that teachers receive, however, addresses teaching and learning through a broad context due to the diverse teaching background of the audience. Having teachers actively participate in learning through activities that require work within their classroom context provides a relevant context for inquiry (Adler, 1991; Ball & Cohen, 1999; Borko, 2004; Darling-Hammond, 2013; Dewey, 1910, 1933; Guskey, 2009; Kolb, 1983; Schon, 1983, 1987). When teachers become active participants in learning situated in their

work context, they are better able to confront their knowledge and beliefs, experiment within the confines of their students, and see, hear, and feel the impact of their instruction on students (Dewey, 1910, 1933; Guskey, 2009; Kolb, 1984; Richey et al., 2011; Schon, 1983, 1987). These actions are essential to the change process in that "monitoring one's pattern of behavior and the cognitive environmental conditions under which it occurs is the first step towards doing something to affect it" (Bandura, 2001, p. 8).

Examination from Multiple Perspectives

As teachers critically self-reflect, they take time to examine the effectiveness of their practice. Expanding this critical reflection to include an examination from multiple perspectives can provide teachers with a more holistic view of their practice, which may lead to a greater depth of understanding and self-awareness (Adler, 1991; Cornish & Jenkins, 2012; van Mannen, 1995). Research shows four critical lenses through which teachers should critically self-reflect: autobiographical, student, peer, and theoretical.

Autobiographical lens. Autobiographical, or reflecting on oneself, is the foundation of critical self-reflection and is the first lens teachers will use to reflect (Brookfield, 1995; Cornish & Jenkins, 2012; Dewey, 1933; Schon, 1987; van Mannen, 1995). Critical reflection through this lens often entails comparing and contrasting current teaching experiences to past experiences of the teacher as a learner, their knowledge and beliefs developed over time, past ideologies, and more (Brookfield, 1995; Cornish & Jenkins, 2012). As teachers critically reflect through the autobiographical lens, teachers can identify areas within their current practice that may become the focus of their change efforts (Brookfield, 1995; Cornish & Jenkins, 2012; Dewey, 1933; van Mannen, 1995).

Student lens. Just as important as critically reflecting through the autobiographical lens is to critically reflect through the student lens (Brookfield, 1995; Cornish & Jenkins, 2012; Guskey, 2002). This perspective allows teachers to examine the experience that students have with and through instruction and also to determine the impact that a particular aspect of the instruction has on students' learning, as this can serve as reinforcement for or against change (Bandura, 1971; Brookfield, 1995; Cornish & Jenkins, 2012; Guskey, 2002). Careful and guided coupling of the autobiographical lens with the student lens during a period of critical self-reflection allows teachers to begin to determine if their knowledge, beliefs, and, as a result, their instructional practice discovered through one lens is affirmed through the other (Brookfield, 1995; Cornish & Jenkins, 2012; Osterman & Kottkamp, 2004). At the same time, teachers may begin to determine the cause and set goals for making a change for any identified differences.

Peer lens. When considering alternatives to current instructional practice, teachers may need to seek knowledge and ideas from their peers (Brookfield, 1995; Garet et al., 2001; Osterman & Kottkamp, 2004). When engaging peers in their critical self-reflection, teachers can discuss ideas and challenges with "others who work in situations like ours" (Brookfield, 1995, p.36). According to Osterman and Kottkamp (2004), "contrasting, opposing ideas or alternate explanations stimulate engagement and further challenge learners to assess and refine their thinking" (p. 20). It should be noted, however, that it is argued in recent literature that involving peers in critical self-reflection may bring about tensions in the experience based on the personal nature of critical self-reflection (Cannon & Edmonson, 2005; Putnam & Borko, 2015). Specific considerations should be made within the professional development design to reduce the possibility of added tensions to the critical self-reflection process and allow teachers the potential benefits of critically reflecting through the peer lens.

Theoretical lens. Having found a gap in knowledge and beliefs, and, as a result, practice, teachers may continue to critically reflect through the lens theoretical lens by consulting the scholarly literature on the topics to gain additional insights (Brookfield, 1995; Osterman & Kottkamp, 2004). Critical self-reflection through the theoretical lens provides teachers with deeper insights and potentially alternative strategies for experimentation. It can also help teachers to "understand the link between their private teaching struggles and broader political processes" (Brookfield, 1995, p. 38).

Provide Alternatives

When critically reflecting on their practice, teachers often need help with gaps in their knowledge of strategies and approaches when current practice does not yield the desired results. For this reason, teachers should be provided with alternatives to experiment to find the approach that works within their classroom context (Guskey, 2009; Willis, 2002; van Mannen, 1995). These alternatives can serve as a source for new strategies but can also serve as behavior models, a key component of social cognitive theory (Bandura, 1986). As teachers examine the behavior models through direct or indirect observations, such as through video, they are guided to notice the consequences on teaching and learning the behavior during implementation. As teachers consider these consequences, they decide whether to implement the behavior in their classroom. As with Guskey's (2002) Model of Teacher Change, when teachers implement a new strategy or adopt new behavior and observe positive consequences, they will experience an increase in their perceived self-efficacy. As teachers continue using the alternative based on the positive consequences, they will have potentially experienced a change in both their knowledge and beliefs.

Operationalize Critical Reflection through a Guided Process

Research has yielded critical self-reflection models and descriptions of critical self-reflection processes (Dewey, 1910, 1933; Larrivee, 2000; Mezirow, 1990; Schon, 1983, 1987; Orril, 2001; Osterman & Kottkamp, 2004). However, these models and processes typically focus on helping one understand critical self-reflection rather than on how to critically self-reflect (Adler, 1991). For example, Osterman and Kottkamp (2004) provide readers with a cycle for critical reflection. The cycle is initiated with a problematic situation. The first step in the cycle is problem identification, then moving on to observation and analysis, abstract reconceptualization, and then active experimentation. This cycle repeats until the teacher comes to a solution for the original problematic situation. What needs to be added to the cycle and other models and processes is how one should work through these steps in the cycles. Many specific questions still need to be answered. As van Mannen (1995) pointed out, teachers already experienced in critical self-reflection may not need additional guidance. However, less experienced and novice teachers may need additional guidance.

Learning how to critically self-reflect and the process of critical self-reflection is challenging (Adler, 1991; Ostermann & Kottkamp, 2004). Without clear guidance, teachers may misinterpret the process as a form of rationalization. When rationalization occurs, teachers may not clearly understand problem situations, nor do they know of or believe an alternative would solve the problem. Often, the problem is seen as something outside of one's control and, therefore, unsolvable (Loughran, 2002). Loughran (2002) pointed out that just because a teacher may have experience with reflection in general, it does not mean they understand how to critically self-reflect and would, therefore, need guidance through this process.

Within a professional development context, guidance for critical self-reflection can come through scaffolding and reflection triggers (Addler, 1991; Carrington & Selva, 2010; Verpoorten et al., 2012). Scaffolding should include breaking down complex learning tasks and teacher practices into more manageable chunks and breaking down evolutionary change by providing questions that evolve to "be more specific and in-depth" (Orrill, 2001, p. 30), thus leading the teacher from a surface reflection to a process of critical self-reflection. For example, teachers may begin by critically reflecting on the technical aspects of their instruction and then move on to questions that involve an autobiographical lens. From there, they would answer questions that involved the perspectives of others, and then finally, they would critically self-reflect on a more global scale while at the same time critically reflecting at a greater depth (Adler, 1991; Orrill, 2001). When scaffolding occurs in this way, teachers gain greater self-awareness of their knowledge and beliefs and can understand the connection between teaching and learning and their role in students' success (Adler, 1991; Bandura, 1971). With greater self-awareness, teachers can "reflect on their personal efficacy, the soundness of their thoughts and actions, the meaning of their pursuits, and make corrective adjustments if necessary" (Bandura, 2005, p. 10).

When engaging in critical self-reflection, teachers may need support in knowing what type of questions to answer and when to answer those questions. This guidance can come in the form of reflective triggers. Reflective triggers are deliberate prompts within the professional development course that signal the teacher to stop and reflect (Verpoorten et al., 2012). In many cases, these can be questions strategically placed within the course, but they can also be reminders or activities that require critical reflection to be completed.

Design Pilot

This project was framed as educational design research (EDR) – an iterative approach to designing and studying an instructional intervention over time in an applied setting (McKenney & Reeves, 2012). Three online courses were constructed using the proposed design principles. The courses were piloted with K-12 teachers (n=75) in a large urban school district in the northeastern part of the United States. The pilot's goal was to test the efficacy of the design principles and elicit feedback from participants to determine if the activities within the courses provided them with a heightened self-awareness of their instructional practices. The EDR project consisted of one mesocycle comprised of three micro-cycles:

1. Analysis and exploration in the form of the literature review;
2. The design and construction described earlier in the paper, and;
3. Evaluation and reflection as part of the pilot.

Course Delivery Mode

Several needs were considered when determining the delivery mode for professional development:

1. Provide teachers access to their classroom learning space as part of the learning process.
2. Meet the needs of each teacher.
3. Provide teachers with a flexible format for learning and engaging in the critical reflection process.

Based on the foundations of experiential learning theory and social cognitive theory, the determination was made to implement professional development through online delivery.

Online professional development programs have been implemented as a viable alternative to traditional face-to-face professional development (Bill & Melinda Gates Foundation, 2014;

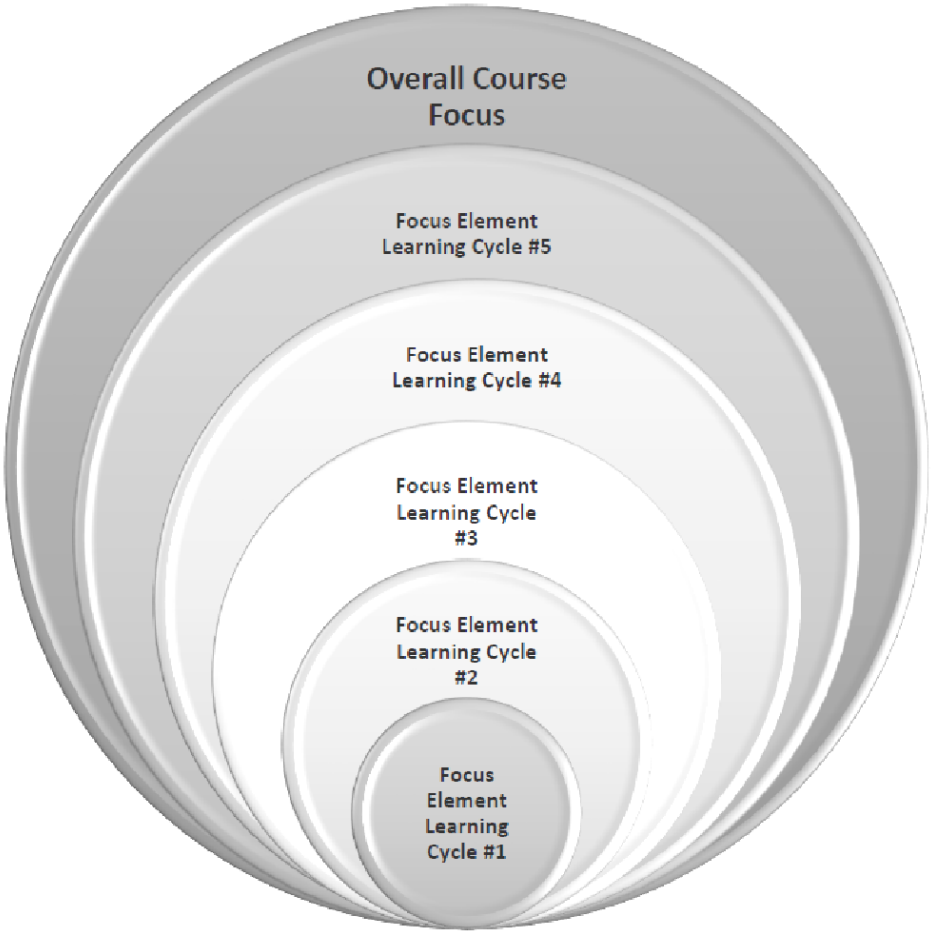
Carr, 2010; Dede et al., 2009). It was determined that online delivery would allow teachers to move from the formal learning space to the authentic context of their classroom. The online delivery integrated teachers' classrooms as part of the learning process, allowing for concrete experiences, active experimentation, critical reflection, and observation of the consequences of instructional behaviors. Online delivery of professional development further allowed for the opportunity to provide an increased scope of resources through the online learning platform, increased flexibility in time and location, and condensed delivery of content in smaller units of learning (Bartley & Goleck, 2004; Bill & Melinda Gates Foundation, 2014; Carr, 2010; Michael, 2012; Petrides, 2002; Schrum, 1998). Along with allowing teacher-learners to move between the formal and informal learning spaces easily, it also allowed for the individualization of learning by creating a safe reflective space in which teachers analyzed their practice, beliefs, and understanding. Online delivery also allowed for individualized support from the course facilitator through feedback and two-way communication and provided a place for purposeful peer interaction through online discussion boards.

Course Structure

A key element used in the course structure design was the need to break complex ideas and topics down into smaller more manageable parts (Bandura, 1986). Figure 2.1 shows how this need is operationalized within the overall structure. Within the course structure, teachers completed multiple learning cycles. Each cycle focused on a single element of a more complex idea. For example, complex ideas such as student engagement, differentiated instruction, or student-centered learning can be the broad focus of the course, and each cycle then addresses a specific element of this more complex focus. The number of individual learning cycles completed depends on the number of individual elements of the larger course focus.

Figure 2.1

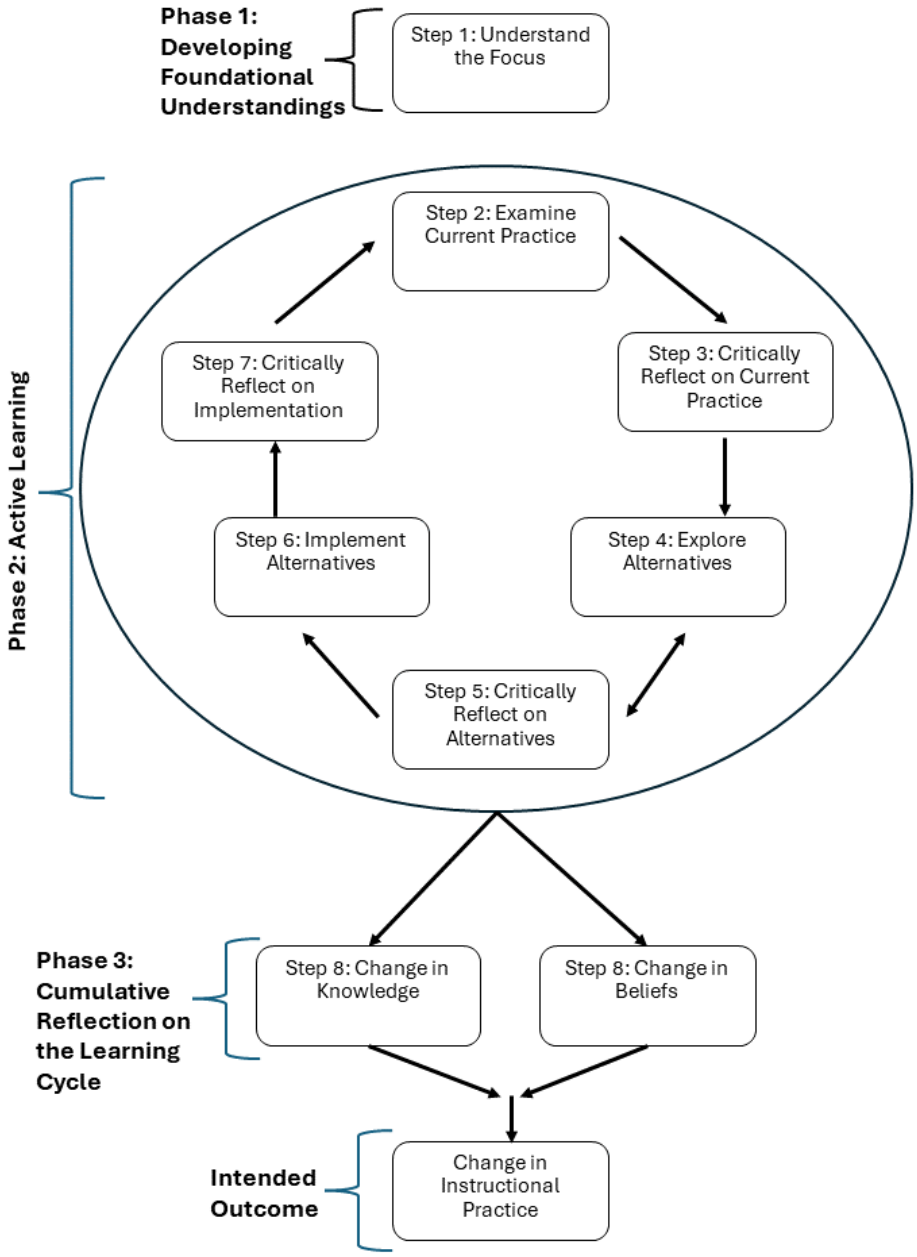
Course Structure



Learning cycle structure. Just as the overall course structure was purposeful in its design, so was the structure of each learning cycle. Figure 1.2 shows the structure of a learning cycle, including the phases and steps in which participants engage—within each learning cycle, participants moved through three phases. Phase 1 was the development of foundational understandings. Phase 2 encompassed a cycle of active learning. Phase 3 was a cumulative reflection on the learning cycle. Each phase was designed to support changes in teachers' knowledge and beliefs that may lead to changes in teachers' instructional practices.

Figure 2.2

Learning Cycle Structure



Phase 1: Development of foundational understandings. In Phase 1, participants worked through Step 1: Understand the Focus. Course activities supported participants as they worked to understand the content and conceptual focus of the cycle by learning more about the instructional

behavior model to be examined. Specifically, participants worked to answer the question, 'What is the desired behavior.' Within this first step of the learning cycle, participants were engaged in experiences designed to support grasping experiences through abstract conceptualization (Kolb, 1983), to assist participants in developing a shared understanding of the behavior model, and to serve as starting points for the Attention Process in which participants begin to relate the model behavior to their behavior (Bandura, 1986). Table 2.2 summarizes the theoretical foundations for Phase 1 of the learning cycle.

Table 2.2

Phase 1 Theoretical Alignment

Learning Cycle Step	Experiential Learning Theory (Kolb, 1983; Kolb, Boyatzis, & Mainemelis, 2001)	Model of Teacher Change (Guskey, 2002)	Social Cognitive Theory (Bandura, 1986)
Understand the focus	Grasping Experience through Abstract Conceptualization	Stage 1: Teachers Experience Professional Development	Theoretical Component: Behavior Model Observational Learning Process: Attention

Phase 2: Active learning. Phase 2 was a phase of active learning encompassing steps 2-7 of the learning cycle. Participants worked through alternating episodes of critical reflection and experiential learning activities within these six steps. Each step in Phase 2 was designed to support participants as they analyzed and made decisions regarding their current practice, identified and tested new practices, and examined the consequences of their practice from multiple perspectives. Table 1.3 summarizes the theoretical foundations for the six steps in Phase 2.

Table 2.3

Phase 2 Theoretical Alignment

Learning Cycle Step	Experiential Learning Theory (Kolb, 1983; Kolb, Boyatzis, & Mainemelis, 2001)	Model of Teacher Change (Guskey, 2002)	Social Cognitive Theory (Bandura, 1986)
Examine Current Practice	Grasping Experience through Concrete Experience Processing Experience through Self-Observation	Stage 1: Teachers Experience Professional Development	Theoretical Component: Consequences of Model Behavior Observational Learning Process: Attention
Critically Reflect on Current Practice	Processing Experience through Reflective Observation	Stage 1: Teachers Experience Professional Development	Theoretical Component: Internal Processes Observational Learning Process: Attention
Explore Alternatives	Grasping Experience through Abstract Conceptualization	Stage 1: Teachers Experience Professional Development	Theoretical Component: Behavior Model Observational Learning Process: Retention
Critically Reflect on Alternatives	Processing Experience through Reflective Observation	Stage 1: Teachers Experience Professional Development	Theoretical Component: Internal Processes Learner's Perceived Self-Efficacy Observational Learning Process: Retention Production
Implement Alternatives	Processing Experience through Active experimentation	Stage 2: Try Out New Strategies	Theoretical Component: Internal Processes Learner's Perceived Self-Efficacy Observational Learning Process: Production
Critically Reflect on Implementation	Processing Experience through Reflective Observation	Stage 3: Determine Benefits Stage 4: Make Change Decisions	Theoretical Component: Learner's Perceived Self-Efficacy Observational Learning Process: Motivation

Phase 3: Cumulative reflection on the learning cycle. This final phase of the learning cycle guided participants through critically reflecting on any changes in their knowledge and beliefs related to the desired instructional behavior. The intended outcome of this examination was for there to have been an evolutionary change in participants' knowledge and beliefs that would lead to sustained changes in instructional practices.

Data Collection

After completing the course, participants provided feedback on their experience. A four-item questionnaire was created to assess participant experiences within the course. The questionnaire contained two general items about the course experience. One asked the amount of time (in hours) that it took to complete the course. The second asked participants to rate the overall clarity of the course content and structure on a 4-point Likert scale with the following labels: (1) Very Confusing, (2) Confusing, (3) Clear, or (4) Very Clear. The third item asked participants to rate the course overall on a 4-point Likert scale with the following labels: (1) not as challenging as it could have been; (2) okay; (3) worthwhile; and (4) challenging and worthwhile. The third item also contained an area where participants may explain their rating. The final item was an open-ended question that asked whether participants would recommend the course to a colleague and why they would/would not do so.

Data Analysis

Descriptive statistics were first calculated on the first three items. Open-ended items in questions three and four were examined using thematic analysis. Themes were constructed through consensus building among two researchers. The researchers first read through the items and identified patterns across responses that formed major themes. Next, they met to discuss major

themes and refine the nature of those themes. The researchers then re-evaluated the responses to determine which responses fell under specific themes.

Results

Participants reported taking an average of 36.14 hours to complete the course. Overall, course content and structure as either clear or very clear, with 68% of participants (n=51) indicating very clear, 28% (n=21) indicating clear, and 4% (n=3) indicating somewhat confusing. For Item 3, the mean rating associated with the overall course rating was 3.56. This score falls between the score of worthwhile (3) and worthwhile and challenging (4), indicating that participants in the course were positive about their course experience.

To gain a deeper understanding of why participants provided the ratings on Item 3, the open-ended responses were reviewed by two researchers using thematic analysis. Of the 75 participants who provided a rating on Item 3, 30 participants provided additional comments. In reviewing the comments five themes emerged, with a majority of comments falling either under the theme of Usefulness of the Course Content (n=12) or the Value of Self-Reflection (n=12). The remaining three themes were Usefulness of Course Materials (n=3), Course Processes and Facilitation (n=2), and Explicitly Stated Change in Instructional Practice (n=1).

During further analysis of the comments under the theme, Value of Self-Reflection, two major patterns began to emerge. One emergent pattern was that the self-reflection caused participants to critically analyze their own instructional practice and identify areas for improvement. For example, “I feel that the course assignments really helped me to look at my classroom and teaching through a new lens. I think that it helped me to see many of the areas that need to be changed” (Participant 3). Another example of this thinking was noted in this response “I learned a lot of strategies and understood my mistakes as a teacher and why they were

happening and had a chance to think through each problem I was having through self-reflection" (Participant 49). Similarly, another participant noted:

> I like how there was a lot of reflection because it made me think about what techniques I have used in my class, what works, what doesn't work, etc. In this way, it helped me to identify some of the areas that I needed to improve on. Prior to this, I knew I needed to improve in places but was not exactly sure where. This helped me to better identify where adjustments needed to be made. (Participant 56)

The other emergent pattern was drawn from participants' responses that focused on growth, both personal and professional. For example, "I had to step outside of my comfort zone sometimes and greatly benefitted from it" (Participant 5). Another participant noted, "I found that I was able to grow as a teacher based on the assignments given" (Participant 21).

Of the 12 comments that addressed the Usefulness of the Course Content, 10 were positive and noted the value of weaving the content and resources from the online course into their own classroom teaching context. One noted:

> The course assignments integrated practice and theory well. I also enjoyed reading the articles, they were full of tangible strategies and information I could actually use in the class. Lastly, the videos exposed me to resources I didn't know were available and I have continued watching other videos to enhance my teaching skills. (Participant 37)

Others similarly noted that they were able to apply the content and resources contained in the online course to their own teaching. For example, Participant 18 stated, "The content of the course was extremely useful and I look forward to integrating many of the strategies and approaches into my own teaching." The two negative comments focused on the fact that the

participants felt that some of the questions and assignments across the modules within a course were redundant.

To gain additional insight on participants' course ratings, Item 4 was examined using thematic analysis. On this item, participants were asked whether they would recommend this course to a friend and why. Of the 75 participants, 66 completed this question. Out of those 66 responses, 64 said that they would recommend the course to a colleague. The reasons stated for this response fell under four themes: Usefulness of the Course Content (n=21), Alignment of the Course to Evaluation Framework and/or District Initiatives (n=13), Changes Made to Instructional Practice (n=16), Course Process and/or Facilitation (n=9), and Answered but Provided No Additional Detail (n=5).

In examining the Usefulness of the Course Content, participants noted that the course was useful because they could easily transfer the strategies within course content to their own teaching context. For example, Participant 27 noted:

> I would recommend this course to a colleague because it had some useful resources and explained how to incorporate the course content into the classroom. There was some background theory, but the course explained how to incorporate what is learned into your own classroom in a way that can be easily executed. Some courses give mostly theory, and you are left with a big question on how do I begin to incorporate this into my classroom and then it never gets done.

Similarly, Participant 40 noted, "Yes. The concepts learned can be applied to any lesson and the way it was presented made it clear." While the majority of the comments focused on the ease of transfer of ideas, others focused on the efficacy of the strategies presented. For example, Participant 11 stated, "I learned things that I can take with me and apply in the classroom with

success." Others responses focused on a specific aspect of the content within a given course. For example, Participant 62 stated:

> Absolutely! It really allowed me to see the difference between traditional lessons (skill building) centered on memorization and procedures without connections and problem-based lessons. Also, it fully fleshed out how important the Standards for Mathematical Practice are in order to enable students to become active problem solvers.

In examining responses aligned with Changes to Instruction Practice, participants commented on both specific and general changes made to their practice. For example, Participant 45 noted a specific change in planning, "I would recommend this course because it caused me to think differently when I was planning. I do think my students benefitted from it." Similarly Participant 51 stated, "I am much more focused on putting together problem-solving sets. My lessons are now designed around challenging problems and problem sets to teach concepts." When noting general changes, participants stated things such as

> I would definitely recommend this course to a colleague. This course allowed me to self-reflect and helped me realize that I did not truly have a learning classroom this past year. I am excited to start using a lot of what I learned in this course to help me elevate the level of learning in my classroom. (Participant 8)

Participants also noted that they experienced a change in instructional practice that had the potential to positively effect on students. One participant noted:

> I have every intention of turn keying this PD to my math department as a way to develop our teachers and our students in strategies for solving math. This was the first time that I was exposed to it in this manner and I feel like it changed me. I can't wait for the

> upcoming year as I know this will make huge improvement in my pedagogue, in student retention of information, in understanding and applying mathematics. (Participant 3)

Participants also based their recommendation on the Alignment of the Course to Evaluation Framework and/or District Initiatives, For example, Participant 5 stated, “Yes. This course is especially worthwhile in light of the Common Core Standards and the philosophy of my own school.” In regard to the alignment to their state evaluation rubric, participants noted things such as “Yes I would recommend this, especially to colleagues who are also new teachers. These two domains in [evaluation rubric name stated] are very challenging and this course is extremely helpful and provides great strategies” and another stated:

> Yes - I would recommend this course. Based on the [evaluation rubric name stated], this is the type of information we need to know in order to be successful teachers. This is also a part of the everyday struggles for the regular teachers and students – engaging students. (Participant 18)

In examining participants’ responses that focused on the Course Process and/or Facilitation, it was found that participants found value in being able to try out new ideas with their students. For example, one participant noted the following:

> [The professional development] provides a new perspective for teachers on how the Board of Education should change its teaching styles and curriculum because it provides new insights and you are able to try out new techniques with your students to see if they work! (Participant 21)

Participants also focused on the benefits of the facilitation and feedback received on their work as can be seen in the following participant response:

> Yes, I feel that I was provided with immediate feedback and comments after completing each module. That was a nice feeling because even though the course was online it felt like my work on each module was being seen and thought about. (Participant 27)

The preliminary feedback provided by pilot participants strengthen the belief that courses aligned to teacher evaluation rubrics and designed for the specific purpose of bringing about evolutionary change to instructional practice are found to be beneficial by teachers.

Discussion

The results from the pilot implementation, while limited by the small number of participants, support key findings and recommendations found in the literature on professional development and teacher change. The data suggest that teachers found the act of critical self-reflection a beneficial component of professional development. This finding is supported by Cabaroglu (2014), who found that when provided with opportunities to engage in critical reflection, teachers find that they "got to know themselves better (p.85)" and reported that the "process promoted a deeper reflection and boosted their confidence to teach (p.85)". These findings also support the recommendation that through critical reflection, teachers gain self-awareness of their practice and can reflect during and after lessons to identify ongoing strengths and challenges as they surface within their classroom (Larrivee, 2000; Loughran, 2002; Osterman & Kotkamp, 1993, 2004; Schon, 1983, 1987).

When discussing changes made to their practice, many participants referenced the impact that their changes had or would have on their students. This finding supports a need for professional development to be grounded in experiential learning theory. Experiential learning theory focuses on how the learner's experience plays a central role in the learning process (Kolb, 1983). Drawing from the experiential learning models of Dewey, Lewin, and Piaget, Kolb (1983)

defines learning as “the process whereby knowledge is created through the transformation of experience (p. 38).” This transformation occurs through two distinct experiences: grasping and processing experiences. Grasping experiences are those during which new information and ideas are perceived and take the form of either concrete experiences, doing an authentic task, or through abstract conceptualizations such as reading and watching. Processing experiences are those during which the learner’s beliefs and behaviors transform either through reflective observations, watching themselves or others, or through active experimentation in which the learner tries out new ideas in authentic situations (Kolb, 1983; Kolb et al., 2001).

Applying Experiential Learning Theory to a design of teacher professional development for evolutionary change suggests a need to purposefully situate the context of the learning within teachers’ classroom environment, to provide opportunities for critical reflection, and to provide resources for a variety of learner needs in order for learners to have both grasping and processing experiences. Guskey’s (2002) Model of Teacher Change is an experiential learning model that can be used to explain the role that professional development takes within the process of teachers making evolutionary changes to their practice. Guskey’s Model of Teacher Change is a four-phase model created on the understanding that teachers will not change their attitudes and beliefs about teaching and learning until they see that new practices positively impact their students’ learning outcomes. Guskey (2002) described the process of teacher change as follows: teachers go through some form of professional development, trying out new strategies presented in the professional development, determining the benefits for students, and then, only after seeing a positive impact on students, changing their own beliefs and practices.

The model presented in this study aligns strongly with Guskey’s (2002) model by integrating directly into the course the use of the strategies presented in teachers’ classrooms,

where they can see the impact on students, and by requiring teachers to analyze that impact through critical reflection. Feedback from participants suggested that these activities were important, as teachers reacted positively to the critical feedback and opportunities to test out strategies in their classrooms.

Implications for Future Research

The results from this pilot study can be used to inform future research on teacher change and teacher professional development in several ways. From an Educational Design Research perspective, the results can be used to further refine and support the design principles proposed within this article. Building on the pilot results, the authors are planning to implement the courses with a larger participant base to determine if similar findings are achieved.
Future research can also investigate and further strengthen the relationship between each of the design principles. These findings may be of particular importance not only to designers of professional development but also to those within state and local school districts who are tasked with providing professional learning opportunities to classroom teachers.

Finally, the phenomenon of evolutionary change and its alignment with teacher professional development is yet another area that can and should be researched further, given the state of teacher evaluation reform and the potential benefits and consequences of its implementation. Teachers are evaluated on the effectiveness of their instructional practices. In this case, teachers deserve to be provided with professional learning opportunities that will allow them to understand and strengthen those practices in a meaningful way.

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CHAPTER 3

MODIFYING A TOOL TO ASSESS TEACHERS' READINESS TO MAKE CHANGES TO THEIR INSTRUCTIONAL PRACTICE[2]

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Abstract

One goal of professional development is to provide teachers with new strategies and ideas for changing their instructional practices. However, for change to occur, teachers must be ready to change (Armenakis et al., 1999; Lizar et al., 2015). This article discusses the need for an instrument to assess teachers' readiness to change their instructional practices and details the process of designing and validating a survey to assist in assessing that readiness.

Adapted from the University of Rhode Island Change Assessment (URICA, University of Rhode Island, 2016), the URICA-TEACH is a 14-item survey administered to 191 K-12 classroom teachers to test the validity and reliability of the measures. The results suggest that the results of the URICA-TEACH area a valid and reliable measure of teachers' current stage of readiness to change their instructional practices.

Key Words: teacher change, change, readiness to change, URICA-TEACH

Introduction

Despite receiving what has been deemed as 'pedagogically sound' professional development, many teachers fail to implement the strategies learned during professional development (Doherty, 2011; Guskey, 2002; Linn et al., 2010). This transfer of learning from professional development to the classroom is important because the overarching goal of teacher professional development is to bring about changes in teachers' knowledge and skills, attitudes and beliefs, and instructional practice (Desimone, 2009). For a successful change process to happen, however, individuals must first be ready to change (Armenakis et al., 1999; Lizar et al., 2015) and willing to try a new practice (Guskey, 2002). Put a different way, teachers are more likely to change as a result of teacher PD when they are both ready and willing to change (Pelletiere, 2006). For professional development to successfully support teachers in making those changes, then, those in charge of designing and implementing professional development need to know if participants are ready to engage in the change process.

The purpose of this study was to modify and validate a survey that could assist in measuring a teacher's readiness to change their instructional practice. The survey, called URICA-TEACH, was modified from the University of Rhode Island Change Assessment (URICA; University of Rhode Island, 2016; see also Mcconnaughy et al., 1983) for use in the context of a teacher's instructional practice. Permission to use and modify the URICA was granted via contained on the HABITS Lab at the University of Maryland Baltimore County website https://habitslab.umbc.edu/faq/.

The URICA is established as a valid and reliable measure of an individual's readiness to change that was originally developed for psychotherapy (see Mcconnaughy et al., 1983; University of Rhode Island, 2016) but has since been modified for examining readiness to

change in a variety of behavioral contexts (e.g., Lerdal et al., 2008; Aguiar, 2023), including education (Teixeira et al., 2013). To validate URICA-TEACH, we first situated the original URICA items in the context of K-12 instructional practice, then performed a confirmatory factor analysis on the survey responses of 192 teachers. The results revealed a factor structure that mirrors that of the original URICA, offering educators a valid and reliable tool for understanding a teacher's readiness to change their instructional practice.

Literature Review

A teacher's instructional practices are typically revealed by their teaching behaviors (Barrett, 1991; Beery et al., 2013; Burkeet al., 2006; Tieken & Achilles, 2003). A behavior is an action or attempt undertaken in order to bring about a specific state of affairs (Bergner, 2011; Bicard et al., 2012). For example, a teacher might clap three times to get students to stop talking and listen to instruction. While this example of behavior is presented in a simplistic form, the underlying thinking behind that behavior is quite complex. According to Bergner (2011), such behavior is made up of eight parameters, which include personal identity; motivation behind the action; knowledge behind the act; skill, competency, or ability to perform the act; procedural aspects of the behavior; achievement or desired outcome; the aspect of behavior that is personal to the individual; and significance of the act. Thus, a simple behavior like clapping may embody a variety of considerations for instructional practice, from wanting to gain the attention of all students (i.e., motivation) to believing that a good teacher has control of their classroom (i.e., personal identity) or even reinforcing an ongoing behavioral strategy for gaining attention (i.e., significance of the act). Given the complex nature of defining a behavior, the process of changing behaviors is also complex.

Changing Behaviors

If professional development is meant to change a teacher's instructional practice, then one must understand how behaviors are changed. One such model is Prochaska's (1984) Transtheoretical Model (TTM) of behavioral change. The TTM was developed to integrate the "processes and principles of change across major theories of intervention" (Prochaska et al., 2008, p.97) and, as such, identifies the stages of change that take place when one is attempting to change a specific behavior. The TTM posits that individuals go through six stages when changing a behavior. These stages of change are the central organizing construct of the TTM (Prochaska et al., 2006). The stages span from denial of a need to change to having made and sustained a behavioral change over a significant period of time.

Stage 1: Precontemplation. The first stage identified in the TTM is the precontemplation stage (Prochaska et al., 2008). In this stage individuals lack a self-awareness that a need or reason for changing a behavior exists. Individuals are unaware, or under-informed about the consequences of their current behavior. This lack of self-awareness presents itself as a resistance or lack of motivation to change. A teacher at this stage may see the need to make changes to their instructional practice in order to resolve a particular challenge that they are facing in their classroom.

Stage 2: Contemplation. In the contemplation stage individuals are considering making a change to a behavior but have yet to take any specific action towards making that change. Individuals at this stage are becoming more self-aware of the "pros of changing but are also acutely aware of the cons (Prochaska et al., 2008). Individuals in this stage are often seen as procrastinators. At this stage, a teacher may have determined that they need to make a change to their instructional practice, however they may not have taken any steps towards determining what needs to change or how it might be changed.

Stage 3: Preparation. In the preparation stage individuals have an authentic intent to make a change and have taken actionable steps to begin the change process within a specified time frame (Prochaska et al., 2008). For example, a teacher at the preparation stage of change may have identified a need for making changes to their instructional practice and have signed up for a professional development course that would assist them in making that change. This action shows that the individual is ready to begin the change process.

Stage 4: Action. At the action stage, individuals have recently made a change and/or are working through the steps needed to change a specific behavior (Prochaska et al., 2008). Work completed at this stage is observable. For example, a teacher whose has started to implement cooperative learning groups as a way to keep his or her students actively engaged in a lesson has taken an actionable step to changing their previous instructional practice.

Stage 5: Maintenance. In the maintenance stage, individuals are continuing the change actions previously made and are working on refining their actions in order to make the change sustainable over a long period of time (Prochaska et al., 2008). Individuals may need continued support at this stage. For example, a teacher at the maintenance stage may still be implementing cooperative groups, but may need to constantly reflect on and refine their implementation based on challenges that continue to arise. Over time, the teacher's confidence builds as well as their skill and knowledge in knowing when to make adjustments.

Stage 6: Termination. The final stage of change is termination. At this stage the changed behavior has completely replaced the previous behavior and the individual has no desire to revert back to the previous behavior (Prochaska et al., 2008). For the teacher in the previous examples who was implementing cooperative groups, at the termination stage, he or she implements the groups with ease, confidence, and success. Modifications to their approach may still be needed

based on the needs of their students, and when these needs arise, the teacher is able to make the modifications in the moment.

Application of TTM

The identification of the stages of behavioral change in the TTM is important because it suggests that behaviors are not changed in discrete events but are changed over time as the individual moves through each stage of change (Burke et al., 2006; Prochaskaet al., 2006; Prochaska et al., 2008). This is important when approaching teacher PD as an opportunity for teachers to change their instructional practice because it suggests that one-shot professional development opportunities may not be sufficient. If change takes place through a series of stages, then teacher PD needs to be sensitive to the different stages of change that a teacher might experience *throughout* the duration of a PD experience. It is not difficult to imagine that a teacher who is in the *action* stage will react differently to the resources and activities offered during PD than a teacher who is still *contemplating* whether or not any action is needed on their part. Thus, the TTM has the potential to offer powerful insight into the needs of a teacher as they move through a PD experience. Applying the TTM to this context can help educators better understand which stage of change each teacher is in and personalize the PD experience to that teacher's needs.

There are limited examples in current literature that describe the TTM being applied in educational settings and in changing teachers' instructional behaviors (Mitchell et al., 2015; Tyler & Tyler, 2006). The overall thinking is that the TTM can be used in PD to assist teachers in moving from one stage of change to the next (Burke et al., 2006; Mitchell et al., 2015; Stachler et al., 2013; van der Leeuw et al., 2013). Of particular importance is finding ways to determine a teacher's initial stage of readiness, because it can help educators design PD

experiences that complement a teacher's current state of change (Bahmani & Hjelsvold, 2023; Jin et al., 2013; van der Leeuw, 2013;). For example, Bahmani & Hjelsvold collected data using a questionnaire based on the TTM to assess teachers' readiness to engage in multi-campus collaboration. Their questionnaire was specific to making the change to multi-campus collaboration and measured the TTM first five stages of change. van der Leeuw et al. (2013) assessed 24 university faculty's stages of change through interviews conducted after faculty members received feedback from their students. The questions asked in the interview were informed by the TTM and were used to gauge faculty readiness to take action after receiving feedback from their students. Jin et al. (2013) utilized the TTM in a deferment manner. They created a curriculum framework based on the TTM to train pre-service physical educators to change to a more inclusive approach to teaching physical education.

The University of Rhode Island Change Assessment (URICA) and Teacher Change

One method of assessing an individuals' readiness to change is through the use of the University of Rhode Island Change Assessment (URICA) survey. Developed in 1983, the URICA survey is a 32-item self-report measure that assesses an individual's readiness to change a particular behavior (Mcconnaughy et al., 1983). URICA measures readiness based on the stages of change in the TTM, specifically Pre-contemplation, Contemplation, Action, and Maintenance (Mcconnaughy et al., 1983; University of Rhode Island, 2016; UMBC, n.d.). Originally developed and widely used in the field of psychotherapy (Mcconnaughy et al., 1983; University of Rhode Island, 2016; UMBC, n.d.), the URICA has been modified for use in fields outside of psychotherapy (UMBC, n.d.). For example, Teixeira et al. (2013) modified the URICA for use with patients undergoing voice therapy and Lerdal et al. (2008) modified the URICA for use with individuals in order to promote increased physical activity.

In the context of education, several studies have used the URICA to assess issues related to teaching and instructional practice. Elik et al. (2010) drew on the URICA survey to create an instrument that evaluated a preservice teacher's level of readiness to learn about children with learning and behavior disorders. The authors chose URICA for the way it aligned with TTM (Prochaska & DiClemente, 1982), which argues that a person's readiness to change was reflected through their stated willingness and effort to change. Elik et al. (2010) found that readiness to learn was a significant predictor of behavioral change among the 274 participants in their study. Rossi-Barbosa et al. (2014) modified the original URICA survey to evaluate 226 teachers' readiness to change issues they were having with their voice (e.g., hoarseness, unintentional change in pitch or volume) when teaching. While many teachers in the study were aware of and contemplating action on the problem, far fewer intended to take action on it. The authors then used this information to make recommendations for moving teachers from *contemplating action* to *taking action* on this prominent issue. These studies suggest that URICA can be modified to measure issues related to teaching and, in particular, a teacher's willingness and intention to change their current instructional practice.

Instrument Modification and Validation

This study utilized an adapted version of the URICA scale. While Elik et al. (2010) adopted aspects of URICA for their study of preservice teachers, they classified their use as a pilot in that they had a small number of participants who validated their measure. Thus, this study builds on the potential established in Elik et al. in that we not only adapted the URICA to address a teacher's intention to change their instructional practice but also performed an exploratory factor analysis to establish the factor structure underlying the URICA-TEACH. This

study was approved by our University's Institutional Review Board (IRB) prior to engaging in research activities.

Our process of adapting the original URICA scale into URICA-TEACH was guided by Hinkin's (1998) recommendations for developing survey questionnaires. Hinkin's first step (Step 1) involves item generation, assessing content validity, and item scaling. Step 2 focuses on the initial administration of the questionnaire to evaluate the instrument's factor structure. Step 3 involves an initial item reduction based on the data collection in Step 2. Step 4 involves an analysis of the reduced items through a confirmatory factor analysis to further validate the reduced items. Below, we describe each step in the context of this study.

Step 1: Item Generation and Content Validity

Item modifation began with an examination of the 32 questions on the URICA questionnaire by stage to determine patterns and characteristics of wording and phrasing for each stage. Because the original URICA was meant for application in substance abuse and psychotherapy, our initial examination sought to determine which items were applicable in the context of teacher change and the degree to which the language of those items would need to be modified for the field of education. One important decision that resulted from our examination was that we included only three of the four stages of change that the original URICA addressed: Pre-contemplation, Contemplation, and Action. The fourth stage, Maintenance, was omitted from our survey because URICA-TEACH was meant to help educators better understand a teacher's readiness for change before and during the process of PD. The Maintenance stage reflects a stage of change that comes *after* PD has been offered to teachers, which means those items were asking about behaviors that *had not yet happened.* For example, Maintenance items ask teachers to consider whether the change was successful (i.e., "I have not been as successful

as I had hoped…") or if they were maintaining a new practice (i.e., "I'm not following through with what I had already changed…"). We ultimately dropped the items in the Maintenance stage because we felt those items would not only be confusing for teachers to respond to but also outside of the intended purpose of readiness to make a change of URICA-TEACH.

Once we had examined the 21 items in the remaining three stages (i.e., pre-contemplation, contemplation, and action), we modified the original URICA items such that they focused on changes in a teacher's instructional practice. As part of our modification process, we reviewed two previously validated adaptations of the URICA to determine how changes to wording and phrasing were made when using URICA outside the context of substance abuse. The comparison of URICA adaptations showed that there was consistency in the wording and phrasing of questions for each stage across questionnaires. The most significant changes were typically made to specific behaviors related to the target domain, e.g., teacher's voices, intention to exercise. Our modification of items mirrored the manner in which URICA items had been modified in the past, meaning that we preserved the overall structure and intent of the item while also situating the item in behaviors related to teacher change in instructional practice. Table 3.1 provides examples across URICA versions by stage of the question-behavior continuity. For example, an original URICA item asked for the level of agreement with, "I think I might be ready for some self-improvement" became "I think I might be ready to consider making some changes in my instructional practice in order to resolve challenges that I face in my classroom." This was similar to the phrasing in the context of teachers' voice ("I feel I am ready to improve my voice") and physical activity ("[I] Might start exercising regularly").

After the individual questions were modified for URICA-TEACH, it was sent for expert review and feedback. The panel of eight expert reviewers was assembled; it included one

university professor of teacher education, five former and one current classroom teacher, and one international professional development product manager. All eight expert reviewers currently

Table 3.1

Comparison of URICA Questions

Stage of Change	**Original URICA** (McConnaughy, Prochaska, & Velicer, 1983)	**Adapted URICA-Voice** (Teixeira et al., 2013) (URICA-E2)	**Adapted URICA-E2** (Lerdal et al., 2008)	**Adapted URICA-TEACH Change**
Pre-Contemplation	As far as I am concerned, I don't have any problems that need changing.	I do not think I had to change my voice.	As far as I am concerned I don't need to exercise regularly.	If there are challenges in my classroom, they are due to factors other than my instructional practice.
Contemplation	I think I might be ready for some self-improvement.	I feel I am ready to improve my voice.	[I] Might start exercising regularly.	I think I might be ready to consider making some changes in my instructional practice in order to resolve challenges that I face in my classroom.
Action	I am doing something about the problems that had been bothering me.	My voice problem bothers me and I am trying to solve it.	I am finally exercising regularly.	I am currently changing something about my instructional practice that has been bothering me.

worked closely with classroom teachers as professional learning experts. As part of the expert review process, panel members were asked to review each of the questions and provide feedback on the clarity of the question, the question's ability to measure the designated stage of change, and the response that they thought a teacher might give to in response to the questions. Expert

reviewers were also asked to provide their opinion on the questionnaire as a whole and to provide recommendations based on the survey's purpose.

All eight of the expert reviewers felt that the questions would be able to measure the stages of change they reflected. Additionally, the expert reviewers liked the survey and felt it would provide very useful information to educators as part of teacher PD. When it came to the individual questions, the expert reviewers' recommendations fell into two categories: tone and repetitiveness.

Tone. Six of eight reviewers felt that two of the Precontemplation questions projected a negative tone and recommended those questions to be reworded so teachers would not feel they were being judged. For example, question 17 originally stated, "All this talk about different ways of teaching is pointless. Why can't teachers just be left alone to do what they think is best." The reviewers noted how the tone might make teachers react strongly to the item because it portrayed them as being somewhat unapproachable and unwilling to change. The statement was revised such that it communicated a neutral tone about why a teacher might want to keep an existing practice, reading "I believe that teachers know what is best, and if allowed to do what they feel is right there would not be a need to spend time on learning about new ways to teach."

Repetitiveness. Every expert reviewer made at least one comment regarding the fact that they felt the questions were repetitive. Several reviewers provided specific items that repeated a similar idea or question focus. Upon reviewing those items, we ultimately omitted three items from the 21 items we had generated for URICA-TEACH.

First draft of URICA-TEACH. After revising the questionnaire based on expert feedback, the version of URICA-TEACH that was presented to participants for validation contained 18 items, with 6 items for each of the three stages of change (Precontemplation,

Contemplation, and Action). Each item asked teachers to rate their agreement with the item on a Likert-scale from strongly disagree (1) to strongly agree (5). In preparation for administering the first draft of URICA-TEACH, we also prepared eight demographic questions to collect data about each respondent's professional teaching experience, including their teaching experience, grade level taught, geographical location, school size, etc.. The final demographic question was open-ended, asking teachers to describe a specific challenge or set of challenges that they are currently facing in their classroom. Participants were directed to respond to the items on URICA-TEACH in the context of that challenge. We chose to do this because Desimone (2009) suggested that self-reports are stronger when teachers have a concrete, tangible referent to respond to.

Step 2: Initial Administration

With IRB approval, participants were recruited via email sent from a professional development mailing list. All subscribers to the mailing list had previously granted permission to receive emails with information regarding available professional development opportunities, opportunities to participate in special professional learning events, and opportunities to provide feedback and participant in research on new education innovations. Of the 1,493 individuals who received the email, 191 completed the permissions process to participate in this study. The 191 participants were simultaneously sent a link for completing the URICA-TEACH online and were asked to provide any additional thoughts and/or feedback at the conclusion of the survey. The URICA-TEACH was administered to those 191 participants who were current K-12 classroom teachers from a range of geographic regions in the United States, including the North and Southeast, North and Southwest, and Mid-west. The number of participants satisfies the recommendations of Hair Jr. et al. (2009), who suggest upwards of 200 participants for factor

analysis. The teachers represented a variety of grade levels, from elementary (53%) to middle (23%) and high school (30%). Table 3.2 provides a summary of the demographics of all participants who completed the survey.

Table 3.2

Participant Demographic Data

Number of years as a classroom teacher	0-5	6-10	11-15	16-20	> 20	
	30%	24%	21%	13%	12%	
Current Grade Band Teacher Assignment	K-5	6-8	9-12			
	53%	23%	24%			
School Classification	Public	Private	Charter	Title 1	Non-Title 1	
	94%	23%	24%	63%	37%	
School Area Classification	Urban	Suburban	Rural			
	56%	31%	13%			
US Geographic Region	Northeast	Southeast	Mid-West	Northwest	Southwest	Outside US
	39%	3%	48%	1%	7%	2%
School has adopted a whole school reform initiative within the last 3 years	Yes	No				
	69%	31%				
School has adopted a new teacher evaluation system within the last 3 years.	Yes	No				
	76%	24%				

Step 3: Initial Factor Solution and Item Reduction

Due to the URICA-TEACH being an adaptation of the URICA scale, an initial item reduction was completed by conducting an exploratory factor analysis (EFA) with Principal Components extraction and Varimax rotation. The results of the EFA on the 18 initial items in URICA-TEACH indicated a five-factor solution that explained 61.76% of the variance. Factors were determined using the Kaiser Guttman Rule, meaning that we selected factors whose eigenvalues were greater than one. To reduce items, we began by examining the items within each stage of change. Our goal was to retain the items that loaded cleanly onto the anticipated factor. We then systematically removed the items that did not load onto the anticipated factor in a one-at-a-time fashion, re-running the EFA after removing each item. This process resulted in removing 3 items (one per factor) from the 18 we started with. After re-running the EFA, we found four factors with eigenvalues greater than one; however, our visual examination of the Scree Plot suggested that a three-factor solution could also be supported. We then re-examined the remaining items within each stage of change to see if any other items were cross-loading or loading in unexpected ways (i.e., did not load on the factor we expected). This resulted in omitting one more item from the survey, reducing the total number of items to 14.

Results

The final 14 items were analyzed through Exploratory Factor Analysis (EFA) with Principal Components extraction. To verify the appropriateness of factor analysis, we conducted a Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity values. Tabachnick and Fidell (2001) suggest that values over .60 on these tests indicate that an underlying factor structure is present in the data. The results of our KMO was .80 and Bartlett's test was significant (BTS value = 739.94, $p < 0.001$), confirming that it was appropriate to proceed with a factor analysis

on our 14 items. The results of the EFA revealed three factors with eigenvalues over one; those three factors explained 53.35% of the variance.

Varimax rotation was used to interpret the factor structure behind those 14 items. We selected .50 as our cut-off for factor loadings. Hair Jr. et al. (2009) recommend a cut-off of .50 because, at this threshold, the results have practical significance; the authors further note that loadings above .70 indicate well defined structures while loadings between .30 and .49 are minimally acceptable. This resulted in five items loading onto Factor 1, four loading onto Factor 2, and five loading onto Factor 3. These loadings aligned conceptually with the stages of change in the original URICA. For example, the items in Factor 1 were associated with Pre-contemplation, whereas the items in Factors 2 and 3 were associated with Contemplation and Action, respectively. The internal consistency (Cronbach's alphas) within each construct was above .70, which Fraenkel and Wallen (2008) suggest are acceptable. Table 3.3 displays the survey items, factors, and factor loadings for URICA-TEACH.

Table 3.3

Survey Items, Factors, Factor Loadings, and Reliability Coefficients for URICA-TEACH

#	Item	1	2	3
Pre-contemplation (Cronbach's Alpha = .71)				
8	I do not feel it is necessary for professional development because any challenges I face in my classroom are not related to my instructional practice.	.55		
10	My instructional practice may not be the best, but I do not think that there is anything that I really need to change right now.	.76		
17	I believe teachers know what is best, and if allowed to do what they feel is right there would be no need to spend time on learning about new ways to teach to address the current challenges in my classroom.	.74		

19	I have challenges in my classroom, but so does every other teacher, and I do not think it is the best use of my time to focus on them right now.	.70		
24	Compensating for any perceived faults in my instructional practice is easier than trying to change those practices.	.59		
Contemplation (Cronbach's Alpha = .73)				
9	I'm hoping that professional development will help me better understand my instructional practice and how it relates to the challenge or challenges that I am facing in my classroom.		.75	
13	I wish I had more ideas on how to address the challenge or challenges that I am facing in my classroom.		.63	
16	I hope that any professional development I engage in will have some good advice for the specific challenge or challenges that I am facing in my classroom.		.52	
20	I am facing a challenge or challenges in my classroom and I really think that I should consider addressing them by making changes to my instructional practice.		.67	
Action (Cronbach's Alpha = .76)				
3	I am currently changing something about my instructional practice that has been bothering me.			.53
6	I am finally ready to make some changes in my instructional practice based on the challenges that I am facing in my classroom.			.59
11	I am really working hard to make changes in my instructional practice based on the classroom challenge or challenges I am facing.			.82
22	While I am not always successful in addressing the challenge or challenges that I face in my classroom, I am at least working on them.			.72
26	I have made changes to my instructional practice based on past challenges that I have faced in my classroom and have a plan in place to make additional changes in order to resolve a current challenge.			.66

Discussion

In this paper, the URICA-TEACH survey was modified to provide educators with a tool for assessing a teacher's level of readiness to change an instructional practice in response to a

current challenge in the classroom. The results of our EFA established a three-factor structure in which the items within each factor aligned conceptually with the stages of change that the original URICA was built upon (i.e., Pre-contemplation, Contemplation, Action). Additionally, the items within each factor displayed internal consistency levels that are acceptable in the context of education. This suggests that URICA-TEACH is a viable scale for measuring a teacher's readiness to change as they engage in professional learning experiences that focus on changing their own practice.

A scale like URICA-TEACH is important in the context of education for several reasons. To begin, a teacher's intent to change is an important part of making an actual change in practice. Teachers are more likely to participate in making decisions about their school when they exhibit higher levels of readiness to change (Inandi & Gillic, 2016). Teachers are more likely to use new technology in the classroom when they are more willing to try new, innovative approaches to learning (Baylor & Ritchie, 2002) or take instructional risks (Vanatta & Fordham, 2004). This is because teachers who are more willing to change tend to be less resistant to change when asked to try something new (Self & Schraeder, 2009). With that, teachers who resist change often struggle to see how new practices might improve learning (Mathipa & Mukhari, 2014; McKenzie & Scheurich, 2008). Simply put, teachers who are more willing to change are often less resistant to change, which puts them in a stronger position to benefit from efforts that introduce new teaching practices. URICA-TEACH, then, offers educators a tool for understanding a teacher's readiness to change and the potential willingness or resistance that a teacher may present as part of a PD experience.

Another reason why a scale like URICA-TEACH is important in teacher education is that it is rooted in a behavioral perspective of teacher change. While beliefs and attitudes are certainly

an important part of teacher change, behaviors offer a viable starting point for instructional change because they are an outward reflection of those beliefs (Guskey, 2002). Because URICA-TEACH was built using the Transtheoretical Model (TTM), it has the potential to help educators understand what stage of change a teacher is currently in, meaning how close (or far) a teacher is from being willing to try something new. This is an important component of Guskey's (2002) model for long-term changes in teaching practice. According to Guskey (2002), teacher change does not necessarily originate with a change in belief or attitude, but instead from enacting a change and observing how it improves student learning. Enacting new practices can be challenging, however, because teachers are often reluctant to try something new if they believe that what they are doing is already effective or if they do not recognize the value in trying new practices to improve student outcomes (Lockton & Fargason, 2019; Snyder, 2017). URICA-TEACH, then, offers an important tool in the teacher change process in that it offers insight into whether or not a teacher is even willing to try something new, and to what degree. This type of information can be critical for administrators and educators who are tasked with implementing changes to longstanding practices in the classroom (Lockton & Fargason, 2019).

Implications

URICA-TEACH offers teacher educators and professional developers a powerful starting point for working with teachers. The survey can be administered prior to a professional learning effort to better understand which teachers might be more willing to try something new. Teachers with a high readiness may be more willing to try new practices in the classroom, whereas teachers who are less willing may need additional support before they are willing to try something new. Teachers who are less willing may need time to reflect on their current classroom practices and address any issues or beliefs that may be holding them back. They may

also need time to identify a new practice that they *would be* willing to try in the classroom, even if it is a modified version of the practices offered in the professional learning session. The overall idea is that URICA-TEACH can help reveal which teachers may be less willing or more resistant to change *before* attending a professional learning session, providing teacher educators and professional developers an opportunity to customize their approach to better meet that teacher's needs and improve the likelihood that change may occur.

Limitations

This study sought to establish the factor structure of URICA-TEACH through exploratory factor analysis (EFA). As such, one limitation of the study is there is no indication of whether a teacher's *reported* readiness to change aligns with or reflects their *actual* willingness to change. In other words, there is still a need to confirm that the scores obtained through URICA-TEACH reflect how a teacher reacts when presented with professional learning that focuses on changing their teaching practice. Future research could explore whether a teacher's reported URICA-TEACH scores reflect their actual behaviors, and to what extent. Additionally, participants in this study were primarily elementary school teachers from Title 1 schools in an urban area. While we chose EFA because it was a good first step towards establishing that the original URICA factor structure would carry over in URICA-TEACH, a Confirmatory Factor Analysis (CFA) with a broader variety of teachers would further establish URICA-TEACH as a valid and reliable measure of a teacher's readiness to change their instructional practice.

Conclusion

Teachers are more likely to change their instructional practice when they are both ready and willing to change (Pelletiere, 2006). The results of this study suggest that URICA-TEACH offers a valid and reliable measure of a teacher's current stage of change with regard to their

instructional practice. Knowing a teacher's level of readiness to change can be a powerful piece of information for a teacher educator or developer. It can be used to help address teachers with a stronger resistance to change or even move forward quickly among teachers who are already willing to change. It is our hope that URICA-TEACH can help improve PD efforts and establish long-lasting changes that teachers desire.

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CHAPTER 4

SUPPORTING EVOLUTIONARY CHANGES IN TEACHING PRACTICE THROUGH CRITICAL REFLECTION[3]

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Abstract

In this study, we used two specific design principles to develop and evaluate an online teacher professional development (PD) program aimed at supporting evolutionary change – that is, gradual changes in teachers' current teaching practices through self-reflection. The two design principles employed were 1. center on critical reflection and 2. operationalize critical reflection through a guided process. These were a subset of five design principles being focused on in a more extensive educational design research project. Coupled with using the URICA-TEACH survey to indicate teachers' readiness to change, the work of 12 teachers who completed the course over a 2-month period was analyzed through a mixed-methods design that examined participants' levels of reflection, types of changes expressed, intent to change, and readiness to change. The findings suggest that the design principles played a role in teachers making evolutionary changes to their instructional practices and give rise to meta-inferences that have implications for subsequent study iterations of the EDR project.

Key Words: Teacher professional development, teacher change, professional development design, mixed methods, critical reflection, online teacher professional development, evolutionary change

Introduction

The idea of change and the concept of reform are ever-present within education. In reform efforts targeting teacher evaluations, teacher professional development is seen by many as a key determinant of success (Darling-Hammond, 2013; Darling-Hammond et al., 2017, Marzano & Toth, 2013; National Council on Teacher Quality, 2013). Researchers have found many professional development offerings that focus on helping teachers to make revolutionary changes (Borko, 2004; Boyle et al., 2005; Darling-Hammond, 2013; Hargreaves & Fullen, 2012; Marzano & Toth, 2013; McGuinn, 2012; National Council on Teacher Quality, 2013; Zaki et al., 2013). Revolutionary changes occur when a teacher supplants their current teaching practice, such as implementing flipped or project-based learning (Burke, 2014). Professional development focused on revolutionary change, however, may not address the needs of teachers under teacher evaluation reform.

Teacher evaluation systems often focus on improving a teacher's current practice based on classroom observations and feedback on their instruction, with the expectation that the evaluative feedback should drive change toward improved instruction (Darling-Hammond, 2013; Marzano & Toth, 2013; National Comprehensive Center for Teacher Quality, 2012; The National Council on Teacher Quality, 2013)**.** This type of change, in most cases, is evolutionary rather than revolutionary. As defined by Burke (2014), evolutionary change is a change that builds on existing knowledge, belief, and practice and takes place over time. For professional development to focus on helping teachers improve their current instructional practices, the professional development design needs to focus on helping teachers make evolutionary changes to gradually align their practice with the indicators of effective teaching used as part of their state's teacher evaluation plan.

When considering a professional development design that supports evolutionary changes in teaching practice, designers should consider that, for teachers to make evolutionary changes, they need to develop a self-awareness of their teaching practice (Galea, 2012; Loughran, 2002). Self-awareness may be achieved if the professional development design engages teachers in activities requiring them to critically reflect on their practice. Professional development programs that allow teachers time to frequently reflect on their practice and make changes has been associated with gains in student learning (Darling-Hammond et al, 2017). Critical reflection is a form of reflective practice that helps teachers identify problem areas within their practice, determine the potential cause of the problem, and begin to consider and test out solutions (Larrivee, 2000; Loughran, 2002; Osterman and Kotkamp, 1993 & 2004). Through critical reflection, teachers gain self-awareness of their practice and can reflect during and after lessons to identify ongoing strengths and challenges as they surface within their classroom (Larrivee, 2000; Loughran, 2002; Osterman and Kotkamp, 1993 & 2004; Schon, 1983; Schon, 1987).

Designing professional development to bring about and support an evolutionary change in the practices of experienced classroom teachers lends itself to the need for a purposeful set of design principles. Five design principles were created for this study: 1) Center on critical reflection; 2) Active participation through experiential learning; 3) Examination from multiple perspectives; 4) Provide alternatives; and 5) Operationalize critical reflection through a guided process. These five principles were based on a review of the related literature and, in particular, the theoretical foundations associated with teacher change – Bandura's (1986) Social Cognitive Theory, Kolb's (1983) Experiential Learning Theory, and Guskey's (2002) Module of Teacher Change. The five principles reflect the main practical implications of each theory as established through empirical research. In the sections that follow, the practical implications of these

theories are explored; Chapter 2 (i.e., Article 1) of this dissertation also provides a detailed literature review on teacher change. Table 4.1 displays each design principle as aligned to its associated theorical foundation, and the types of activities associated with each design principle that are completed by participants in a professional development course.

Table 4.1

Design Principle Theoretical and Course Activity Alignment

Design principle	Evolutionary change in teachers' knowledge and beliefs happens when…	Theoretical foundation	Course activities
Center on critical self-reflection	Goals and activities are centered on critical self-reflection allowing for observations of practice, and consequences on students' learning through both grasping and processing experiences.	Social Cognitive Theory (Bandura, 1986) Experiential Learning Theory (Kolb, 1983)	Embedded triggers throughout the course and allow for reflection on current practice, potential alternatives, implementation of alternatives, and changes made to knowledge, beliefs, and/or practice.
Active participation through experiential learning	Teachers are actively involved through the context of their classroom and own personal experiences.	Experiential Learning Theory (Kolb, 1983)	Activities in which the teacher works in their classroom to gather data and experiment with alternative strategies.
Examination from multiple perspectives	Teachers examine their instructional practice from multiple perspectives.	Social Cognitive Theory (Bandura, 1986)	Key questions focused on consequences through multiple perspectives with the option to implicitly reflect through the peer lens on the discussion board when examining alternatives.
Provide alternatives	The content of the professional development provides viable and diverse instructional alternatives.	Social Cognitive Theory (Bandura, 1986)	Alternative strategies for consideration presented through videos, instructional cases, and course readings.
Operationalize critical reflection through guided process	Guidance for each step of the critical self-reflection to support teacher efficacy aligned to the processes of attention, retention, production, and motivation.	Social Cognitive Theory (Bandura, 1986) Experiential Learning Theory (Kolb, 1983)	Teachers are guided throughout the process through the course scaffolding and critical reflection triggers.

To study the application and effectiveness of the five design principles, a multi-study educational design research (EDR) project was conducted. McKenney and Reeves (2012) defined EDR as:

> A genre of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others. Its goals and methods are rooted in, and not cleansed of, the complex variation of the real world. (p. 7).

EDR was chosen because EDR "seeks to increase the impact, transfer, and translation of education research into improved practice" (Anderson & Shattuck, 2012, p.2). Three main phases are within the McKenney and Reeves (2012) model of EDR. Phase 1 focuses on analysis and exploration. A real-world problem is identified and analyzed through theory and practice in this phase. In Phase 2, the design and construction phase, an intervention is designed and developed to address the real-world problem. In Phase 3, the evaluation and reflection phase, the intervention is implemented and studied within an authentic context; this often occurs over multiple study iterations. During each iteration, revisions are made to the intervention based on study results. The outcome of working through these three phases is two-fold. First, there is the maturation of the intervention, and second, there is a deeper and broader theoretical understanding (McKenney & Reeves, 2012).

The purpose of this study was to evaluate and reflect (i.e., Phase 3 of EDR) on the design principles as they were enacted in an online PD program for K-12 teachers. This study evaluated the effectiveness of two specific design principles associated most closely with critical self-reflection: Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process. Focusing on these two principles provided insight into a critical learning activity that

can support teachers in making evolutionary changes to their knowledge, beliefs, and instructional practice. The research questions guiding this study were:

1. What level of reflection can be observed in participants' work on each of the critical reflection trigger points within the course?
2. What changes in knowledge, beliefs, and/or instructional practice are expressed by participants within their coursework on each of the critical reflection trigger points?
3. What are the patterns between levels of readiness (low, mid, and high) and intent to change as expressed in the reflection prompts?
4. What patterns in intent to change and level of reflection emerged among individual participants who had low, mid, and high levels of readiness to change?

Literature Review

The idea of reflection and reflective thinking can be seen throughout history as early as Socrates, Plato, Aristotle, Confucius, and Buddha, all of whom described ways of examining life to gain a better understanding and solve problems (Fook et al., 2006; Tannebaum et al., 2013). The general concept of reflective practice, however, has been shrouded somewhat in ambiguity due to the practice itself being referenced by several different terms, such as reflection, reflective practitioners, and critical reflection, none of which is associated with a clear and concise definition (Fook et al., 2006; Hebert, 2015; Loughran, 2002).

A search of the literature on reflective practice revealed that the concept of reflective practice is one of interest across many disciplines and professions. Vast amounts of research exist on reflective practice in education (Fook et al., 2006; Hebert, 2015). Within each of these fields, the context for the use and study of reflective practice varies. Table 4.2 provides examples

from the literature of the contexts in which reflective practice has been studied within K-12 education.

To better understand the modern foundations and applications of reflection and reflective thinking in teacher education, one can look to the significant works by Dewey and Schon, as well as the definitions and discussions on implementing reflection practice by van Mannen (Day & Harbour, 2013; Fook et al., 2006; Hebert, 2015l; Tannebaum et al., 2013). Dewey approached

Table 4.2

Research Contexts of Reflective Practice in K-12 Education

Context	Example
Designs to Promote Reflective Practice	Designing Technology to Support Reflection (Linn et al., 1999)
Support for Student Learning	Scaffolding Reflection and Articulation of Scientific explanations in a Data-Rich, Project-Based Environment: An Investigation of Progress Portfolio (Land & Zembal-Saul, 2003)
Reflective Practice as a Method of Teacher Professional Development	Using Video to Analyze One's Own Teaching (Tripp & Rich, 2012)
Key Influencing Factors	Exploring the Key Influencing Factors on Teachers' Reflective Practice Skill for Sustainable Learning: A Mixed Methods Study (Chen & Chen, 2022)
Pre-Service Teacher Learning	Encouraging Reflective Practice with Future Early Childhood Teachers to Support the National Standards: An Australian Case Study (Lemon & Garvis, 2014)
Methods to Promote Reflective Practice	Reflective Practice through Journal Writing and Peer Observation: A Case Study (Lakshmi, 2014)
Developing Critical Reflection Capacity	Moving Beyond a Hall of Mirrors: Developing Critical Reflective Capacity in Teachers and Teacher Educators (Fox et al., 2019)
Teachers as Reflective Practitioners	Facilitating Teachers as Action Researchers and Reflective Practitioners: New Issues and Proposals (Avgitidou, 2020)
Professional Development through Reflective Practice	Professional Development Through Reflective Practice: A Framework for TESOL Teachers (Farrell & Macapinlac, 2021)

reflection and reflective thinking through a technical-analytic lens (Day & Harbour, 2013; Galea, 2012; Hebert, 2015). Dewey (1910) described reflection as a consequential thought process taking time and considerable effort. Dewey (1933) further clarified his definition by explaining that the consequential thought process involved in reflecting thinking is "a consecutive ordering in such a way that each determines the next as its proper outcome, while each outcome in turn leans back on, or refers to, it predecessors" (p. 4). Under Dewey's definition, reflective thinking begins with a problem or situation about which one has questions, confusion, or a sense of doubt (Fook et al., 2006). One then works to interpret the situation and its possible consequences by gathering and analyzing data and forming a plan of action. The goal, then, of reflective thinking is to search for cause, meaning, solutions, and validation of beliefs connected to the original problem or situation (Desjarlais & Smith, 2011).

Schon (1983, 1987) viewed reflection, reflective thinking, and practice as a way to solve problems. While Dewey described a consequential process for reflective thinking, Schon described an experiential-intuitive model of reflective practice (Hebert, 2015). Within his model, Schon describes reflection and reflective practice as a conversation with oneself during the problem (Schon, 1983, 1987). Within these conversations, the person reflecting utilizes intuition and professional knowledge to work through and solve problems as they happen. Schon (1983, 1987) defines this type of reflection as reflection-in-practice.

While reflection-in-practice can take place both consciously, with the individual choosing to reflect on a situation as it is happening, or subconsciously, going through the reflection process intuitively without thought to the reflection process itself, Schon (1983) believed there was a distinct pattern of thinking taking place. First, a problem or purpose of inquiry is determined. Then, according to Schon (1983), the inquirer "draws on some element of his

familiar repertoire which he treats which he treats as exemplar or as generative metaphor (p. 269)" and then determines similarities and/or differences to the current situation. These discoveries may lead to a solution, or they may lead to new questions or the discovery of a new phenomenon on which the individual will again reflect. The process put forth by Schon differs from Dewey's more technical structured approach through which the individual focuses on one problem throughout the entire process (Hebert, 2015; Schon, 1983 & 1987; Tannebaum et al., 2013; van Mannen,1995). While there are those critical of the rigidity of Dewey's model, including Schon himself, there are also those critical of Schon's model, especially when considering its application in a classroom setting (Hebert, 2015; Mezirow, 1990; Schon, 1983 & 1987; Tannebaum et al., 2013; van Mannen, 1995).

van Mannen (1995) looked at reflection and reflective practice models of both Dewey and Schon through the lens of applying these models to situations taking place with teaching and learning in a classroom. First, van Mannen acknowledges the need for teachers to have a model for reflecting on their practice, such as the model proposed by Dewey. However, he goes on to explain that, for teachers, having a model for reflection in itself is not enough. He further explains that there needs to be a combination of an effective model with opportunities for teachers to reflect-in-action for teachers to examine the situation from within the context of their classroom.

Through his exploration of reflection in a classroom context, van Mannen (1995) found that a teacher's ability to reflect both on and in practice were impacted by the teacher's level of experience, the type of experience, ability to notice, and their professional and practical knowledge, with level of experience and practical experience playing key roles. For example, an experienced teacher has more practical knowledge gained through their experiences from which

to draw solutions to problems during a lesson. In comparison, a novice teacher may end a lesson with more questions than problem solutions due to their lack of experience and practical knowledge. The important role of practical knowledge and experience form the basis of van Mannen's conclusion that teachers, whether it be in practice or on practice, should be taught to reflect on the practical tact of teaching. Tact, according to van Mannen (1995), is "a form of practical knowledge that realizes itself (becomes real) in the very act of teaching (p. 45)", and the practical tact of teaching encompasses everything inherent about teaching, including their beliefs and understandings about themselves as a teacher, their students, their classroom environment, their school environment, their content, and their grasp and ability to teach.

Critical Reflection

Dewey, Schon, and van Mannen provide the overarching idea of using reflection to solve problems by utilizing knowledge, beliefs, and experiences to think about the problem either after or during the time that the problem situation is taking place. Critical self-reflection adds a layer to that overarching idea in that not only are knowledge, beliefs, and experiences used to solve problems, but they are also carefully and thoroughly critiqued for the role that they play in bringing about and solving the problem (Larrivee, 2000; Mezirow, 1990; Osterman, & Kottkamp, 2004). Within the context of teacher professional development, critical self-reflection involves a systematic observation and analysis of knowledge, beliefs, and experiences carried out to improve professional practice (Larrivee, 2000; Osterman & Kottkamp, 2004.) Research on critical self-reflection shows that after completing critical self-reflection activities, teachers found that they 'got to know themselves better' and reported that the 'the process promoted a deeper reflection and boosted their confidence to teach (Cabaroglu, 2014). Professional development focused on promoting evolutionary changes in teaching practice, therefore, should

seek to provide opportunities and guidance to teachers that support them in critically self-reflecting on their practice.

Centering Designs on Critical Reflection

Having design principles explicitly focus on critical self-reflection allows for professional development goals and activities to be centered on and around critical self-reflection. In much of the literature on the use of critical self-reflection as a form of professional development, critical self-reflection is utilized in the background to assess teachers' understanding of what was taught (Carrington & Selva, 2010; Cornish & Jenkins, 2012; Guskey, 2002 & 2014; Long, 2012; Orrill, 2001; Pelgrim et al., 2013). In these models, the content is the center of professional development. For critical self-reflection to be effective in bringing about change, it must be intentionally and systematically placed at the center of professional development (Adler, 1991; Laprade et al., 2014; Loughran, 2002; Orrill, 2001; Osterman & Kottkamp, 2004). In the professional development design for which these design principles have been developed, the underlying goal is to assist teachers in developing their skills at critical self-reflection. The overarching goal, however, is to assist teachers in changing their knowledge and beliefs around a specific content focus through critical self-reflection.

Operationalizing Critical Reflection through a Guided Process

Research has yielded critical self-reflection models and descriptions of critical self-reflection processes (Dewey, 1910, 1933; Larrivee, 2000; Mezirow, 1990; Orril, 2001; Osterman & Kottkamp, 2004; Schon, 1983, 1987). However, these models and processes typically focus on helping one understand critical self-reflection rather than how to self-reflect critically (Adler, 1991). For example, Osterman and Kottkamp (2004) provide readers with a cycle for critical reflection. The cycle initiates with a problematic situation. The first step in the cycle is problem

identification, then moving on to observation and analysis, abstract reconceptualization, and then active experimentation. This cycle repeats until the teacher comes to a solution for the original problematic situation. Missing from the cycle and other models and processes is how one should work through these steps in the cycles.

Learning to critically self-reflect and the process of critical self-reflection are both challenging (Adler, 1991; Ostermann & Kottkamp, 2004). Without clear guidance, teachers may misinterpret the process as a form of rationalization (Loughran, 2002). When rationalization occurs, teachers do not clearly understand problem situations, nor do they know of or believe an alternative would solve the problem. Often, the problem is seen as something outside of one's control and, therefore, unsolvable (Loughran, 2002). Loughran (2002) also pointed out that just because a teacher may have experience with reflection in general, it does not mean they understand how to critically self-reflect and would, therefore, need guidance through this process.

When applied to professional development, guidance for critical self-reflection can come through scaffolding activities such as reflection triggers (Addler, 1991; Carrington & Selva, 2010; Verpoorten et al., 2012). These reflection triggers should support teachers in breaking down complex learning tasks and practices into more manageable pieces on which to reflect. In the context of evolutionary change, this can be done by providing questions that lead teachers to go beyond surface reflection and "be more specific and in-depth" (Orrill, 2001, p.30). Not only will this guide teachers through the reflection process, but it also incorporates the natural way teachers reflect. Research has shown that when teachers reflect, they cycle through different levels of thought as they move from surface to deeper levels of reflection (Larrivee, 2008; Fox et al., 2019). When scaffolding occurs in this way, teachers gain a greater self-awareness and can

better understand the connection between their teaching practices and their students' success (Adler, 1991; Bandura, 1971).

While support through scaffolding is a necessary part of a guided process for critical self-reflection, the type of question is only one aspect of developing effective scaffolds. Another consideration is the timing of those questions. As Schon (1983, 1987) pointed out, many thoughts on reflective practice follow a model of reflection-on-practice, or rather reflection after something has occurred. However, Schon also describes the process of reflection-in-practice, which is more ongoing and entails episodes of reflection throughout. Van Mannen (1995), when looking at Schon's approach, concluded that there was benefit in reflection-on-action and reflection-in-action; however, for this to happen within professional development, teachers would need guidance. To this end, reflective triggers can serve as deliberate prompts within the professional development course that signal the teacher to stop and reflect (Verpoorten et al., 2012). In many cases, these can be questions strategically placed within the course, but can also be reminders or activities that require critical reflection to be completed. The use of reflective triggers allows teachers to experience the benefits of both reflection-on-practice and reflection-in-practice.

Critical Reflection Triggers

Within this study, critical reflection triggers were purposefully placed activities and questions that participants were asked to complete. The construction of each activity and question was carefully and explicitly written to trigger critical reflection. Carefully considering the activities and question prompts was important because participants' level of thinking mirrors the level of question prompts (Blanchette, 2001; Ertmer et al., 2011; Jarosewich et al., 2010; Meyer, 2004). When the activities and question prompts are at a depth of shallow reflection,

participants' engagement in those question prompts and activities tends to be shallow. The design of the question and activity prompts was guided by Larrivee's (2008) description of levels of reflection.

Levels of Reflection

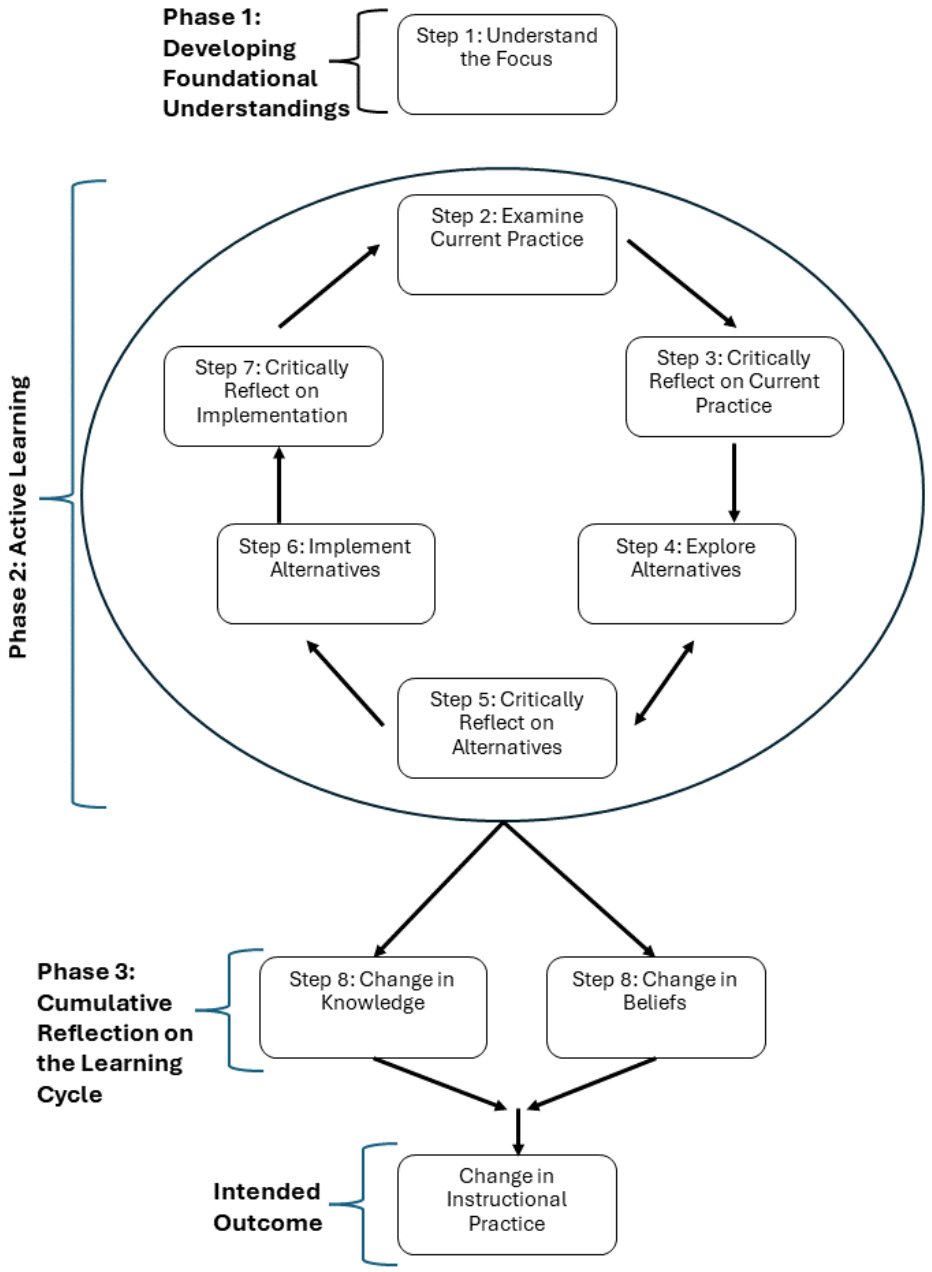
Reflection as a construct is abstract. To help make this abstract construct concrete, Larrivee (2008) developed a rubric that can be used to assess teachers' level of reflection. Larrivee's rubric is comprised of four observable levels. Level 1 is Pre-Reflection and is, as the label suggests, the stage before any true reflection takes place. Here, teachers are still more reactive than thoughtful and purposeful in their work. Level 2 is labeled Surface Reflection and coincides with the initial level of reflection. Level 3 is Pedagogical Reflection and is aligned to the general advanced level of reflection. Level 4 is labeled Critical Reflection, and it encompasses the general level of higher-order reflection. At the most basic levels, Levels 1 and 2, reflection focuses on elements of teaching that can be broken down into isolated events, such as a particular lesson, or the use of a particular strategy. At the advanced level, Level 3, teachers' reflections are focused on the deeper aspects of teaching and the theory and rationale behind their practice. At the higher order level, Level 4, questions and activities require teachers to think about their practice both within and outside of a singular teaching event and also to examine the consequences, both positive and negative, of the choices that they make in their instruction and can generalize theory and instruction to settings outside of their classroom.

Timing of critical reflection triggers. Just as the construction of the critical reflection triggers is important to the support of teachers' critical reflection, so is the timing of those triggers within the professional development course (Adler, 1991; Laprade et al., 2014; Loughran, 2002; Orrill, 2001; Osterman & Kottkamp, 2004). In this study, participants engaged in repeated cycles of

learning as a form of professional development; those cycles consist of three phases of activity. Figure 4.1 shows the situation of the phases within the course. Phase 1 is the development of foundational understandings.

Figure 4.1

Learning Cycle Structure



Phase 2 encompasses a cycle of active learning. Phase 3 is a cumulative reflection on the learning cycle. Each phase was designed to support changes in teachers' knowledge and beliefs through critical reflection that may lead to changes in teachers' instructional practices. In this study, critical reflection triggers were placed at key moments throughout the learning cycle.

Phase 1: development of foundational understandings. In Phase 1, participants worked through Step 1: Understand the Focus. Course activities supported participants as they worked to understand the content and conceptual focus of the cycle. In this study the focus of the earning cycle was the use of learning questions. Activities and question prompts for this phase were designed to support participants in developing a shared understanding of the definition of learning questions and the effect of the use of learning questions on student learning. Here, participants also began the process of gaining a deeper self-awareness by examining their current questioning practices.

identified and tested new practices and examined the consequences of their practice from multiple perspectives.

Phase 2: active learning. Phase 2 was a phase of active learning encompassing steps 2-7 of the learning cycle. Participants worked through alternating steps involving critical reflection and experiential learning activities as they learned about different questioning strategies. Each step in Phase 2 was designed to support participants as they experimented in their classrooms and analyzed and made decisions regarding evolving their current questioning practice.

Phase 3: cumulative reflection on the learning cycle. In this final phase of the learning cycle, participants were guided through critically reflecting on any changes made related to their desired instructional behavior related to their use of learning questions. After this period of critical reflection, participants were guided and further supported through making decisions

about the next steps in their evolutionary change process. The intended outcome of this examination was for there to have been an evolutionary change in participants' knowledge and beliefs that would lead to sustained changes in instructional practices with regard to the use of learning questions.

Factors Impacting Critical Reflection

Supporting teachers in making evolutionary changes to their instructional practice through critical reflection focuses on developing a self-awareness of their current instructional practice and identifying and understanding where changes need to be made (Galea, 2012; Loughran, 2002). When considering a design for professional development that incorporates critical self-reflection, one needs to consider the factors that impact the critical self-reflection process. Research on and about critical self-reflection points to seven key impacting factors. Table 4.3 summarizes these factors and their importance from a design perspective. While the literature

Table 4.3

Factors Impacting Critical Reflection

Impacting Factor	Importance
Experience	Teachers' experience with critical self-reflection may have a negative or positive effect on current and future attempts (Loughran, 2002). Teachers' experience in the classroom may impact their ability to identify problems (van Mannen, 1995).
Context	Critical self-reflection begins with a problem situation; therefore, the reflection should be situated within the context of the teachers' classroom. (Dewey, 1933; Schon, 1983 & 1987; van Mannen, 1995).
Process Guidance	Teachers may be unfamiliar with a process for engaging in critical self-reflection (Dewey, 1933; van Mannen, 1995; Adler, 2001).
Overall Understanding	Teachers may not fully understand the purpose of critical self-reflection and therefore may show resistance (Adler, 2001; Osterman & Kottkamp, 2004).

Impacting Factor	Importance
Value of the Process	While they may understand the process, teachers may not value the process (Larrivee, 2000; Osterman & Kottkamp, 2004).
Overarching Theories	The overarching theories that teachers use to analyze their knowledge, beliefs, and practices will impact the determination for need for change and/or how that change is made (Schon, 1987).
Availability of Alternatives	Lack of available alternatives to consider as potential solutions to the problem situation may reinforce the original knowledge, beliefs, and practices (Schon, 1987, van Mannen, 1995).
Perceptions	People have difference perceptions of reality; therefore, their reflective practice is driven by their perceptions (Chen & Chen, 2022).

does address factors that influence teachers' reflective practice, research on whether an individual's readiness to change influences the level of critical reflection that they may be able to obtain if supported through professional development is lacking.

Readiness to Change

Teacher's instructional practices make up their teaching behaviors (Barrett, 1991; Beery et al., 2013; Burke et al., 2006; Tieken & Achilles, 2003). A *behavior* is an action or attempt undertaken in order to bring about a specific state of affairs (Bergner, 2011; Bicard, 2012). For example, a teacher starts a phrase, and students finish it to get their attention before delivering instruction. While this defines a relatively simple behavior, the make-up of behaviors is quite complex. According to Bergner (2011), behavior consists of eight parameters. These parameters include the identity of the person, the motivation behind the action, the knowledge behind the act, the skill, competency, and ability to perform the act, the procedural aspect of the behavior or performance, the achievement or desired outcome, the aspect of the behavior that is personal to the individual, and the significance of the act. Given the complex nature of defining behavior, the process of changing behaviors is also complex.

When supporting teachers in making evolutionary changes to their instructional practices, it may be beneficial to understand how behaviors are changed. Prochaska's (1984) Transtheoretical Model of behavioral change (TTM) is one model for understanding how behaviors are changed. The TTM identified six stages that individuals go through when changing a behavior. These stages of change are the central organizing construct of the TTM (Prochaska et al., 2006). The stages span from denial of a need to change to having made and sustained a behavioral change over a significant period.

The TTM integrated the "processes and principles of change across major theories of intervention" (Prochaska et al., 2008, p.97) and identified the stages of change that occur when attempting to change a specific behavior. The identification of the stages of behavioral change shows that behaviors do not change as a result of discrete events, such as the one-shot professional development opportunities of the past, but rather they change over time as an individual moves through each stage (Burke et al., 2006; Prochaska et al., 2006; Prochaska et al., 2008). Research question 4 of this study sought to investigate if there is a pattern of readiness to change among participants' levels of reflection and expressed intent to change.

Research Design

Given the complexity of EDR, a pragmatist approach was utilized when designing the study's methods. Under the pragmatist philosophy, research components are chosen "based on what will work best for the research problem, research questions, and research circumstance" (Johnson & Christensen, 2014, p.489). Pragmatism does not restrict research to one specific paradigm (Morgan, 2014). In a pragmatist philosophy, utilizing multiple methods within different paradigms is encouraged to emphasize shared meaning.

Through the lens of pragmatism, there is an emphasis on personal experiences and the interpretations of those experiences when considering one's understanding of the world (Morgan, 2007 & 2014). The constant change in the world "presents situations that require adaptive behaviors from individuals, which is why Dewey argues inquiry is critical to manage this uncertainty" (Hall, 2013, p. 17). It is through experiences during the inquiry process that knowledge is gained (Morgan, 2007). When applied to this study, pragmatism allows for a variety of research methods to be used to answer the questions needed to move forward with the educational design research process.

While applying a pragmatist approach, this study was conducted using a convergent mixed methods design. Mixed methods research is conducted when "one method for gathering data may not be adequate for answering complex questions that sometimes require a variety of qualitative and quantitative methods in one study" (Hesse-Biber & Johnson, 2013, p.103). Here, the researcher "gathers both quantitative (closed-ended) and qualitative (open-ended) data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand research problems" (Creswell, 2015, p.2). Based on the researcher's approach to the study's design, mixed methods designs can have either a qualitative or quantitative dominant approach or a balance of the two where both methods are treated equally (Teddlie & Tashakkori, 2009). For this study, the mixed methods approach was a qualitative dominant design. With the qualitative analysis being dominant, a large random sample is not necessary (Warfa, 2016). The qualitative data was quantized for the purpose of further analyzing the qualitative data, and not for the purpose of making any generalizations. This design was employed for two reasons. First, the research questions investigated were ones in which the results of the professional development intervention were analyzed, and the underlying cause of

those results was also sought. Second, the interpretation of the results will be used to enhance the design of the intervention in later research study iterations.

The literature supports the use of mixed methods in this study, as mixed methods designs have been used to study many aspects of professional development within K-12 education settings (Duffield et al., 2013; Holmes et al., 2010; Parylo, 2012; Rademaker, 2008). Mixed methods have also been used in designing, testing, evaluating, and revising EDR interventions (Anderson & Shattuck, 2012; Kennedy-Clark, 2015). Mixed methods was used in this study for complementarity. Complementarity is the mixing of methods within a study to examine a complex phenomenon from multiple angles (Greene, 2007). In this study, critical reflection was studied to determine the depth of reflection attained by participants within a purposefully designed online professional development, to uncover any patterns in participants' level of critical reflection and the types of changes participants report having made to their instructional practice, and to explore whether a person's stage of readiness to make changes has an impact on their level of reflection.

The examination of the critical reflection design principles from multiple angles will allow for the application of what Teddlie and Tashakkori (2009) refer to as a convergent mixed design. In convergent mixed designs, "data are gathered and analyzed using one method and then transformed and analyzed using the other method" (Teddlie & Tashakkori, 2009, p. 155). After the transformations and analysis were completed, meta-inferences were drawn based on the simultaneous examination of the results. Meta-inferences (Tashakkoi & Teddlie, 2008) are: “An overall conclusion, explanation, or understanding developed through an integration of the inferences obtained from the qualitative and quantitative strands of a mixed methods study” (p. 108-109). The meta-inferences in this study focused on the continued use of critical reflection

within a set of design principles for professional development that supports teachers in making evolutionary changes to their instructional practice.

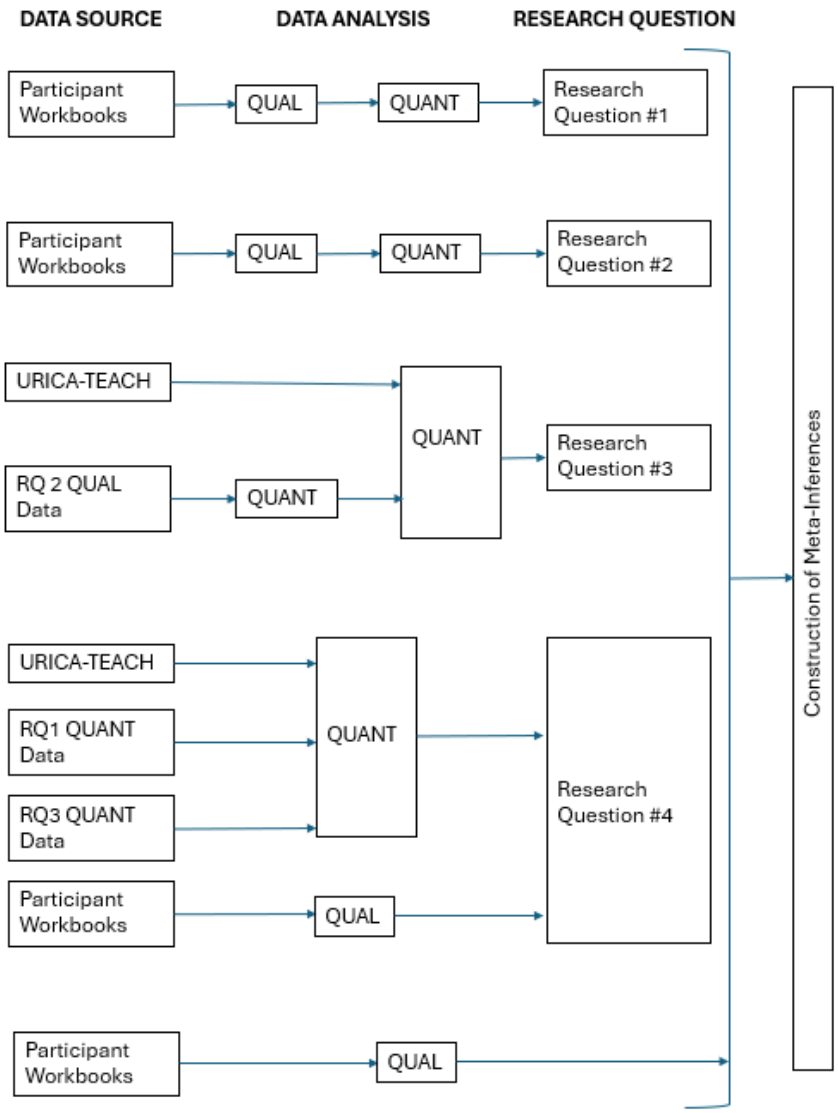
Figure 4.2 shows the convergent mixed design for this study. Here, both qualitative and quantitative data were collected. Research Question 1 was explored using quantitized qualitative data. Research Question 2 was explored through a qualitative analysis of the data. The qualitative data used in Research Question 2 was quantized and mixed with the quantitized data from Research Question 1 to explore Research Question 3. The quantitative and quantitized data from Research Question 1 were analyzed quantitatively to explore Research Question 4. Finally, the results from Research Questions 1-4 and a qualitative analysis of targeted participants were used to construct meta-inferences regarding the two design principles, Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process.

Site Selection

The professional development intervention was designed to be implemented entirely online. Therefore, the site selected was the online learning management system (LMS) through which the course was delivered. The LMS used was a platform called Pathwright. This platform employs a linear delivery system, meaning that participants do not have to access different areas of the platform to complete the course. The course design estimates that participants will spend approximately 36 hours on the coursework. This time included time teachers spent completing the work within the course and the time spent during active experimentation within their classroom. The 36-hour course was comprised of 5 modules, each designed to be completed in approximately 6 hours. Participants' work in 3 of the six modules was the focus of the data collection and analysis. These three modules were selected as they included the critical reflection triggers within the course.

Figure 4.2

Convergent Mixed Methods Study Design



Design of Critical Reflection

In general, the prompts contained in each of the three modules were designed to help teachers move progressively from identifying issues in their current practice to learning more about how to address those issues through instruction and, ultimately, enacting changes that address the identified issues. This progression is reflected in the reflection prompts, or triggers, used to promote participant reflection. For example, in Module 1 of the Teaching with Learning

Questions course, participants are presented with information on research based questioning best practices and then work through a series of self-assessment questions such as: *Critical Reflection Activity 1.1.1: Assess yourself of the opportunities that you provide students to engage in each of the questioning activities listed. In your assessment, consider how often, how successful and that the role that each strategy plays in your overall instructional practice plan.* At the end of Module 1, participants are then asked to identify a short-term change that they would like to make to their questioning practice. Participants do not have to identify how they will make the change, just identify what they want to change and why.

In Module 3, after having been presented with different questioning strategies through readings, case studies, and videos, participants are asked to reflect on how those strategies might be implemented in their classroom and the effect the strategy might have on their students' learning. For example, one of the prompts that participants answer is: *M3S1D2: Do you believe that your students would benefit from a strategy such as 'The Wingman' strategy? If so, how. If not, why, and could you modify the strategy in order for it to be beneficial?* At the end of Module 3, participants choose a strategy to use as is, or modify and use, to meet their change goal established in Module 1.

Finally, in Module 5, participants reflect on the implementation of their chosen strategy that takes place in Module 4. During the reflection process, participants answer questions such as: *LA5.1.1: How are the questions that you recorded during this lesson similar to, or different from, the questions that you asked at the start of the course.* At the end of the Module 5 participants reflect on the changes that they have made to their questioning strategies and discuss new goals, and plans for meeting those goals, as they work to continue to evolve their practice

Methods

Multiple data collection methods were used in the study. Each method measured the construct of critical reflection within the context of the professional development design and the effectiveness of using critical reflection to support evolutionary change. This study was approved by our University's Institutional Review Board (IRB) prior to engaging in research activities.

Participant Recruitment

The goal for data collection was to achieve results that closely aligned with an authentic professional development experience for all participants. The Teaching with Learning Questions course was developed using the design principles from the study and approved for inclusion in the NY City After School Professional Development Program (ASPDP). Teachers self-select courses from the ASPDP catalog, sign up, and pay ASPDP for professional development credits.

There were 35 participants in the Teaching with Learning Questions course during the study period. All teachers that paid ASPDP for the course completed the same coursework, took all surveys, and were administered the URICA-TEACH. All teachers that completed the course received their professional development credits as per ASPDP guidelines, and only after the term ended, were participants asked if their work could be used for research analysis. Of the 35 course participants, 12 agreed to allow their coursework to be analyzed as a part of this study; this study therefore uses a sample of convenience. Table 4.4 displays a demographic comparison between the study participants (N=12) and the course participants. Analysis of the participant demographic data suggests that the 12 study participants were representative of the 35 course participants.

Table 4.4

Demographic Data Comparison of Study and Course Participants

		Study Participants		Course Participants	
		N	%	N	%
Current Classroom Teacher		12	100%	35	100%
Years of Teaching Experience					
	1-5 years	5	42%	12	34
	6-10 years	5	42%	10	29
	11-15 years	0	0%	7	19
	16-20 years	0	0%	3	9
	>20 years	2	17%	3	9
Current Grade Level Taught					
	K-5	8	67%	20	57%
	6-8	0	0%	8	23%
	6-12	4	33%	7	20%
School Designation					
	Urban	9	75%	29	83%
	Suburban	2	17%	4	11%
	Rural	1	8%	2	6%
School Met Annual Goals					
	Yes	7	58%	22	63%
	No	5	42%	13	37%
Previous Experience with Online Professional Development					
	Yes	11	92%	33	94%
	No	1	8%	2	6%
Self-Selected the Course					
	Yes	12	100%	35	100%
	No	0	0%	0	0%
Reason for Choose the Course					
	Certification requirements	4	33%	13	37%
	Professional development credits	5	42%	15	43%
	Improve classroom practice	2	17%	5	14%
	Not specified	1	8%	2	6%

Data Collection

The data were collected from two sources, the URICA-TEACH and a document analysis. Table 4.5 provides a summary of the data collection methods. Before starting the course, participants were asked to complete the URICA-TEACH (Appendix A). The URICA-TEACH was developed based on the University of Rhode Island's Change Assessment Scale, or URICA,

and measured three stages of participants' readiness to change: pre-contemplation, contemplation, and action. The development of URICA-TEACH is detailed in Article 2, in which the validity and reliability of the instrument were established through exploratory factor analysis.

Table 4.5

Data Collection Summary

Data Collection Instrument	Data Type	Collection Method	What is being measured/investigated?
URICA-TEACH	Quantitative	4-point Likert scale questions	readiness to change.
Document Analysis	Qualitative	Artifacts from submitted course work.	changes in participant thinking, beliefs, and/or practices. Intent to change levels of critical reflection

Participants recorded their responses to the critical reflection prompts (N=25) within the assigned coursework in their Participant Workbooks. These Participant Workbooks (N=12) were collected, and all 300 participant responses were individually analyzed. Each prompt was first analyzed and scored using Larrivee's (2008) Level of Reflection rubric (Appendix B) to establish the overall quality of reflection. The responses were then analyzed for the type of change, if any, expressed in the response. Finally, each prompt was analyzed to determine the expressed intent to change. Based on the findings, a subset of participants' responses was analyzed further to provide context for the earlier results.

Data Management

All personally identifiable information was removed from participants' work, and a pseudonym was assigned to each participant to ensure the confidentiality of participants' information. All information collected was stored on a password-protected hard drive, with the researcher and the researcher's advisor being the only two with access to the data.

Data Analysis

"Analyzing data in mixed methods research is one of the most difficult steps- if not the most difficult step – of the mixed methods research process" (Onwuegbuzie & Combs, 2010, p. 398). This step is challenging because the researcher is faced with multiple methods of analysis. This study addressed each of the four research questions in a separate analysis. The results of the separate analysis were combined and used in the development of meta-inferences regarding the use of the Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process as design principles for supporting evolutionary changes in teachers' instructional practice. Table 4.6 provides a summary of the data analysis by research question.

Research Question 1

The goal of Research Question 1 was to determine the level of reflection reached by participants on purposefully placed reflection triggers within the course, which was first explored through qualitative content analysis. Qualitative content analysis involves coding texts or other artifacts using "codes derived from the theory or prior knowledge and then analyzing the distribution of codes" (Bernard & Ryan, 2010, p. 287). Qualitative content analysis can be used inductively or deductively (Bernard & Ryan, 2010; Cho & Lee, 2014) and was used deductively here because the codes and categories are drawn from the relevant learning theory and literature on teacher professional development and teacher change (Cho & Lee, 2014). The specific approach to conducting qualitative content analysis used in this study was the six-step process defined by Mayring (2000) that included the following: Step 1: Create research questions. Step 2: Create theoretical definitions of categories. Step 3: Develop theoretical-based codes. Step 4: Revise categories. Step 5: Final work through of the text. Step 6: Interpretation of results.

Table 4.6

Data Analysis by Research Question

Research Question (RQ)	Data Source	Method of Analysis	Purpose of Analysis
RQ1: What level of reflection can be observed in participants' work on each of the critical reflection trigger points within the course?	Participant Workbooks	Qualitative Content Analysis Quantitizing to report level of change based on Levels of Reflection Rubric (Larrivee, 2008) Descriptive statistics calculated to describe the data	To determine the level of reflection reached by participants on purposefully placed reflection triggers within the course. To summarize the level of reflections reached within and across critical reflection trigger points.
RQ 2: What changes in knowledge, beliefs, and/or instructional practice are expressed by participants within their coursework on each of the critical reflection trigger points?	Participant Workbooks	Qualitative Content Analysis Provisional Coding for type of change Quantizing to describe the data	To determine the types of changes expressed by participants as having been made to their knowledge, beliefs, and instructional practice. To make connections between the prompt types and reported change types.

Research Question (RQ)	Data Source	Method of Analysis	Purpose of Analysis
RQ3: What are the patterns between levels of readiness (low, mid, and high) and intent to change as expressed in the reflection prompts?	URICA-TEACH Research Question 2 Qualitative Data	URICA-TEACH composite score Descriptive statistics by type of intent Comparison of intent across URICA-TEACH groups	To determine if there are any noticeable patterns in participants' intent to change based on level of readiness
RQ4: What patterns in intent to change and level of reflection emerged among individual participants who had low, mid, and high levels of readiness to change?	URICA-TEACH Research Question 1 Data Research Question 3 Data Participant Workbooks	Graphic representations of level of reflection vs intent to change Comparison of data within and across triggers and between low, mid, and high level readiness groups. Qualitative analysis of sub-set of participants.	To describe the patterns, present in the data, between participants' readiness to change and their level of reflection reached within each critical reflection trigger and within the course. To provide context for the findings.
Meta Inferences	Results from RQs 1-4 Participant Workbooks	Collective Case Study analysis (Stake, 1994)	To construct meta inferences regarding the effectiveness of Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process to support teachers in making evolutionary changes to their instructional practice.

Application of qualitative content analysis. The step-by-step application of qualitative content analysis used in this study is described as follows:

Step 1. Create research questions. The research questions were developed based on the literature on critical reflection, the role that critical reflection plays in designing teacher professional development that supports teacher change, and the design principles to be tested.

Step 2. Create theoretical definitions of categories. For this step, rather than creating theoretical definitions, the definitions and indicators for the level of reflection were taken from Larrivee's (2008) rubric on Levels of Reflection.

Step 3. Develop theoretically based codes. The process used for developing theoretical-based codes involved analyzing and coding the indicators for each level of reflection in the Larrivee (2008) rubric. The levels of reflection are:

Level 1: Pre-Reflection. At this level, teachers operate in survival mode, and reflections defend rather than analyze current practices. Here, students' differing needs are not considered, and connections are not made between teaching practices and student learning. The teacher appears to be focused on classroom management, attributes ownership of problems to students or others, and sees classroom circumstances as something that they cannot control.

Level 2: Surface Reflection. At Level 2, teachers limit their practice analysis to technical aspects of instruction. When discussing modifications to instruction, they do so without considering any underlying theories or challenging their underlying beliefs about teaching and learning. Here, changes are made based on past personal experiences and are focused on short-term results.

Level 3: Pedagogical Reflection. At Level 3, teacher reflections analyze the relationship between teacher practice and student learning. Here, the teachers engage in constructive criticism

as they examine the effectiveness of their practice and are willing to take risks when making changes. In their analysis, teachers look for patterns to better understand student results and use theory to help guide explanations and changes. At this level, the student plays a much more significant role in the decision to make changes, and the teacher owns their practice and learning outcomes.

Level 4: Critical Reflection. When reflecting on Level 4, teachers look outside their classroom at the greater educational landscape. Here, status quo norms and practices are examined, like those concerning power and control in the classroom. Reflections at this level address equity and inclusion issues, critically analyze practice, beliefs, and assumptions, and work to generate new hypotheses.

Step 4: Revise Categories. Once the provisional codes were developed in Step 3, they were applied to individual participants' units of reflection responses to the critical reflection triggers within the learning cycle. After the initial application of the codes, the codes were revised as needed. Table 4.7 is the final list of codes used in the qualitative analysis for participants' level of reflection. Appendix C provides an example of the coding and analysis process for Research Question 1 as applied to participants' responses.

Step 5: Final work through of text. The revised provisional codes were then used to code all the units of reflection responses to the critical reflection prompts within the course for all participants. The coded responses were grouped as a whole and by reflection focus prompt types. There were four different prompt types based on the reflection focus.

- *Type 1- Current Practice:* Prompts asking teachers to reflect on their teaching practices.
- *Type 2- Student Learning*: Prompts asking teachers to reflect on current or potential aspects of their students' learning.

Table 4.7

Codes for Level of Reflection

Reflection Component	Sub-Type Provisional Code	Provisional Code Definition	Reflection Score
Problem Only – No Control	Pre-Reflection	States a problem in the context of something outside of the teacher's control (i.e. source of problem is students, or administration).	1.0
Problem Only	Surface	Recognizes a problem and connects with instructional practice, but no possible solution considered.	2.0
Reflection Component	Sub-Type Provisional Code	Provisional Code Definition	Reflection Score
Problem with Solution, No Justification	Surface	Identifies a problem and provides a solution under consideration but does not provide a justification in terms of how the solution will benefit instruction and student learning.	2.0
Problem, Solution, and Justification	Pedagogical	Identifies a problem and a solution that is justified in terms of how the solution will benefit instruction and student learning.	3.0
Problem and Theory Connection	Pedagogical	Identifies a problem and using educational theory to examine potential solutions.	3.0
Generalization to Education as a Whole	Critical Reflection	Reflects on problems with education in general and makes connections to theory and relates to instructional practice	4.0
Applications Outside of Own Classroom	Critical Reflection	Considers how changes that are made in their classroom could potentially have applications outside of their classroom.	4.0

- *Type 3- Teacher Change:* Prompts asking teachers to reflect on changes they wanted to make, or had made, to their teaching practices.
- *Type 4-Teacher Change and Student Learning:* Prompts asking teachers to reflect on changes they would like to make or have made to their teaching practices and the anticipated or actual effect they will have on students' learning.

Step 6: Interpretation of results. Interpreting the results for Research Question 1 involved determining the level of reflection for each coded response. Assigning the score for the level of reflection allowed the qualitative data to be transformed into quantitative data (Collingridge, 2013), allowing for the calculation of descriptive statistics to describe the results.

Research Question 2

The goal of Research Question 2 was to identify any changes to participants' knowledge, beliefs, and instructional practice as expressed by participants through their coursework. Research question 2 was explored using the process for qualitative content analysis described for Research Question 1. Steps 1 and 2 were completed in conjunction with Research Question 1 for this research question. Steps 3 and 4 were omitted as a set of provisional codes were developed and revised during a pilot study of the design principles, including Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process. Table 4.8 lists each provisional code and the working definition of each code as it was used in this study. Appendix D provides an example of the coding and analysis process for Research Question 2 as applied to the types of changes in participants' responses.

Step 5: Final work through of text. The previously revised provisional codes were used to code all the units of reflection responses in order to identify the types of changes expressed within participants' responses.

Table 4.8

Codes for Type of Change

Type of Change	Sub-Type Provisional Code	Provisional Code Definition
Actual	Change in Pedagogical Knowledge	Knowledge about teaching actions
Actual	Change in Pedagogical Beliefs	Beliefs regarding teachings actions
Actual	Change in Instructional Practice	The instructional actions taken during a lesson that directly relate to the delivery of the content and actions taken by the teacher that may impact any or all areas of the classroom and/or student learning.
Desired	Desire to Change - General	A general desire to change expressed without details of what the change is, or how it will be actualized.
Desired	Desire to Change-Planned	An expressed desire to change that provides explicit details about the change and how it will be actualized
Desired	Desire to Keep Current Practice	An expressed desire not to change and to keep current practices

Step 6: Interpretation of results. The interpretation of the results for Research Question 2 involved quantitizing the qualitative results to describe the coded data.

Research Question 3

Research Question 3 was first addressed by calculating participants' composite score for readiness to change on the URICA-TEACH. The process used to calculate the composite score the process used was that of Prochaska (1984). The mean was created for each URICA-TEACH construct. Then, the mean Precontemplation scores were subtracted from the sum of mean scores

for Contemplation and Action. Participants were placed into three groups based on their URICA-TEACH contemplation score: low, mid, and high. Then, using the data generated for Research Question 2, three distinct categories of intent to change were created.

- *Actual Change:* This category consisted of all actual changes made to pedagogical beliefs, knowledge, and practices.
- *Desire to Change:* This category consisted of both desired general changes and desired planned changes.
- *Desire to Keep Current Practice:* This category consists of only those prompt responses in which participants expressed an explicit desire to keep their current practice.

All other prompts were put into a generic category of *No Change-No Intent* based on the response lacking any mention of an actual change, desire to change, or desire to keep current practice. Finally, the associated intent to change data for each participant was combined with others in their URICA-TEACH readiness and group, and an across-group analysis was conducted.

Research Question 4

Patterns in participants' readiness to change, level of reflection, and intent to change were first examined using the quantized data from Research Question 1 and Research Question 3. Then, the quantized data and the URICA-TEACH composite scores were used to examine participants' level of reflection across and within readiness to change groups. Next, the quantized data from Research Question 1, Research Question 3, and the URICA-TEACH composite scores were used to examine individual participants within each readiness to change group, and individual participant responses were used to provide context for the analysis results.

Meta Inferences

The purpose of this study was to assess the effectiveness of using two specific design principles to support teachers in making evolutionary changes to their instructional practice: Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process. The findings from Research Questions 1-4 and the targeted follow-up analysis of participants' responses were mixed to complete a collective case study analysis to develop meta-inferences regarding the effectiveness of these design principles. A collective case study was chosen to construct meta-inferences in alignment with Stake's (1994) description of collective case studies. According to Stake, collective case studies are used to learn about a phenomenon by examining multiple cases together. The cases are not predetermined as they are chosen during the data analysis, by which case exhibits the key issues or dominant themes. The lack of predetermination of the cases was because the cases themselves are secondary issues, as it is the phenomenon, the design principles to support evolutionary change, which are the focus of the study.

Forming meta-inferences, then, requires the researcher to look across cases to find recurring patterns or results that are associated with the phenomenon of interest – in this case, the way the design principles may or may not have impacted a teacher’s level of reflection or stated intent to change in relation to their level of readiness to change. In this study, this task was performed by looking at the qualitative data one more time to identify instances where language associated with evolutionary change were evident. While the specific words varied from person to person, the qualities of evolutionary change were evident when a participant was discussing gradual changes made to their own, self-identified goals for their teaching practice. This often took the form of a description of what a participant might be doing more of or less of as a result of the PD, or even changes in their thinking or beliefs around an instructional practice.

Assessing Data Quality

To help ensure a high level of quality in both the data collected and, in the analysis, and integration the following steps will be taken:

1. The quantitative and qualitative data were taken from the same population, which plays an important role in the development of meta-inferences (Onwuegbuzie & Johnson, 2006).
2. A thorough accounting of the procedures taken to collect and analyze the data was provided. This "systematic and careful documentation of all procedures" (Freeman et al., 2007, p. 26) detailed every study step.
3. Any claims and inferences made were justified through explicit examples and explanations of the data.
4. A peer review was conducted to assess the quality of the design, analysis, findings, and interpretive rigor (Tashakkori & Teddlie, 2008).

Results

Research Question 1: What level of reflection can be observed in participants' work on each of the critical reflection trigger points within the course?

Using qualitative content analysis and the Levels of Critical Reflection rubric (Larrivee, 2000), the critical reflection prompts from Modules 1, 3, and 5 were analyzed to determine each prompt's reflection potential (RP). Each prompt (N=25) was reviewed, coded, and scored individually. Table 4.9 displays the mean score of the reflection potential of the prompts for each module. Module 1 had the highest mean reflection potential score, $M = 2.87$, whereas Module 5 had the lowest mean reflection potential score ($M = 2.60$). The mean reflection potential across all three modules fell between Surface Reflection (2) and Pedagogical Reflection (3).

After calculating the mean reflection potential scores, the reflection prompts were analyzed to code each prompt to determine the focus of the critical reflection prompts across Module 1, Module 3, and Module 5. Four critical reflection prompt types were identified: Current Practice, Teacher Change, Student Learning, and Teacher Change & Student Learning. The reflection potential was calculated for each type of prompt within each module. The mean reflection potential across Modules 1, 3, and 5 ranged between Surface Reflection (2) and Pedagogical Reflection (3) for two prompt types: Current Practice and Teacher Change. The mean reflection potential across Modules 1, 3, and 5 was consistent at Pedagogical Reflection (3) for the remaining two prompt types: Student Learning and Teacher Change & Student Learning.

The participants' responses to each critical reflection prompt were also scored using the same method applied to determine each prompt's reflection potential. Table 4.9 displays the mean reflection potential (RP) for each prompt type and participants' mean level of reflection (P-LoR) on all prompts across all prompt types and modules. The overall mean level of reflection for participants fell below the reflection potential in Module 1 and Module 3. In Module 1, the overall mean reflection potential was scored at 2.87, while the mean participant level of reflection was 2.58. In Module 3, the overall mean reflection potential was 2.85 and the mean participant level of reflection was 2.62. In Module 5, the mean reflection potential was 2.60; this was lower than the mean participant level of reflection of 2.62, indicating that the participants' reflection met or exceeded the reflection potential in this module.

When examining the prompt type, Current Practice, the mean participant level of reflection exceeded the mean reflection potential in Module 5 only ($M_{P\text{-}LOR}$ = 2.42; M_{RP} = 2.00). In Teacher Change, the mean participant level of reflection exceeded the mean reflection potential in Module 1 ($M_{P\text{-}LOR}$ = 2.59; M_{RP} = 2.50) and Module 5 ($M_{P\text{-}LOR}$ = 2.46; M_{RP} = 2.25). For the prompts,

Table 4.9

Mean Reflection Potential of All Critical Reflection Prompts per Module

					Reflection Focus											
					Current Practice			Teacher Change			Student Learning			Teacher Change & Student Learning		
Mod #	# of MP	Mean RP	N of PR	Mean P-LoR	# of MP	Mean RP	Mean P-LoR	# of MP	Mean RP	Mean P-LoR	# of MP	Mean RP	Mean P-LoR	# of MP	Mean RP	Mean P-LoR
1	8	2.87	96	2.58 SD=.5	2	3.00	2.54 SD=0.3	2	2.50	2.59 SD=0.4	3	3.00	2.56 SD=0.4	1	3.00	2.75 SD=0.5
3	7	2.85	84	2.61 SD=0.6	3	2.67	2.58 SD=0.4	1	3.00	2.42 SD=0.5	1	3.00	2.58 SD=0.4	2	3.00	2.92 SD=0.3
5	10	2.60	120	2.62 SD=0.6	1	2.00	2.42 SD=0.5	4	2.25	2.46 SD=0.4	1	3.00	2.67 SD=0.5	4	3.00	2.81 SD=0.3

Note: Module Prompts (MP), Participant Reflections (PR), Reflection Potential (RP), Participant Level of Reflection (P-LoR)

Student Learning and Teacher Change & Student Learning, the mean participant level of reflection did not meet the reflection potential in any of the three modules.

In Module 1, participants had the greatest difference (-.46) between mean level of reflection (2.54) and the mean reflection potential (3.00) on prompt types with a reflection focus on Current Practice and the least difference (+.09) on prompt types that had a reflection focus on Teacher Change. Participants' mean level of reflection (2.59) only exceeded the mean reflection potential (2.50) on prompt types with a reflection focus on Teacher Change and came the closest (2.75) to reflecting at Level 3: Pedagogical Reflection on prompt types that asked them to critically reflect on Teacher Change & Student Learning. Figure 4.3 displays a comparison of the mean reflection potential and the mean level of reflection across the prompt types.

Figure 4.4 displays a comparison of the mean reflection potential and the mean level of reflection across the prompt types for Module 3. In Module 3, participants had the greatest difference (-.58) between their mean level of reflection and the mean reflection potential on prompts with a reflection focus on Student Learning and the least difference (-.08) on prompts with a reflection focus on Teacher Change & Student Learning. There were no prompt types in which participants' level of reflection met or exceeded the mean reflection potential. participants came closest to achieving Pedagogical Reflection (3) on prompts that had a reflection focus on Teacher Change & Student Learning.

Figure 4.5 displays a comparison of the mean reflection potential and the mean level of reflection across the prompt types for Module 5. In Module 5, participants had the greatest difference (+.42) between their mean level of reflection and the mean reflection potential on prompts with a reflection focus on Current Practice and the least difference (-.19) on prompts with a reflection

Figure 4.3

Module 1 Mean Level of Reflection vs. Mean Reflection Potential for All Prompt Types

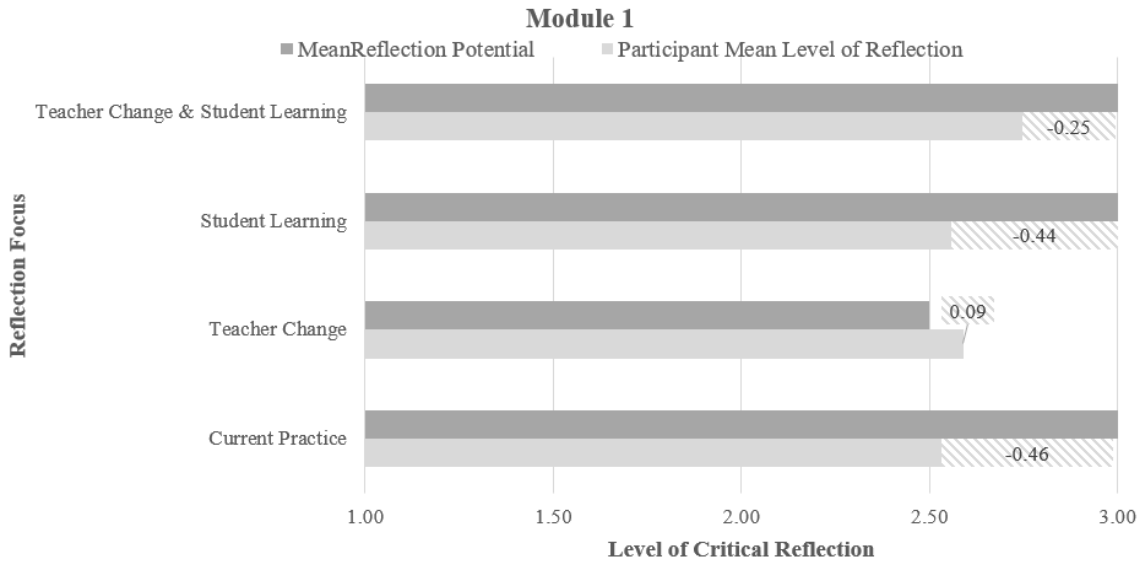
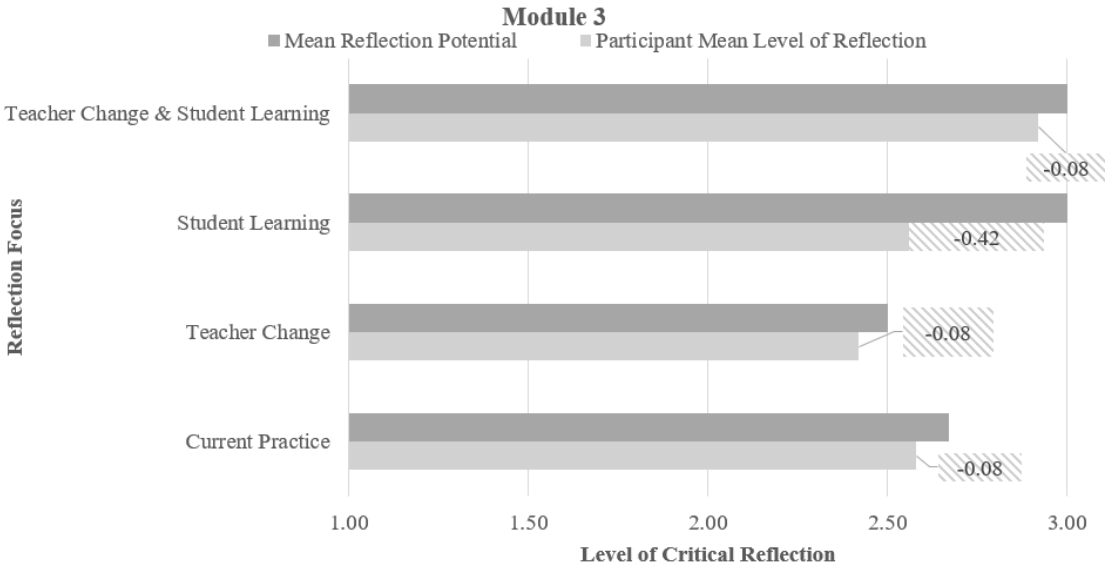


Figure 4.4

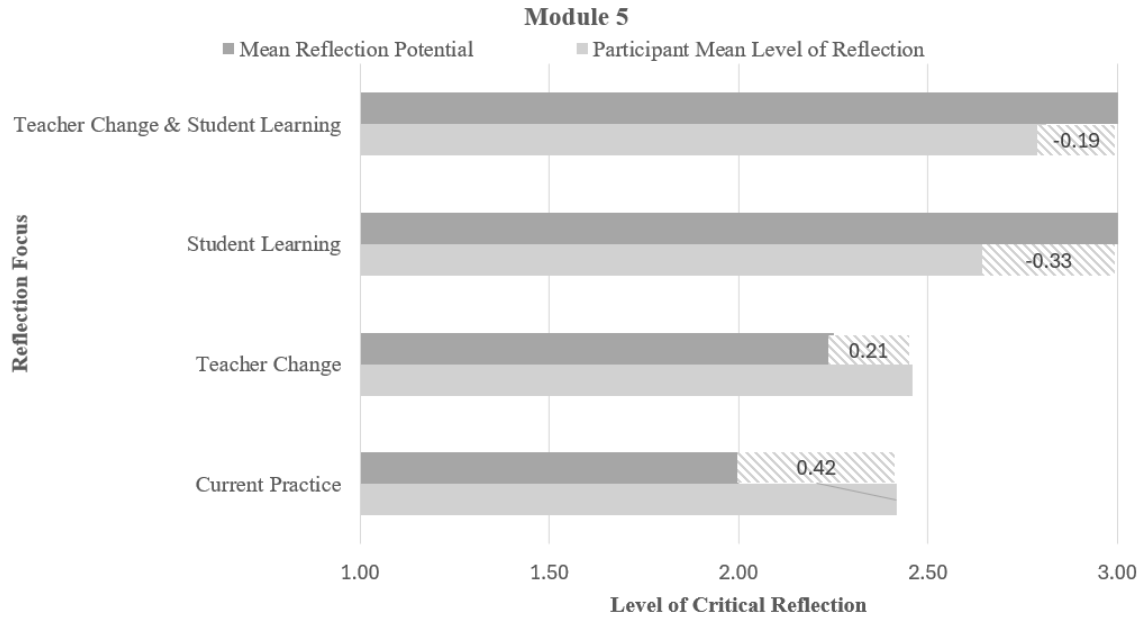
Module 3 Mean Level of Reflection vs. Mean Reflection Potential for All Prompt Types



focus on Teacher Change & Student Learning. There were two prompt types on which participants' level of reflection met or exceeded the mean reflection potential. On the prompts with a reflection focus on Current Practice, participants exceeded the reflection potential by 0.42 and on prompts with a reflection focus on Teacher Change, participants' level of reflection exceeded the reflection potential by 0.21. Participants came the closest to reflecting at Pedagogical Reflection (3) on prompts that had a focus on Teacher Change & Student Learning.

Figure 4.5

Module 5 Mean Level of Reflection vs. Mean Reflection Potential for All Prompt Types



The higher the mean reflection potential, the higher the mean participant level of reflection. Table 4.10 displays the mean participant level of reflection by the mean reflection potential. When the reflection potential was at a Pedagogical Reflection 3, participants' level of reflection was generally below the reflection potential but reached levels of 2.50 or higher on those prompts. When the reflection potential was at 2.50 or lower, participants' level of reflection was

above the reflection potential but only reached a level of higher than 2.50 on the Teacher Change prompt type in Module 3.

Table 4.10

Mean Participant Level of Reflection by Mean Reflection Potential

Mean Reflection Potential	Mean Level of Reflection
2.00-2.49	2.44
2.50-2.99	2.59
3.00	2.66

Research Question 2: What changes in knowledge, beliefs, and/or instructional practice are expressed by participants within their coursework on each of the critical reflection trigger points?

Participants' responses to the critical reflection prompts were analyzed using qualitative content analysis and the provisional codes developed during the pilot study were applied to identify the changes reported in participants' reflection prompt responses. The type of change identified in participants' responses were:

- Actual changes in pedagogical knowledge (ACPK)
- Actual change in pedagogical beliefs (ACPB)
- Actual change in practice (ACP)
- Desired specific change - planned (DSC-P)
- Desired non-specific change - general (DNSC-G)
- Desire to keep current practice (DKCP)
- No change-no intent to change (NCNI)

Once provisional codes were applied, each change type was counted and the percentage of each change out of the total number of responses for each module was calculated as shown in Table 4.11. There were three types of actual changes that participants described having taken place. These changes were coded as being either in changes in pedagogical knowledge, changes in pedagogical beliefs, and changes in practice.

Actual Changes in Pedagogical Knowledge were found in prompt responses in Module 1 and Module 3 only and were at the highest in Module 1 (7%). Actual Change in Pedagogical Beliefs were also only found in Module 1 and Module 3 and were at the highest in Module 3 (6%). Actual Changes in Practice were at the highest percentage in Module 5 (35%); this was also the highest reported type of change in Module 5. Actual Change in Practice, unlike changes in pedagogical knowledge and beliefs, increased from Module 1 (4%) to Module 3 (15%), and from Module 3 to Module 5 (35%).

Table 4.11

Types of Changes Expressed in Participant Critical Reflection Prompt Responses

	Module 1 TRR=96	Module 3 TRR=84	Module 5 TRR=120
	%	%	%
Actual Change in Pedagogical Knowledge	7%	1%	0%
Actual Change in Pedagogical Beliefs	2%	6%	0%
Actual Change in Practice	4%	15%	35%
Desired Specific Change -Planned	0%	17%	10%
Desired Non-Specific Change - General	33%	17%	22%
Desire to Keep Current Practice	3%	7%	3%
No Change - No Intent	50%	38%	30%

Note: Total Responses Reviewed (TRR)

Participant responses were found to express two distinct desires to change. One was a desire to make a specific type of change that were expressed along with how participants planned

to make that change. There were no Desired Specific Change-Planned expressed in Module 1, but this type of change was expressed in Module 3 (17%) and Module 5 (10%), with the highest percentage expressed in Module 3. The second type of desire expressed was a general desire to make a change. These changes were non-specific and were not expressed along with a plan for making the change. Desired Non-Specific Change-General were expressed in all three modules, with the highest percentage expressed in Module 1 (35%). Participants also expressed either a desire to keep current practices or did not express any type of change or any intent to change. Desire to Keep Current Practice was expressed in all three modules, with the highest percentage expressed in Module 3 (7%). No Change-No Intent was found in all three modules, with the highest being in Module 1 (50%). Instances of No Change-No Intent decreased from Module 1 (50%) to Module 3 (38%) and from Module 3 to Module 5 (30%).

To explore types of changes expressed in participants' critical reflections, the types of changes were then grouped by the type of reflection prompt (e.g., Current Practice, Teacher Change.) in each module. Table 4.12 displays the percentage of each reported change type for each prompt type within each module that was calculated. Actual Change in Pedagogical Knowledge was predominantly found in Module 1 (42%) for the Teacher Change & Student Learning prompts. The only other occurrence of Actual Change in Pedagogical Knowledge having been expressed was in Module 2 (4%) in Teacher Change & Student Learning and Module 1 (8%) in Current Practice prompts. Actual Change in Pedagogical Beliefs was only expressed in Module 1 (16%) and Module 3 (21%) for the prompt type, Teacher Change & Student Learning.

Actual Change in Practice was found in all four reflection prompt types. Within Current Practice, Actual Change in Practice was found in Module 1 (4%) only. Within the Teacher

Change prompt type, Actual Change in Practice was found in Module 1 (8%) and in Module 5 (44%). Within the Student Learning prompt type, Actual Change in Practice was only found in Module 3 (8%). The prompt type, Teacher Change & Student Learning, was the only prompt type within which participant responses reflected an Actual Change in Practice in all three modules, and the percentage increased from Module 1 (8%) to Module 3 (50%) and dropped from Module 3 to Module 5 (44%). Desired Specific Changes-Planned were expressed in four points in the course with three of the reflection prompt types. Within Teacher Change, Desired Specific Change-Planned were expressed in responses in Module 3 (50%) and Module 5 (2%). Within Student Learning, these desired changes were expressed in Module 3 (67%) and within Teacher Change & Student Learning in Module 5 (23%).

Desired Non-Specific Change-General was also found within three reflection prompt types. These changes were found throughout Current Practice for Module 1 (54%), Module 3 (28%), and Module 5 (42%). Within Teacher Change, these desired, general changes were found in Module 1 (75%) responses and in 40% of the Module 5 responses. No desired, general changes were found for the prompt type, Student Learning. Within Teacher Change & Student Learning, desired general change was found in Module 3 (17%) and Module 5 (13%).

A Desire to Keep Current Practice was also found in all four reflection prompt types. Within Current Practice, this desire was found in Module 3 (14%). Within Teacher Change, this was found in Module 1 (13%) and Module 5 (4%). Within Student Learning, this desire was found in Module 3 (8%), whereas within Teacher Change & Student Learning it was found in Module 5 (2%).

Table 4.12

Percentage of Change Type by Reflection Focus Category Per Module

	Reflection Focus											
	Current Practice			Teacher Change			Student Learning			Teacher Change & Student Learning		
	Mod 1	Mod 3	Mod 5	Mod 1	Mod 3	Mod 5	Mod 1	Mod 3	Mod 5	Mod 1	Mod 3	Mod 5
Actual Change in Pedagogical Knowledge	8%	0%	0%	0%	0%	0%	0%	0%	0%	42%	4%	0%
Actual Change in Pedagogical Beliefs	0%	0%	0%	0%	0%	0%	0%	0%	0%	16%	21%	0%
Actual Change in Practice	4%	0%	0%	8%	0%	44%	0%	8%	0%	8%	50%	44%
Desired Specific Change - Planned	0%	0%	0%	0%	50%	2%	0%	67%	0%	0%	0%	23%
Desired Non-Specific Change – General	54%	28%	42%	75%	0%	40%	0%	0%	0%	0%	17%	13%
Desire to Keep Current Practice	0	14%	0%	13%	0%	4%	0%	8%	0%	0%	0%	2%
No Change - No Intent	33%	58%	58%	4%	50%	10%	100%	17%	100%	33%	8%	17%

Research Question 3: What are the patterns between levels of readiness (low, mid, and high) and intent to change as expressed in the reflection prompts?

Participants were placed into three groups based on their composite URICA-TEACH scores as shown in Table 4.13. The Low Group was composed of participants with URICA-TEACH composite scores between 3.0 and 4.0; members of the Low Group had the highest Pre-Contemplation scores of all participants. The Mid Group was composed of participants with URICA-TEACH scores between 4.0 and 5.0; this group had lower Pre-Contemplation scores than the Low Group but similar Contemplation scores. The High Group was composed of participants with scores over 5.0; this group had some of the highest scores in Contemplation and Action. Of the three groups, the High Group was the smallest (N=3) and the Mid Group was the largest (N=5), with the Low Group in between (N=4).

Table 4.13

Participant Groups Based on URICA-TEACH Composite Scores

Group	ID	Pre-Contemplation Mean	Contemplation Mean	Action Mean	Composite Score
LOW	002TA	2.40	3.00	3.00	3.6
	003LS	1.40	2.50	2.20	3.3
	004LD	2.40	3.00	3.00	3.6
	007VV	2.80	3.75	2.80	3.6
MID	001JS	1.80	3.50	3.00	4.7
	005KS	1.40	3.00	2.60	4.2
	009KC	1.60	3.00	2.80	4.2
	011PR	1.60	3.00	3.00	4.4
	012JS	2.00	3.75	3.00	4.75

Group	ID	Pre-Contemplation Mean	Contemplation Mean	Action Mean	Composite Score
HIGH	006RP	1.20	4.00	3.20	6
	008CS	1.80	3.75	3.40	5.35
	010NH	1.20	3.25	3.80	5.85

Note: Composite calculation: (Contemplation mean + Action mean) – Precontemplation mean.

change types: actual change in pedagogical knowledge, actual change in pedagogical beliefs, and actual change in practice.

The change types were then consolidated into four categories to better understand each group's intent to change; those categories were: Actual Change, Desire to Change, Desire to Keep Current Practice, and No Change-No Intent to Change. The category labeled Actual Change was composed of the actual changes to pedagogical knowledge, beliefs, and practice. The category labeled Desire to Change was composed of two change types: desired specific planned change and desired non-specific general change. The remaining two intent to change categories were composed of the singular change types and included Desire to Keep Current Practice and No Change-No Intent. The percentage for each intent to change category was calculated for each URICA-TEACH group by module as shown in Figure 4.6.

As participants advanced through the course from module to module, the overall percentage of responses that expressed either an Actual Change or a Desire to Change increased regardless of group. For the Mid and High groups, the increase in Actual Change or Desire to Change occurred from Module 1 to Module 3 and continued to increase from Module 3 to Module 5. The Low group did not indicate any substantial increase in Actual Change or Desire to Change until Module 5. In Module 1 and Module 3 the percentage of prompts for the Low

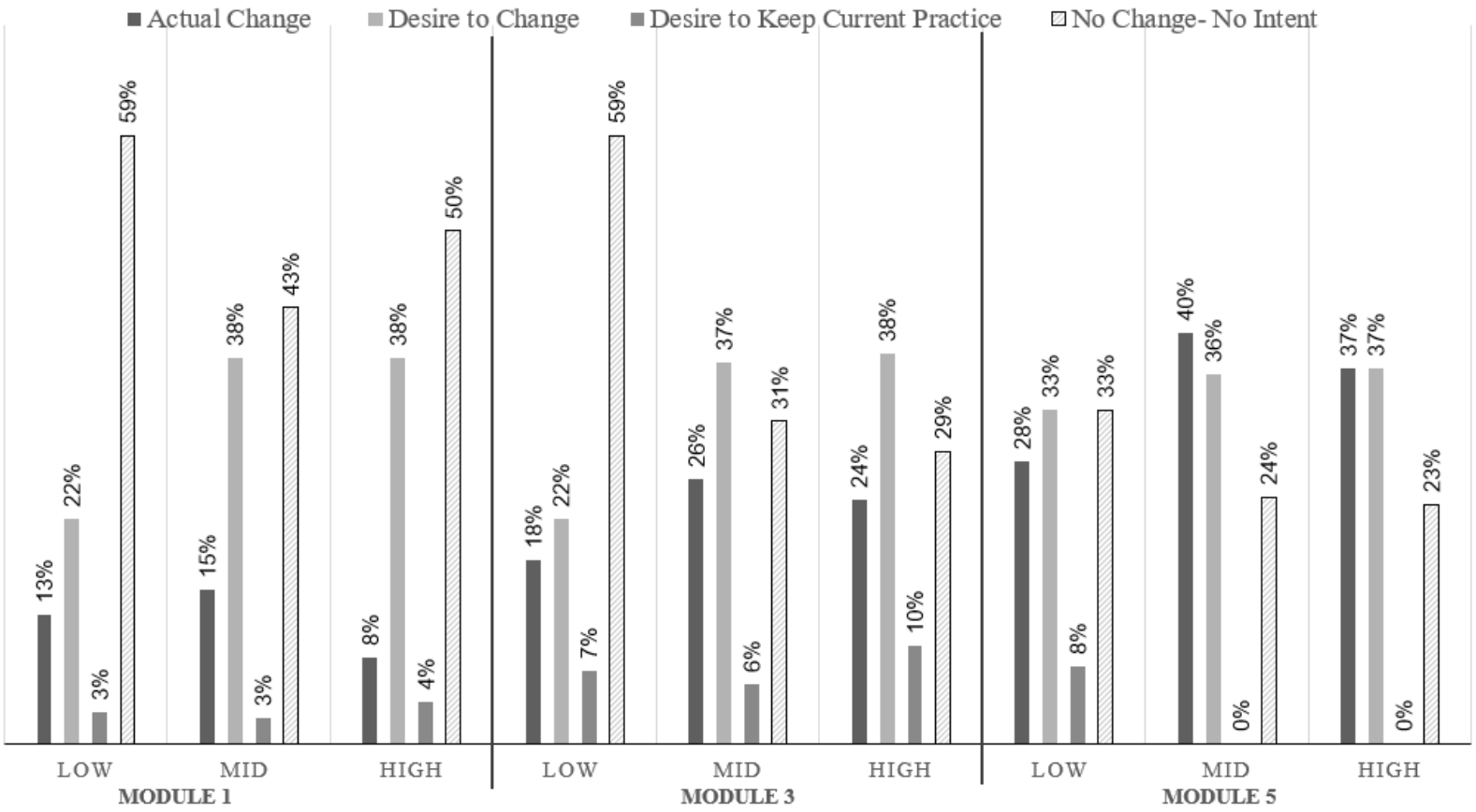
group that expressed No Change-No Intent was the same, 59%. By Module 5, the Low group responses showed a decrease in No Change-No Intent to 33%.

The Low groups' Desire to Change percentages were also the same in Module 1 and Module 3 (20%), but then increased in Module 5 (33%). Actual Change had a small increase from Module 1 (13%) to Module 3(18%), but a larger increase from Module 3 to Module 5 (28%) where the percentage of responses that reflected Actual Change more than doubled from Module 1. The Mid group started Module 1 with the greatest percentage of responses that reflected Actual Change (15%) of all three groups and had the same percentage of Desire to Change responses as the High group (38%). The Mid groups' responses that reflected Actual Change not only increased, but also remained the greatest of all three groups through Module 3 and Module 5. The Mid group percentage increased from Module 1 (15%) to Module 3 (26%) and peaked in Module 5 (40%). The Mid groups' Desire to Change stayed relatively constant from module to module; the percentage of Desire to Change varied by only 1% across modules.

The High group started Module 1 with the smallest percentage of responses that reflected an Actual Change (8%). As the course progressed, the High groups' Actual Change responses increased in Module 3 (24%) and then peaked in Module 5 (37%). Like the Mid group, the High groups' Desire to Change stayed relatively consistent across modules (varied < 1%). In Module 1 and Module 3, the percentage of prompts that reflect a Desire to Change was 38% and in Module 5 it was 37%. Regarding a Desire to Keep Current Practice, all three groups had a small percentage (< 10%) in Module 1 and Module 3. By Module 5, this shifted such that the only group with any responses that reflected a Desire to Keep Current Practice was the Low group. The Low group's Desire to Keep Current Practice was lowest in Module 1 (3%) but increased in Module 3 (6%) and was highest in Module 5 (8%).

Figure 4.6

URICA-TEACH Group Intent to Change



Research Question 4: What patterns in intent to change and level of reflection emerged among individual participants who had low, mid, and high levels of readiness to change?

To answer Research Question 4, participants' responses at the highest level of reflection, Pedagogical Reflection (i.e., Level 3), and the intent to change reflected in those responses were isolated for analysis. This step was taken to understand patterns in participants' intent to change and level of reflection when reaching Level 3, which indicates Pedagogical Reflection. This began by looking at the percentage of responses at Level 3 by the different types of Intent to Change (e.g., Actual, Desired, No Change-No Intent) for the full participant set as shown in Table 4.14. The percentage of Level 3 responses for each module showed that the overall percent of Pedagogical Reflection (3) increased from Module 1 (56%) to Module 3 (64%), with only a slight increase from Module 3 to Module 5 (65%). The subset of Level 3 responses for each module were then analyzed by intent to change. The analysis showed that Module 5 had the highest percentage of Level 3 reflections that expressed Actual Change and Desire to Change and the lowest percentage of Desire to Keep Current Practice and No Change-No Intent to Change of all three modules. Within the Level 3 reflections, Actual Change increased from Module 1 (21%) to Module 3 (26%) to Module 5 (35%).

Table 4.14

Participant Level 3 Responses by Intent to Change

Module	1	3	5
Number of L3 Participant Reflections	53	54	77
% of L3 in the Module	56%	64%	65%
Actual Change	21%	26%	35%
Desire to Change	30%	27%	39%
Desire to Keep Current Practice	1.8%	7.4%	1.2%
No Change-No Intent to Change	47%	37%	25.6%

In contrast, No Change-No Intent to Change showed a decreasing pattern from Module 1 (47%) to Module 3 (37%) to Module 5 (25.6%). Desire to Change showed a decrease from Module 1 (30%) to Module 3 (27%), then an increase from Module 3 to Module 5 (39%). Desire to Keep Current Practice had an increase from Module 1 (1.8%) to Module 3 (7.4%) and then a decrease from Module 3 to Module 5 (1.2%).

Participants' Level 3 responses were then analyzed by URICA-TEACH composite score groups (i.e., Low, Mid, High) to examine patterns both within groups and across groups. As shown in Table 4.15, across groups there was no discernable pattern for the percentage of Level 3 prompts out of all prompts in each of the modules. In the Low group, the percentage of prompts at a Level 3 reflection increased from Module 1 (28%) to 3 (50%) to 5 (55%). In the Mid group, the percentage of Level 3 prompts decreased from Module 1 70%) to Module 3 (66%) and then increased in Module 5 (78%). In the High group, the percentage of prompts at Level 3 was the same for Module 1 and Module 3 (67%) and then decreased in Module 5 (53%).

Table 4.15

Participant Level 3 Responses and Intent to Change by URICA-TEACH Group

	Low			Mid			High		
Module	1	3	5	1	3	5	1	3	5
Number of L3 Participant Reflections	9	14	22	28	23	39	16	14	16
% of L3 in the Module	28%	50%	55%	70%	66%	78%	67%	67%	53%
Actual Change	33%	21.4%	27%	21%	39%	43.5%	12.5%	14%	25%
Desire to Change	11%	21.4%	41%	36%	35%	38.4%	31%	36%	50%
Desire to Keep Current Practice	11%	7%	4.5%	0%	4%	0%	0%	14%	0%
No Change-No Intent to Change	44%	50%	27%	43%	35%	18%	56%	36%	25%

Within the Low group, reflections that focused on an Actual Change decreased from Module 1 (33%) to Module 3 (21.4%), then increased in Module 5 (27%). The Low group was the only group that had a lower percentage of Level 3 prompts in Module 5 (27%) than in Module 1 (33%) on Actual Change. Desire to Change increased from Module 1 (11%) to Module 3 (21.4%) to Module 5 (41%). Desire to Keep Current Practice made up the smallest amount of Level 3 reflections and decreased from Module 1 (11%) to Module 3 (7%) to Module 5 (4.5%). The greatest percentage of Level 3 prompts was attributed to No Change-No Intent to Change in Module 1 (44%) and Module 3 (50%) and was somewhat lower in Module 5 (27%).

Within the Mid group, Actual Change increased across all three modules, going from 21% in Module 1 to 39% in Module 3 and then ending with 43.5% in Module 5. The Mid group had the greatest percentage of Actual Change Level 3 reflections in Module 3 and Module 5 out of all three groups. For Desire to Change, the percentage of Level 3 reflections decreased slightly from Module 1 (36%) to Module 3 (35%) and then increased in Module 5 (38.4%). Desire to Keep Current Practice increased from Module 1 (0%) to Module 3 (4%) and then decreased in Module 5 (0%). No Change-No Intent decreased across all three modules, starting at 43% in Module 1, decreasing to 35% in Module 3, and finishing at 18% in Module 5.

The High group had the lowest percentage of Level 3 prompts for Actual change out of all three groups. While the percentage of Level 3 prompts was the lowest, like the Mid group the percentages increased over all three modules going from 12.5% in Module 1 to 14% in Module 3 to 25% in Module 5. Desire to Change also increased across all three modules. Desire to Keep Current Practice increased from Module 1 to Module 3 and then decreased from Module 3 to Module, while No Change-No Intent decreased across all three modules.

While examining the within group data, two relationships emerged between change intent categories. The first was an inverse relationship in the percentage of Level 3 reflections between Actual Change and No Change-No Intent across all three modules. This relationship is displayed in Figure 4.7. For the Low group, as Actual Change increased, No-Change-No Intent decreased, and when Actual Change decreased, No Change-No Intent increased. The same inverse relationship was seen in the Mid group. As shown in Figure 4.8, when Actual Change increased from Module 1 to Module 3 and again from Module 3 to Module 5, No Change -No Intent decreased from Module 1 to Module 3 and from Module 3 to Module 5. This relationship was also present in the High group. As shown in Figure 4.9, when Actual Change increased from Module 1 to Module 3 to Module 5, No Change-No Intent decreased.

Figure 4.7

Low Group Actual Change and No Change – No Intent

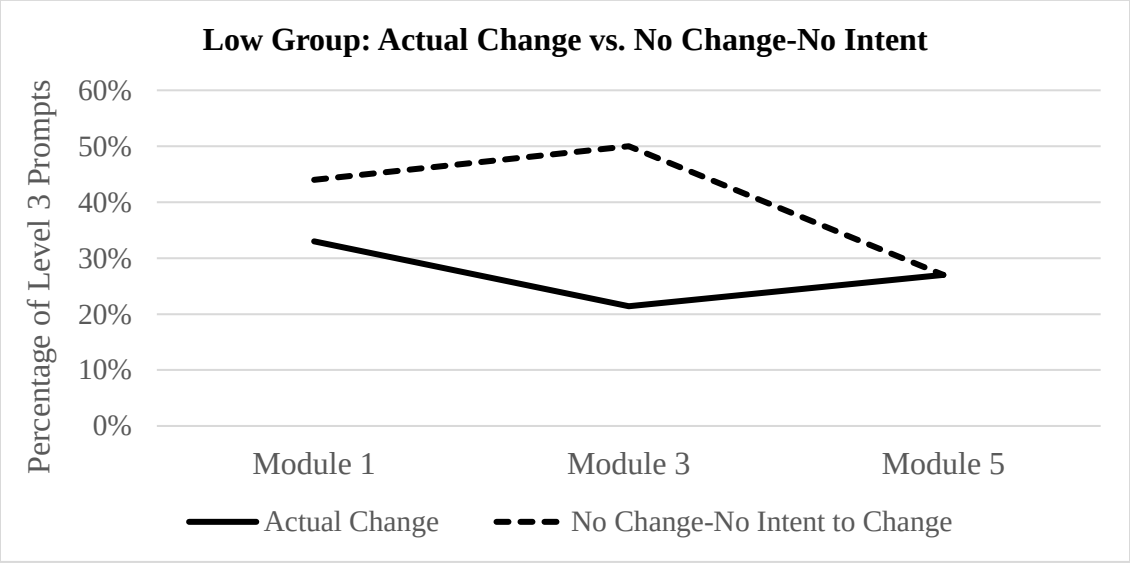


Figure 4.8

Mid Group Actual Change and No Change – No Intent

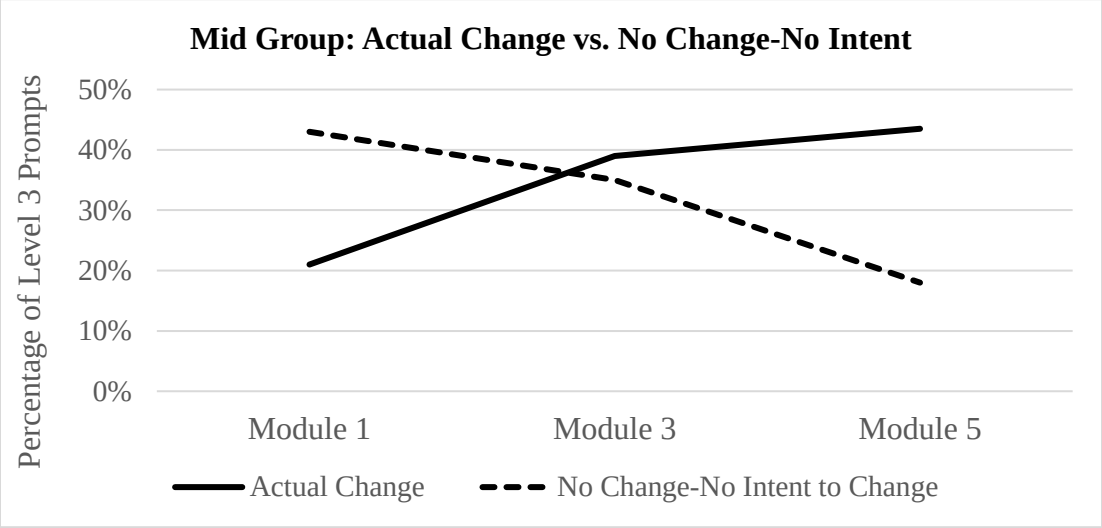
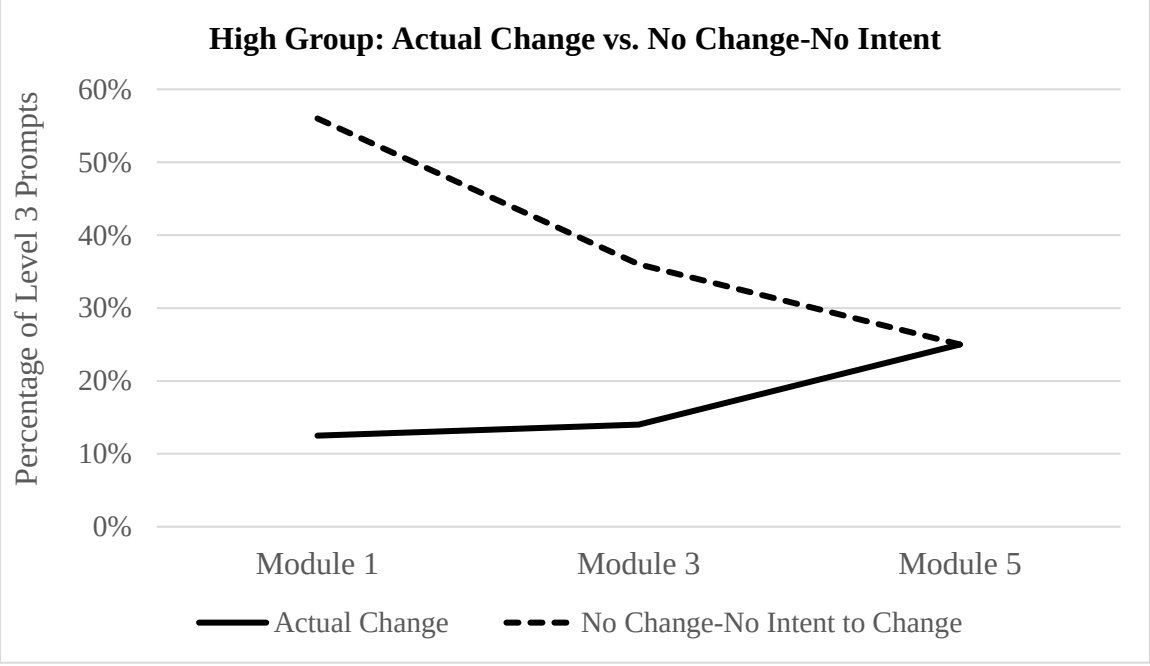


Figure 4.9

High Group Actual Change and No Change – No Intent



The same type of inverse relationship was seen with the percentage of Level 3 prompts that reflected a Desire to Change and a Desire to Keep Current Practice. Figure 4.10 shows that

within the Low group, Desire to Change increased across all three modules, while Desire to Keep Current Practice decreased. Similarly, Figure 4.11 shows that within the Mid group Desire to Change decreased from Module 1 to Module 3 while Desire to Keep Current Practice increased. When Desire to Change increased from Module 3 to Module 5, Desire to Keep Current Practice decreased.

Within the High group, the relationship between the percentage of Level 3 reflections that expressed Desire to Change and Desire to Keep Current Practice was more direct between Module 1 and Module 3; as Desire to Change increased, so did the expressions of Desire to Keep Current Practice. Figure 4.12 shows that this shifted back to an inverse relationship between Module 3 to Module 5 the relationship, where Desire to Change increased while the Desire to Keep Current Practice decreased.

Figure 4.10

Low Group- Desire to Change and Desire to Keep Current Practice

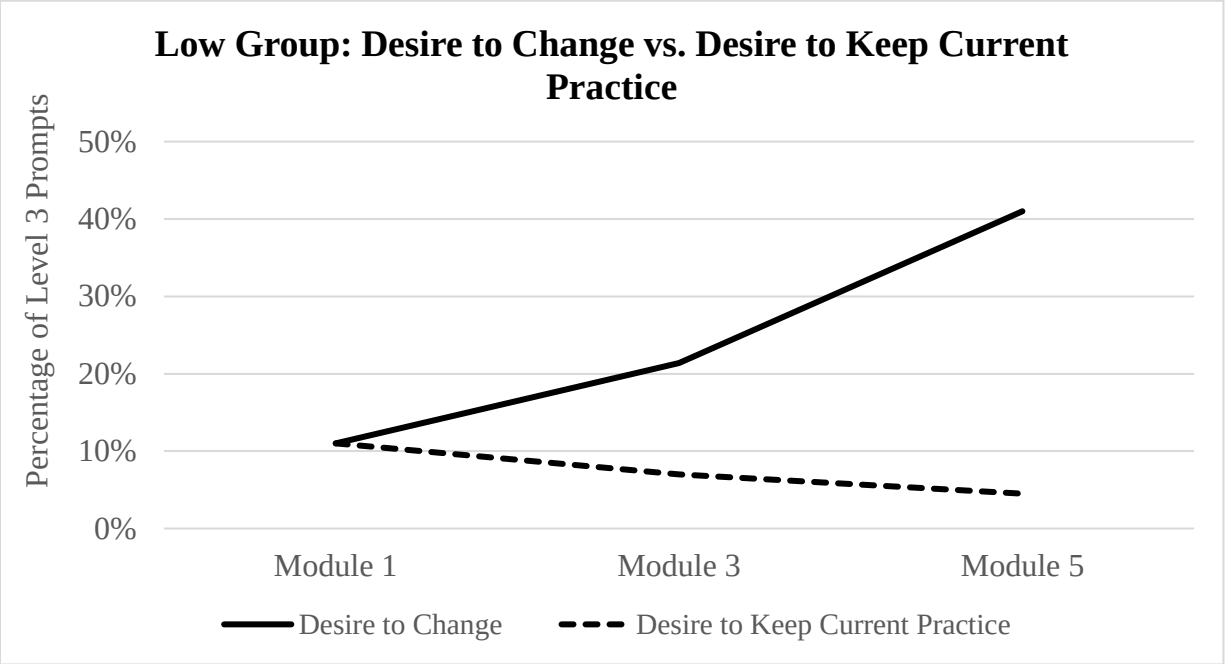


Figure 4.11

Mid Group- Desire to Change and Desire to Keep Current Practice

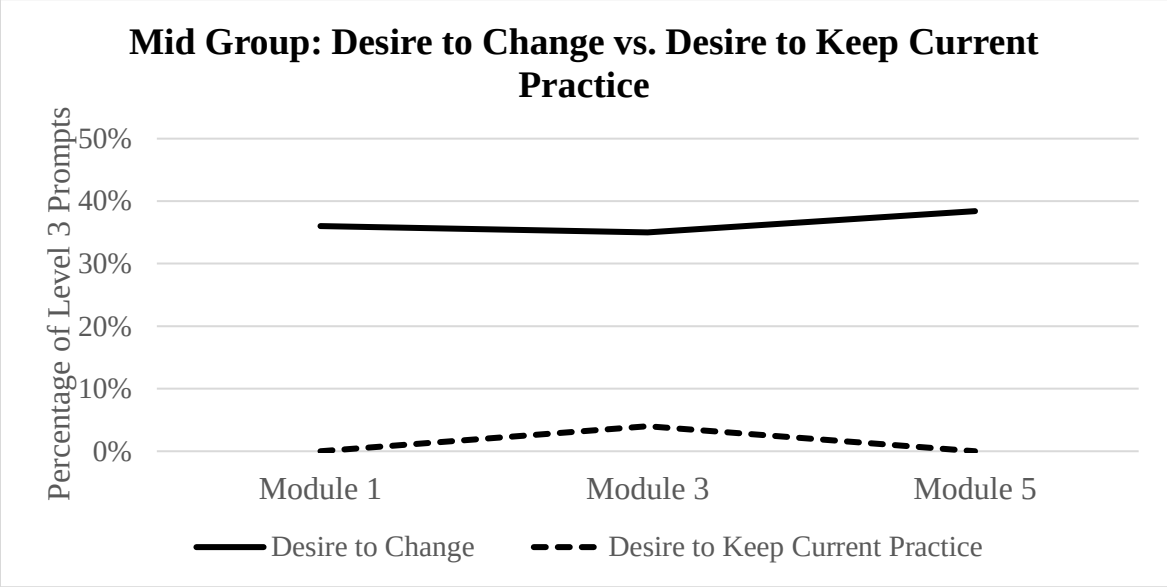
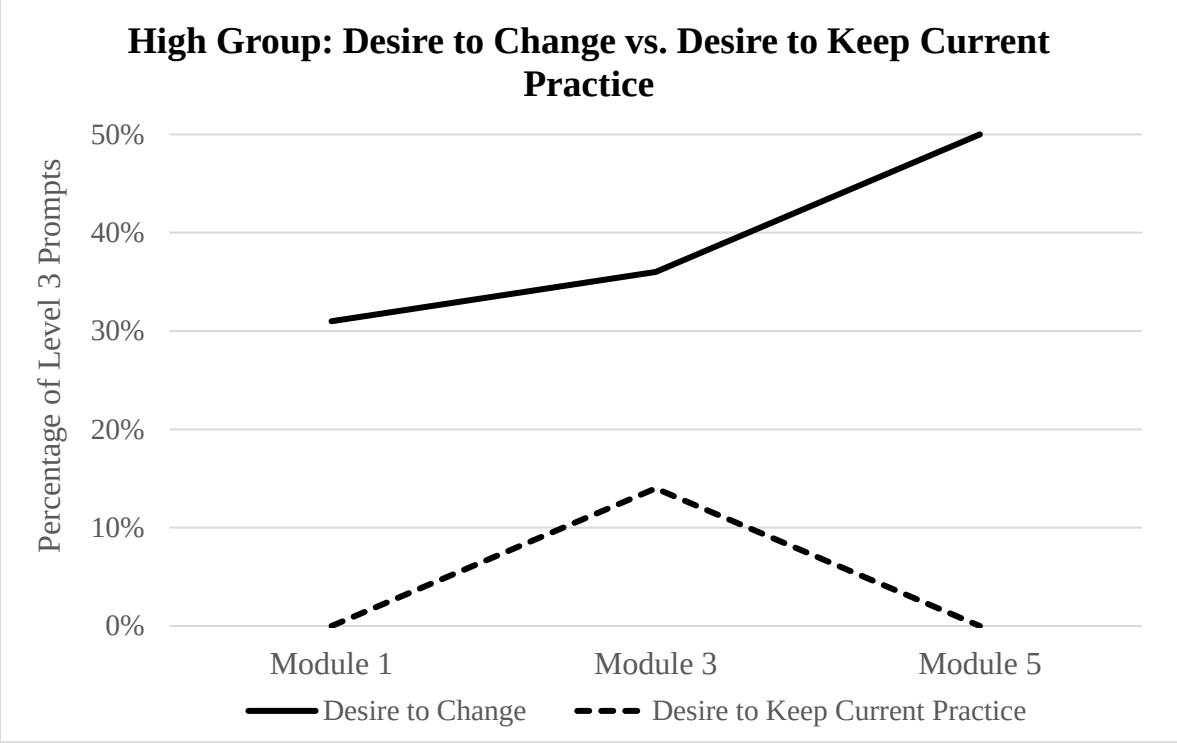


Figure 4.12

High Group- Desire to Change and Desire to Keep Current Practice



Participants' Stated Intent to Change by Group

The group data was further examined to understand each participant's intent to change within each group. The results are presented by Module below.

Stated Intent to Change: Module 1

Table 4.16 shows each individual participant's intent to change as expressed on each prompt within Module 1. In Module 1, the Low group only had two participants (003LS and 002TA) who expressed a desire to change on any of the first five prompts within the module. Both responses were on the same critical reflection prompt, Prompt 2 (Student Learning). On that same prompt, participant 004LD expressed a desire to keep current practice and the other participant, 007VV, did not express any intent to change nor keep current practice. All of the remaining participant responses from the individuals in the Low group on the first five questions in Module 1 expressed No Change-Intent. It was not until the last three questions of Module 1 that the number of Low group participant responses that expressed No Change-No Intent became the minority response. On the last three questions, all but two individual responses expressed either Desire to Change or Actual Change. Out of the 12 individual responses for the Low group on the last three prompts, five expressed an Actual Change and five expressed Desire to Change.

Unlike the Low group, the Mid group individual responses expressed Desire to Change at the beginning of Module 1. Out of the 10 individual responses on the first two prompts of Module 1, all but two expressed Desire to Change. On the three Student Learning prompts, prompts 3, 4, and 5, the Mid group responded the same as the Low group, with all participant responses expressing No Change-No Intent. On the last three prompts, all but one of the individual responses in the Mid group expressed Desire to Change or an Actual Change; this was like the Low group.

Table 4.16

Module 1: Participant Intent to Change and Level of Reflection by Low (L), Mid (M), and High (H)

Participant	URICA-TEACH	Prompt (RF)(RP) 1 (CP) (3)	2 (TC) (2)	3 (SL) (3)	4 (SL) (3)	5 (SL) (3)	6 (TCSL) (3)	7 (CP) (3)	8 (TC) (3)
003LS	L3.3	NC-NI	DC	NC-NI	NC-NI	NC-NI	AC	NC-NI	AC
002TA	L3.6	NC-NI	DC	NC-NI	NC-NI	NC-NI	AC	DC	DC
004LD	L3.6	NC-NI	DKCP	NC-NI	NC-NI	NC-NI	AC	DC	DC
007VV	L3.6	NC-NI	NC-NI	NC-NI	NC-NI	NC-NI	NC-NI	AC	DC
005KS	M4.2	DC	DC	NC-NI	NC-NI	NC-NI	AC	DC	DC
009KC	M4.2	NC-NI	DC	NC-NI	NC-NI	NC-NI	NC-NI	DC	DC
011PR	M4.4	DC	DC	NC-NI	NC-NI	NC-NI	AC	DC	DC
001JS	M4.7	DC	DC	NC-NI	NC-NI	NC-NI	AC	AC	AC
0012JS	M4.75	NC-NI	DC	NC-NI	NC-NI	NC-NI	AC	DC	DC
008CS	H5.35	NC-NI	DKCP	NC-NI	NC-NI	NC-NI	AC	NC-NI	DC
010NH	H5.85	DC	DC	NC-NI	NC-NI	NC-NI	NC-NI	DC	DC
006RP	H6.00	DC	DC	NC-NI	NC-NI	NC-NI	NC-NI	DC	DC

Note. Reflection Potential (RF), Reflection Potential (RP), Current Practice (CP), Teacher Change (TC), Student Learning (SL), Teacher Change & Student Learning (TCSL), Actual Change (AC), Desire to Change (DC), Desire to Keep Current Practice (DKCP), No Change-No Intent (NC-NI)

For the three people in the High group, responses on the first two prompts of Module 1 were mixed. Two participants' responses were the same as the Mid group, meaning they expressed a Desire to Change. One participant (008CS) responded similarly to the Low group participant, 004LD, with No Change-No Intent and a Desire to Keep Current Practice. On prompts 3, 4, and 5, the High group expressed No Change-No Intent; this was like the Low and Mid group responses on those Student Learning prompts. On the last three prompts in Module 1, the High group had fewer participants who expressed Desire to Change and Actual Change when compared to the Low and Mid groups. There were three responses that expressed No Change-No Intent, which is the highest number of all three groups, and the remaining five responses expressed Desire to Change.

Stated Intent to Change: Module 3

Table 4.17 displays the individual participants intent to change on each of the prompts in Module 3. Unlike Module 1, 10 of the 12 participants expressed Actual Change or Desire to Change on the first two prompts of Module 3. The two participants whose responses did not align with the other responses were both in the Low group: 004LD and 007VV. Upon deeper inspection, participant 004LD only had one response across all prompts in Module 3 that expressed an Actual Change, and no responses that reflected Desire to Change. Similarly, participant 007VV had only one response that reflected Actual Change and one that reflected Desire to Change.

On Prompt 3 (Current Practice), 9 out of the 12 participants expressed Desire to Change. Of note are the three that did not express Desire to Change but rather expressed a Desire to keep their current practice. Two of those three participants were from the Low group, and one was from the High group. On prompts 4 and 5, both of which were Current Practice prompts, all but

Table 4.17

Module 3: Participant Intent to Change and Level of Reflection by Low (L), Mid (M), and High (H)

Participant	URICA-TEACH	Prompt (RF)(RP) 1 (TCSL) (3)	2 (SL) (3)	3 (CP) (3)	4 (CP) (3)	5 (CP) (2)	6 (TCSL) (3)	7 (TC) (3)
003LS	L3.3	DC	DC	DC	NC-NI	NC-NI	AC	DC
002TA	L3.6	AC	DC	DKCP	NC-NI	NC-NI	AC	DC
004LD	L3.6	NC-NI	NC-NI	DKCP	NC-NI	NC-NI	AC	NC-NI
007VV	L3.6	NC-NI	NC-NI	DC	NC-NI	NC-NI	AC	NC-NI
005KS	M4.2	DC	DC	DC	NC-NI	NC-NI	AC	DC
009KC	M4.2	AC	DC	DC	DC	NC-NI	AC	NC-NI
011PR	M4.4	AC	DC	DC	NC-NI	NC-NI	AC	NC-NI
001JS	M4.7	AC	AC	DC	NC-NI	NC-NI	AC	DC
0012JS	M4.75	DC	DC	DC	NC-NI	NC-NI	AC	DC
008CS	H5.35	AC	DC	DKCP	DC	NC-NI	AC	NC-NI
010NH	H5.85	AC	DC	DC	NC-NI	NC-NI	AC	NC-NI
006RP	H6.00	DC	DC	DC	DC	NC-NI	AC	DC

Note. Reflection Potential (RF), Reflection Potential (RP), Current Practice (CP), Teacher Change (TC), Student Learning (SL), Teacher Change & Student Learning (TCSL), Actual Change (AC), Desire to Change (DC), Desire to Keep Current Practice (DKCP), No Change-No Intent (NC-NI)

three responses reflected No Change-No Intent, and those three expressed a Desire to Change. Of the three who did express a Desire to Change, one was from the Mid group and two from the High group.

On the next two prompts, Prompt 6 (Teacher Change & Student Learning) and Prompt 7 (Teacher Change), all participants expressed the same intent. On Prompt 6, for the first time in the course, all participants reflected an actual change. On prompt 7, the final prompt of Module 3, participant responses were back to being split in their intent. In the Low group, two out of four participants expressed a Desire to Change and two expressed No Change-No Intent. In the Mid group, three participants expressed a Desire to Change and two expressed No Change-No Intent. Two participants in the High group expressed No Change-No Intent and one other expressed a Desire to Change.

Stated Intent to Change: Module 5

Table 4.18 displays the individual participants intent to change on each of the prompts in Module 5. In Module 5, most participants stated an Actual Change or a Desire to Change across 9 of the 10 prompts; this represents a marked shift from the patterns that emerged in Module 1 and Module 3. There were, however, two participants whose patterns diverged slightly from the others in their group. One was in the Mid group; participant 0012JS expressed a Desire to Change on Prompt 2 (Student Learning) while the other 11 participants express No Change-No Intent, and on Prompt 5 (Current Practice) on which High group participant 008CS expressed No Change-No Intent while the others expressed Actual Change.

There were two participants whose responses across all 10 prompts were largely different than the others in their group. Those two participants were both in the Low group; participants 004LD and 007VV. Throughout Module 5, participant 004LD expressed No Change-No Intent

Table 4.18

Module 5: Participant Intent to Change and Level of Reflection

Participant	URICA-TEACH	Prompt # (RF)(RP) 1 (TCSL) (3)	2 (SL) (3)	3 (CP) (3)	4 (CP) (3)	5 (CP) (2)	6 (TCSL) (3)	7 (TC) (3)	8 (TC) (2)	9 (SL) (3)	10 (TCSL) (3)
003LS	L3.3	DC	NC-NI	DC	DC	AC	AC	AC	AC	NC-NI	DC
002TA	L3.6	DC	NC-NI	NC-NI	DC	AC	AC	AC	AC	NC-NI	DC
004LD	L3.6	DKCP	NC-NI	DKCP	NC-NI	DKCP	NC-NI	NC-NI	NC-NI	NC-NI	NC-NI
007VV	L3.6	NC-NI	NC-NI	DC	DC	AC	AC	AC	NC-NI	NC-NI	NC-NI
005KS	M4.2	DC	NC-NI	DC	DC	AC	AC	AC	AC	NC-NI	DC
009KC	M4.2	DC	NC-NI	DC	NC-NI	AC	AC	AC	AC	NC-NI	DC
011PR	M4.4	DC	NC-NI	DC	NC-NI	AC	AC	AC	AC	NC-NI	DC
001JS	M4.7	DC	NC-NI	DC	DC	AC	AC	AC	AC	NC-NI	DC
0012JS	M4.75	DC	DC	DC	NC-NI	AC	AC	AC	AC	NC-NI	DC
008CS	H5.35	DC	NC-NI	DC	DC	NC-NI	AC	AC	AC	NC-NI	DC
010NH	H5.85	DC	NC-NI	DC	NC-NI	AC	AC	AC	AC	NC-NI	DC
006RP	H6.00	DC	NC-NI	DC	DC	AC	AC	AC	AC	NC-NI	DC

Note. Reflection Potential (RF), Reflection Potential (RP), Current Practice (CP), Teacher Change (TC), Student Learning (SL), Teacher Change & Student Learning (TCSL), Actual Change (AC), Desire to Change (DC), Desire to Keep Current Practice (DKCP), No Change-No Intent (NC-NI)

or a Desire to Keep Current Practices. Participant 007VV similarly expressed No Change-No Intent on half the prompts in this Module.

Participants 004lD and 007VV

The stated intent to change from participants 004LD and 007VV diverged from the typical pattern of responses in both Module 3 and 5. To better understand potential differences between these participants and the other ten participants, the percentage of Pedagogical Reflections (i.e., Level 3 reflections) were calculated for all participants. Table 4.19 displays the percentage of Pedagogical Reflections by participants across all three modules. It was found that the smallest percentage of Level 3 reflections were associated with participants 004LD (36%) and 007VV (32%); for the remaining 10 participants, over half (50%) of their reflections reached Level 3.

Table 4.19

Level 3 Reflection Responses by Participant Across Modules by Low (L), Mid (M), and High (H)

Participant	URICA-TEACH	Number of L3 Responses Module 1	Number of L3 Responses Module 3	Number of L3 Responses Module 5	Total	% of All Prompts
003LS	L3.3	4	3	7	14	56%
002TA	L3.6	2	5	6	13	52%
004LD	L3.6	2	4	3	9	36%
007VV	L3.6	1	2	5	8	32%
005KS	M4.2	6	6	9	21	84%
009KC	M4.2	5	5	5	15	60%
011PR	M4.4	4	3	9	16	64%
001JS	M4.7	7	6	9	22	88%
0012JS	M4.75	6	6	7	19	76%

Participant	URICA-TEACH	Number of L3 Responses Module 1	Number of L3 Responses Module 3	Number of L3 Responses Module 5	Total	% of All Prompts
008CS	H5.35	4	6	4	14	56%
010NH	H5.85	4	4	5	13	52%
006RP	H6.00	6	3	7	16	64%

Further qualitative analysis was conducted on 004LD and 007VV's responses within all three modules to better understand their experience with the reflection prompts as individuals with lower URICA-TEACH scores. In the case of 004LD, it was noted that while the participant agreed with the ideas and strategies that were presented throughout the course, on only a few occasions did they express any desire to implement the ideas in their classroom. Instead, they either only commented their agreement with the idea or strategy, or they commented that this was something that they were already doing in practice. Even in instances where they wanted their students to do something differently, they did not express any desire to change their teaching practice to bring about a change in students. Instead, the responsibility was placed on the students to make the change.

In the case of 007VV, there were instances of changes and desire to change expressed. When this participant's response was scored at less than a Level 3, the lower score was largely due to short responses that lacked any real details. For example, in response to a new idea or strategy in Module 3, their response was "I agree. This would be good." While they agreed with the strategy, they gave no indication of whether this was something that compelled them to make a change in their current teaching practice or whether they would attempt to implement it as part of their instructional practice.

In the final Teacher Change prompt in Module 5, both 004LD and 007VV were the only two participants that did not indicate an Actual Change. 004LD's response was consistent with their previous responses in that they simply stated what they were already doing in their classroom. However, 007VV in their response, described change in a different context. When asked what changes they have made, participant 007VV stated:

> More workshops for now (haha). I don't think I need to change too much, but when Danielson framework blows over and something new comes along I believe that's when we all need to change.

This response indicates that 007VV may situate change within a different context than other participants. The other 11 participants' responses, even when it indicated having made no changes, were contextualized within instructional practice. 007VV, however, seemed to associate the need for change with policy mandates rather than associated with student learning or as a means to achieve their ideal-self as a teacher.

Meta-Inferences

In addition to the results of Research Questions 1-4, an additional qualitative analysis was conducted using ten of the twelve participants as the collective case to identify any evidence of evolutionary change, which are changes that happen incrementally over time. The ten participants were chosen based on the Actual Change data on the final Teacher Change prompt in Module 5. This prompt asked participants to reflect on a change they had made due to the course. In the analysis, what was looked for were changes to a current practice. Based on the responses to the first Current Practice prompt in Module 1, all the case participants used questioning strategies at the start of the course. Table 4.18 provides each participant's response and the expressed evolutionary change. In reviewing participants' responses, key phrasing was

looked for, which indicated that their questioning strategies had not been supplanted, indicating a revolutionary change, but that their strategies had evolved.

Key phrases found in the participants' responses included used more, asked more, instead of, broader range, increased the use of, included more, provided more, talk less, focus more, and stay away from. From the way that participants expressed the change, it shows that the change that they made was an actual change that was made, versus a desired change.

One clear pattern among this data was that the PD program led to an increase in teachers using questioning strategies as part of their teaching practice. For some, it was the type of question that shifted, towards higher-level, more open types of questions that allowed students an opportunity to think deeply about some aspect of the content. For others, it was the way that questions shifted the responsibility of learning back onto the student, offering an opportunity for students to take ownership or leadership over their learning and thinking. The responses to this prompt suggest that, overall, teachers found a way to take a broad type of change in instructional practice (i.e., question strategies) and find a way to use it to address an issue in their own teaching.

A second pattern within the data is that 9 out of the 10 participants in this case coupled their description of the change with an explanation of why they made the change. The extension of their response into why they made the change may indicate that the change was not just a random strategy being tried out, but rather a purposeful change that was taken to achieve a particular result.

Table 4.20

Examples of Evolutionary Change

Participant	URICA-TEACH	Responses Expressing Evolutionary Change in Instructional Practice	Evolutionary Change
001JS	4.70	I am trying to use more questions that allow more students to take ownership of the learning and understanding. I'm learning that by using questions, you are able to help guide your students into understanding the content more because it becomes more meaningful when the learning comes from them.	**use more** questions that allow more students to take ownership of the learning and understanding.
002TA	3.60	I have increased the use of questions to relate the content to students lives	**increased the use of** questions to relate the content to students lives
003LS	3.30	I asked more higher level and thought-provoking questions now. I also think I asked a broader range of types of questions, such as those that are intended to use in various learning situations.	**asked more** higher level and thought-provoking questions asked **a broader range** of types of questions
005KS	4.20	I never put much thought into questioning strategies before this class. I now use questions to help my students think about the lesson instead of just simple answers. There are no barriers to questioning strategies in my classroom.	use questions to help my students think about the lesson **instead of** just simple answers

Participant	URICA-TEACH	Responses Expressing Evolutionary Change in Instructional Practice	Evolutionary Change(s)
006RP	6.00	I've changed the thought behind the question so I don't need to clarify that I need an explanation. I'm ready to change my questioning style to include more in-depth questions.	thought behind the question **include more** in-depth questions.
008CS	5.35	The changes I have made to my questioning practices is providing more talk that is student-led. I even have questions on reflections of the learning and purpose of the learning.	**providing more** talk that is student-led have questions on reflections of the learning and purpose of the learning
009KC	4.20	I decided to start with an open-ended question versus asking a question that will want students to recall previously learned information.	Starting with open-ended questions **instead of** recall questions
010NH	5.85	A change I have made is that I think more about the learning situation and what outcome I want to have When developing the questions. I want the questions to lead children to learn what I'm trying to teach without talking at them but have them be involved.	**think more** about the learning situation and desired outcome questions to lead children to learn
011PR	4.40	A change I have made to my questioning practice is to focus more on Guiding questions that give students the push they need to find the answer through inquiry. I'm trying to stay away from questions that elicit a one-word response that has to do with them memorizing something.	**focus more** on Guiding questions that give students the push they need to find the answer through inquiry **stay away from** questions that elicit a one-word response

Participant	URICA-TEACH	Responses Expressing Evolutionary Change in Instructional Practice	Evolutionary Change
012JS	4.75	A change I have made is making sure I am talking less and turning the talking over to my students. It is important for me to make my classroom student led. Sometimes I really need to remind myself to stop talking and just hear what my students have to say!	**talking less** and turning the talking over to my students

Discussion

This study aimed to evaluate the effectiveness of two specific design principles of a professional development design that supports teachers in making evolutionary changes to their instructional practice. These two design principles are associated most closely with critical self-reflection: Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process. These design principles also provide the framework and depth for the remaining three design principles.

The design principle, Center on Critical Reflection, focuses on the depth of reflection that each prompt attempts to encourage teachers to engage in their responses. These prompts have context for the embedded activities that address the design principles Active Participation through Experiential Learning, Examination from Multiple Perspectives, and Provide Alternatives. For example, the reflection prompts focused on Student Learning asked participants to reflect through the student lens, and those focused on Current Practice required reflection through the autobiographical lens.

The goal of Operationalize Critical Reflection through a Guided Process is to provide the necessary scaffolding to allow the critical reflection to be actualized through participants' work. Scaffolding was designed to occur through prompt timing within the course, such as more prompts that focused on Current Practice in Module 1 and varying the reflection potential so that participants cycle through different levels of reflection throughout the course. It was expected that the results from focusing on these two design principles would yield findings directly associated with the level of reflection and the guided process and provide additional insight into the remaining three design principles and the overarching purpose of supporting teachers in making evolutionary changes to their instructional practices.

The convergent mixed methods approach used in this study enabled the utilization and mixing of the results from the first two research questions, which were used in questions three and four to uncover patterns in participants' levels of critical reflection, the types of and intent to change reported by participants, and the effects of stage of readiness on critical reflection and intent to change as they move through the guided process of the course. The discussion below focuses more on situating the results associated with research questions three and four and their implications for the design principles they reflect.

Patterns of Critical Reflection

The results from Research Question 1 (levels of reflection) and Research Question 4 (patterns among individuals) show patterns of participants' level of reflection that are of particular interest to the design principles being studied. First, participants' responses showed that the reflection potential of the prompts may have played a role in their level of reflection. The guided process applied through the professional development design was such that the reflection potential of each module was mixed between Level 2 and Level 3. Participants' mean level of reflection maintained a level that was between Level 2: Surface Reflection and Level 3: Pedagogical Reflection. When the mean reflection potential was at or closer to Level 2, participants' mean level of reflection was lower and closer to Level 2. As the mean reflection potential approached or was at Level 3, participants' mean level of reflection also approached Level 3. This aligns with research that suggests teachers often move between different levels of reflection as they cycle internally through various thought processes (Larrivee, 2008; Fox et al., 2019). Although participants in this study cycled between Level 2 and Level 3, the fact that they reflected at Level 3 at various times suggests they did engage in deeper levels of thought that connected with the underlying theory and the implications of that theory in practice (Larrivee,

2008). When examined through the design principle to Operationalize Critical Reflection through a Guided Process, these findings suggest that the guided design of the PD supported participants in reflecting specifically at the pedagogical level (i.e. Level 3).

One unexpected pattern emerged in the participants' reflections. Throughout the course, participants had the greatest difference between the mean reflection potential and mean level of reflection on the prompts that focused on Student Learning. All the Student Learning reflection prompts had a Level 3 reflection potential, but the overall level of reflection among participants remained at Surface Reflection (i.e., Level 2) or lower. This finding was unexpected for several reasons. First, there is evidence that a teacher's level of thinking mirrors the level of challenge presented in the question prompts (Blanchette, 2001; Ertmer et al., 2001; Jarosewich et al., 2010; Meyer, 2004). One possible reason why the teachers in this study did not meet the full reflection potential may have been that it can be challenging to get teachers to look inward when a change in practice is needed; they more often view students as the primary agents responsible for learning and, therefore, see their own actions as being less connected with student learning (Rozhenkova et al., 2023). This potential challenge of seeing student learning connected to instructional practices was evident in the levels of reflection across the prompt types. Compared to prompts that combined Teacher Change and Student Learning, which also had a Level 3 reflection potential, participants had lower mean levels of reflection when addressing Student Learning alone. Data from Research Question 2 and Research Question 4 show that not only did participants have a low level of reflection on Student Learning prompts, but they also expressed fewer instances of actual or desired changes on these prompts, both as a whole and individually.

Another reason why this finding was unexpected is because teaching, as a profession, is focused on student learning. Thus, another possible explanation for this finding is that, despite

the reflection potential being at Level 3, the prompt itself may have been too broad to allow participants to enter a stage of deep thought reflective processes. While abundant research is associated with student learning, how it is defined varies because it is relative to the context of what is being studied. Johnson and Gallagher (2021) stated that student learning is often used in research but not defined by the researchers as the definition is assumed. Thus, lacking a contextual definition may affect a teacher's ability to reflect deeply on student learning. Menekse, Anwar, and Akdemir (2022) found that when teachers were given specific prompts that provided context, reflection performance was better when compared to generic prompts or prompts with a broader scope. This suggests that the Student Learning prompts used in this study may have articulated a view of student learning that was too broad or different from how the participants understood or thought about student learning in their own context. As a result, reflections on student learning remained at a surface level.

These findings suggest that more guidance for Center on Critical Reflection is needed. In the construction of prompts for this study, the focus was on the reflection potential of the prompt and on reflecting through a multiple lens. Considering the findings, the prompts may also need to be constructed with even more guidance, particularly for student lens prompts. For example, Ash and Clayton (2004) found that when reflection prompts were structured into the three general phases of description, analysis, and articulation, the result was more rigorous reflections and refined reflective skills. Additionally, Costa et al. (2020) found it easier for teachers to reflect on a specific concrete context of an experienced lesson or event versus reflecting within a more abstract, futuristic context. Therefore, as part of the guided process, it may be beneficial to provide teachers with the opportunities to define student learning within the context of the course topic before asking them to reflect on the effects of current practices and changed practices on

student learning. Having teachers construct their definition of student learning will offer teachers a foundation to measure current and future effects.

Types of, and Intent to, Change

The design principles at the focus of this study, Center on Critical Reflection and Operationalize Critical Reflection through a Guided Process were chosen due to their role in supporting teachers in making evolutionary changes to their instructional practice. Framing the results within the context of types of and intent to change yields findings aligned to the phases of the professional development upon which the PD program was designed. With the design employed in this study, it was expected that participants would first need to identify and desire to change some aspect of *their* teaching practice. The thinking was that, by focusing on a change that *they identify*, they would be willing to make actual changes to their practice and experience a change in their pedagogical knowledge and beliefs. However, the data from Research Questions 2, 3, and 4 yielded findings contrary to the expected outcomes.

As seen in the data for Research Question 2, participants' desire to change was consistent across all three modules, and they expressed the greatest percentages of actual changes in pedagogical knowledge in Module 1 and the greatest actual changes in pedagogical beliefs in Module 3. In Module 5, no participant responses expressed a change in pedagogical knowledge or beliefs. One potential reason for this finding is that the course prompts in Module 5 may not have provided participants with explicit prompts to express their knowledge and beliefs (Menekse et al., 2022; Mihalia & Alina-Oana, 2014). That said, the determination would also need to be made as to whether having participants reflect explicitly on pedagogical knowledge and beliefs is necessary. What has been found in the literature is that, while pedagogical beliefs are themselves subtle, difficult to measure, and challenging for participants to express, they are

instead actualized in new behaviors (Mihalia & Alina-Oana, 2014; Cheng et al., 2023). Guskey (2002) stated that if teachers have successfully changed their practice, then it is likely that a change in beliefs has occurred.

While a change in pedagogical knowledge and beliefs was only expressed in a small percentage of participant responses, participants' desire to change was consistently present throughout all three modules. Participants' desire to change cycled through a desire to make general changes first in Module 1, then was divided between a desire to make general changes and specific planned changes in Modules 3 and 5. The fact that participants first expressed a general desire to change is consistent with the first stage of Intentional Change Theory (ICT) (Boyatzis 2006). Stage 1 of the ICT is when participants come to recognize their ideal self and, in Stage 2, compare their current self to their ideal self (Boyatzis & Akrivou, 2006). Within this study, the ideal self was developed in Module 1; it was framed as the type of teacher participants envisioned themselves to be based on their image of a desired future, their core identity, and self-efficacy (Boyatzis & Akrivou, 2006). Participants' transition to planning desired changes in Modules 3 and 5 aligns with Stage 3 of the ICT, suggesting that they began defining and planning for their desired changes to take place (Boyatzis & Akrivou, 2006).

Actual changes in practice were expressed throughout the course, with the greatest percentage of those responses expressed in Module 5. Again, this finding can be explained by the ICT. Stage 4 of the ICT is where experimentation with new strategies and the development of new habits and behaviors occurs (Boyatzis & Akrivou, 2006). Even though actual changes in practice were expressed in the greatest percentage of prompts in Module 5, the fact that participants' desire to change remained consistent with the levels in Modules 1 and 3 was not unexpected. The change process can be a nonlinear process achieved through cycles of emergent

discoveries (Boyatiz, 2006). These cycles of discovery may also account for why there was no evidence of measurable change in pedagogical knowledge and beliefs in Module 5 at the end of the learning cycle. Participants may have ended the course somewhere between Stage 3 and 4 of the ICT, meaning between a desire to change and beginning to experiment with actual change. As a result, they may not yet have reached the point of sustainable change on which they could express specific changes in their pedagogical knowledge and beliefs (Guskey, 2006).

Effect of Stage of Readiness on Critical Reflection and Intent to Change

While there are potential theoretical explanations for the findings associated with participants' level of reflection and types of, and intent to, change as a whole group, results from Research Question 4 indicate that readiness may have played a role in individual participants making evolutionary changes to their instructional practice. At the start of the study, it was expected that the High group would have the highest level of intent because their URICA-TEACH composite score indicated they had the highest level of readiness to change. The High group had URICA-TEACH composite scores closest to the Action stage of the Transtheoretical Model of Change (Prochaska, 1984). At the Action stage, participants are in an active stage of change and are the most willing to acquire new behaviors (Prochaska & Velicer, 1997; Hunter, 2024). However, it was found that the Mid URICA-TEACH Group had the highest level of stated intent to change in Module 1, while the High group had the highest stated desire to keep their current practice. The High group’s desire to keep current practice stayed the highest among all groups until Module 5, where it was no longer expressed in participants’ responses. The High groups’ low level of intent and desire to keep current practice in earlier modules may have been due to participants’ self-awareness of their current instructional practice. When teachers have a

high personal assessment of their teaching ability, they tend to have a lower level of reflection associated with change (Chen & Chen, 2022).

Based on the Transtheoretical Model of Change, it was expected that the Mid URICA-TEACH group would perform similarly to the Low URICA-TEACH group; this was because their scores were closer to the Contemplation stage of the Transtheoretical Model of Change. At this stage, participants are just considering whether change is needed and are more likely to be uncertain that their behaviors need to change (Prochaska & Velicer, 1997; Hunter, 2024). It was expected that the Low URICA-TEACH group would, at the start of the course, have the lowest level of intent and the highest level of desire to keep their current practice, as this group of participants scored at a level that was closest to the Precontemplation stage of the Transtheoretical Model of Change. At this stage, participants have no intent to change their behaviors in the near future (Hunter, 2024; Prochaska & Velicer, 1997).

As expected, the Low group had the lowest levels of intent throughout the course and had the highest level of desire to keep current practice remaining at the end of the course. What was unexpected was that the Mid group had the highest percentage of Level 3 prompts at the start of Module 1 and the end of Module 5 (i.e., the end of the course). The Mid group also had the highest percentage of responses that exhibited a desire to change at the start of the course and the lowest percentage of responses that exhibited a desire to keep their current practice throughout the course. The Transtheoretical Model of Change may explain the Mid group findings. While the Mid group had scores that were closest to the Contemplation stage, there are multiple change processes that are taking place at each stage (Prochaska et al, 1994). Three of the processes that are aligned to Contemplation are consciousness raising during which self-awareness takes place, self-re-evaluation during which current behaviors are examined, and help seeking in which

alternatives are sought (Prochaska et al, 1994). It makes sense, then, that the Mid group had among the highest rates of responses at Level 3: Pedagogical Reflection. All participants enrolled in the professional learning course of their own volition; they were not forced to do so nor were they recruited. The volitional act of enrolling in the professional development may mean that participants who entered at a stage of contemplation, such as the Mid group, may have already been in a phase of self-reevaluation and help-seeking that made them more willing to act on change (Hunter, 2024; Prochaska et al., 1994). As a result, they may have had stronger levels of reflection than the other groups in this study. Ajzen's (2002) Theory of Planned Behavior supports this, arguing that a high level of intent means that a person has a positive attitude about the content, strategies, and ideas being presented, a positive perception regarding the benefits of the desired change, and perceived control over the changes that they intend to make (see also Burns et al., 2018). These positive attitudes and perceptions lead to goal setting, which, for teachers in this study, may have positively influenced their reflection skills (Barrett et al., 2020; Chen & Chen, 2022; Daumiller et al., 2019).

Further investigation into the participants' reflections showed that two of the four Low group participants consistently had lower levels of intent throughout the course, and one of the two maintained their desire to keep their current practice. Qualitative analysis showed that the participant maintained the readiness to change characteristics of Precontemplation, despite the purposeful design of the course. Data from Research Question 4 in particular showed that, while all other participants were at a state of similar intent across the Module 5 reflection prompts, this participant differed from all the others. There are several possible explanations for the reluctance to change that this participant exhibited. One is that after enrolling in the course, the topic and strategies presented may not have aligned with the needs of the participant, therefore hindering

the participant's identification of their ideal self or areas of teaching practice that might benefit from change (Boyatzis & Akrivou, 2006).

Another reason why this participant remained reluctant to change may be that their level of reflection remained closer to Level 2: Surface Level throughout the professional development. This suggests that the participant never reached deeper levels of thought and consideration of the connection between their own teaching practices and student learning (Larrivee, 2008; Fox et al., 2019). As a result, this participant may have felt as if there was no need to change because they felt the problem and responsibility for change rested with the student, not the teacher. Others have noted how a teacher must begin to look towards themselves for meaningful change to occur in their teaching practice (Hood & Travis, 2023; Schon 1983, 1987). This suggests that the design principles embodied in the critical reflection prompts in this study may be more effective for teachers who exhibit a higher level of readiness for change. This participant started with a low level of readiness, which indicated that they may not have been ready for the way course activities were designed to move them through the process of consciousness raising as they began to change their own practice (Hunter, 2024; Prochaska et al., 1994). Key to teachers making evolutionary changes to their instructional practice is the development of a self-awareness of their current instructional practice and the ability to identify and understand their instructional practice challenges (Galea, 2012; Loughran, 2002). A participant who began the PD with a low level of readiness to change may not have been ready to make a personal connection with the ideas and strategies presented in the course. This may have negatively affected their attitudes about the effectiveness of those strategies, which can have a strong and direct effect on their intent to change or enact new teaching practices (Archie et al., 2022).

Supporting Evolutionary Change

Ostinelli & Crescenti (2024) stated that professional learning and development can be viewed as "an evolutionary process capable of generating professional expertise and mastery" (pg. 75). Supporting teachers with making evolutionary changes to their instructional practice through professional learning may require a design that provides guidance and opportunities for teachers to become self-aware of their instructional practices through critical reflection. This element of becoming self-aware not only helps teachers to gain an understanding of their instructional practice, but through the guided process they are able to make the choices about what and how to change. Autonomy and ability to choose what to change is seen in the literature as two important components of professional development reflective professional development (Apricio-Molina & Sepluveda-Lopez, 2023; Ehlert & Souvignier, 2023; Vedder-Weiss et al., 2024).

As seen in the results from Research Questions 1-4, the majority of participants were able to follow the guided process through their reflections and almost all participants were able to describe a change that they had made to their instructional practice. These changes that were expressed were identified by individual participants, as it is not stated in the course what they should. The evidence pulled from participants' responses on their change shows that each participant personalized the change to their instructional practice within the context of their classroom and students. The words used, such as use more, talk less, instead of, and provide more provide support for the idea that the professional development design principles being tested did support teachers in making evolutionary changes, as these phrases indicate an evolution of their current practice, rather than their current practice being supplanted with new methods.

Study Limitations

While the findings are promising for the future EDR studies of the design principles for professional development conceptualized and assessed in this study, the results should be carefully considered in light of the multiple limitations of this study. First, the small sample size limited the types of analysis that could be conducted on participants' responses. It also limited the number of participants in each URICA-TEACH group. The use of convenience sampling, while providing results that are aligned to an authentic professional learning scenario, coupled with the limited number of participants, do not allow of an generalizations across or within participant groups. Second, there is the potential researcher bias as the researcher created the design principles and wrote the course with those design principles. There was a peer review of the qualitative analysis to limit the conscious bias, there is still the potential of unconscious bias to exist in the overall analysis. Finally, the artifacts that were utilized in this study were a benefit in one way, as these were authentically produced outside of a research setting. However, the after-the-fact nature of the data collection inhibited deeper analysis through interviews to further investigate participants' experience within the course and to help validate the qualitative findings through questioning and obtaining firsthand accounts from participants.

Design Implications and Future Research

The findings from this study within the EDR project provided several implications for the design and for future EDR study iterations. First, the URICA-TEACH readiness findings provide a foundation for future research, particularly in how the readiness results can be used to differentiate the professional development for those with low URICA-TEACH readiness scores. Second, because of the connection of pedagogical knowledge and beliefs to the change in instructional practices, scaffolding the prompts in such a way as to help teachers to better be able

to identify what they know and believe may encourage deeper reflections and additional changes to instructional practice. Finally, providing additional scaffolding for teachers to define and make explicit connections to student learning.

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CHAPTER 5

CONCLUSION

There is an abundance of literature that shows that student learning is directly affected by teacher practice. As reform efforts are put in place, including teacher evaluation reform, to improve student learning outcomes, teacher practice becomes a central focus of the effort. The reform expectation is that changes in teacher practice improve student learning. In that context, the focus on improved effectiveness in teacher professional development may need to shift, as research shows that teachers often do not fully implement strategies learned in professional development. One potential reason for the lack of sustainable outcomes from professional development was that the type of change sought in many professional development offerings was revolutionary change. Revolutionary changes seek to supplant current practice and replace it with something completely new. Presented here, however, is the idea that rather than seeking revolutionary change, teacher professional development should seek to support evolutionary changes in teacher practice. Supporting evolutionary change through professional development was the central focus of this dissertation research project.

Evolutionary change builds off what teachers already know and do. It puts teachers in the place of leading their personalized change journey based on connections to their students' learning. Therefore, professional development that supports teachers in making evolutionary changes needs to guide teachers through the evolutionary change process. The purpose of this dissertation research project was to create a set of design principles that can be used in online professional development to support teachers in making evolutionary changes to their

instructional practice and to address the needs of teachers for effective opportunities for professional learning.

Design Principle Summary

Five theoretically based design principles were developed through educational design research (EDR). The design principles were centered on critical reflection, active participation through experiential learning, examination from multiple perspectives, providing alternatives, and operationalizing critical reflection through a guided process. These principles were developed based on Kolb's (1983) Experiential Learning Theory, Guskey's (2002) Model of Teacher Change, and Bandura's (1986) Social Cognitive Theory. Experiential Learning Theory provided the theoretical foundation for the experience types that should be built into professional development to bring about evolutionary change. The Model of Teacher Change provided the stages in which teachers change their practice and, as such, a roadmap for sequencing the learning experiences. Finally, Social Cognitive Theory provided the behavior models and processes that guided the activity and prompt construction that encapsulated the learning experiences within each stage.

Summary of Findings

The design pilot tested the efficacy of the five design principles, and feedback was elicited from participants to determine if the activities within the course provided them with a heightened sense of self-awareness regarding their instructional practice. Self-awareness was looked at specifically for its role in critical reflection and evolutionary change. Self-awareness, gained through examination through the autobiographical lens, is one of the perspectives that the design principles encourage teachers to use to examine their practice and its relationship to student learning. When teachers critically reflect through the autobiographical lens, they can

identify areas within their current practice that may become the focus of their change efforts (Brookfield, 1995; Cornish & Jenkins, 2012; Dewey, 1933; van Mannen, 1995).

The data from the pilot implementation showed that participants found the professional development experience to be worthwhile. This finding was important because teachers' satisfaction with professional development is tied to their perceptions of its effectiveness (Dede et al., (2009); Ehlert & Souvignier, 2023; Gavranovic & Alcakovic, 2023). Additionally, analysis of pilot participants' open-ended responses suggested that teachers found the act of critical self-reflection to be a beneficial aspect of the professional development. Participants also described ways in which learning helped them change aspects of their teaching practice.

As part of the next study within the EDR project, a readiness survey was modified to determine teachers' level of readiness to make changes to their instructional practices prior to engaging with professional development. Readiness to change was considered because for a successful change process to happen individuals must first be ready to change (Armenakis, Harris, & Field, 1999; Lizar, Mangundjaya, & Rachmawan, 2015). The URICA-TEACH was developed by modifying the University of Rhode Island Change Assessment (URICA, UMBC, n.d.). The URICA-TEACH was constructed, validated, and utilized with participants in the second study of the EDR project.

The second study of the EDR project consisted of having participants complete the URICA-TEACH survey to gain insight into their readiness to change. Participants then engaged in the online professional development course. Upon its completion, the data were analyzed around two of the five design principles: Center on Critical Reflection and Operationalize Critical Reflection through Guided Process. These two design principles were the focus of the research in this study because critical reflection plays a role in the evolutionary change process.

One finding was that the reflection potential of the design prompts included in the guided process may have played a role in the participants' level of reflection.

Within a professional development context, guidance for critical self-reflection can come through reflection triggers (Addler, 1991; Carrington & Selva, 2010; Verpoorten et al., 2012). These reflection triggers, or prompts as they were in the course, break down evolutionary change by providing questions that evolve to "be more specific and in-depth" (Orrill, 2001, p. 30), thus leading the teacher from a surface reflection to a process of critical self-reflection. The data from the second study showed that as the reflection potential of the prompt increased, participants' level of reflection increased. An additional finding is that, while participants described changes to their instructional practice, very few expressed changes to their pedagogical knowledge and beliefs, and those that had lower URICA-TEACH readiness to change scores showed the greatest reluctance to make changes to their instructional practice.

An unexpected finding from the third study was that participants had difficulty reflecting at deeper levels on the critical reflection prompts that addressed student learning. The student learning prompt type is the operationalization of the student lens of the design principle Examination from Multiple Perspectives. While this design principle was not the focus of the study, it is worth discussing. Reflecting through the student lens is just as important as reflecting through the autobiographical lens. (Brookfield, 1995; Cornish & Jenkins, 2012; Guskey, 2002). Reflecting through the student lens allows teachers to examine the experience that students have when learning. It also helps teachers to determine the impact that a particular aspect of the instruction has on students' learning. This type of reflection serves as reinforcement for or against change (Bandura, 1971; Brookfield, 1995; Cornish & Jenkins, 2012; Guskey, 2002). In the case of this study, the findings suggest that the reflection through the guided process served

as a reinforcement for change as all but two participants expressed an evolutionary change to their instructional practice, a finding that provides support for the design principles being assessed.

The combined findings from the studies within the EDR project show that within the participants involved in each study, teachers find critical reflection a worthwhile aspect of professional development. Through the guided process, they can reach deeper levels of reflection and they report evolutionary changes to their instructional practice. Also learned was that teachers need additional scaffolding to assist them in reflecting through the student lens, and participants who scored lower on the URICA-TEACH and exhibited lower levels of readiness to change were shown to have greater difficulty in developing self-awareness of their instructional practices.

Implications for Future EDR Studies

Future research on the design principles should include studies in which a modified guided process provides teachers with prompts to assist them in defining student learning to help provide context for their student lens reflections, differentiated scaffolding to support teachers whose URICA-TEACH scores show lower levels of readiness to change to assist them in developing greater self-awareness of their instructional practice, and explicit reflection prompts within the guided process to assist teachers with being able to reflect on changes in their pedagogical knowledge and beliefs. These modifications to the course development will further provide insight into how best to support teachers in making evolutionary changes to their instructional practices.

Implications for Designers of Teacher Professional Development

Educational design research was undertaken in this dissertation for the purpose of studying and maturing a set of theoretically based design principles that can be employed in the creation of teacher professional development courses when evolutionary changes to instructional practice are desired. The intent of having a theoretically based approach to the design and development of professional development for evolutionary change is to provide teachers with professional learning experiences that can support them in advancing their current practice in a way that is personalized, and is aligned to their current individual teaching behaviors, and understanding how teachers' level of readiness to change may affect their outcomes of a professional development experience can allow professional development designers the opportunity to differentiate their courses to address levels of readiness. While additional study iterations are necessary before finalizing the design principles, the combined findings from this EDR project, such as critical reflection being a worthwhile aspect of professional development, the guided process supported deeper levels of reflection and the report of evolutionary changes having been made, and that readiness to change does affect the professional development outcomes for individuals with low levels of readiness, show progress towards meeting this intent.

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APPENDIX A

URICA- TEACH

Part 1. Background information.

Instructions: Please complete the following background information. (Select your answer by clicking each box to make an 'X' appear)

How many years have you spent as a classroom teacher?					
0 – 2	2 – 5	5 – 10	10 – 15	15 – 20	More than 20
☐	☐	☐	☐	☐	☐

What is the most current grade band in which you are teaching or have taught?	
K-2	☐
3-5	☐
6-8	☐
9-12	☐

How is your school classified? (Please select one answer from each column)							
Public	☐		Title -1	☐		Urban	☐
Private	☐		Non Title-1	☐		Sub-urban	☐
Charter	☐					Rural	☐

In what region of the United States is your school located?	
Northeast	☐
Southeast	☐
Mid-West	☐
Northwest	☐
Southwest	☐
Outside of the Continental US	☐

Approximately how many students are currently enrolled in your school district?			
More than 50,000	☐	5,000 – 10,000	☐
25,000 – 50,0000	☐	2,500 – 5,000	☐
10,000 – 25,000	☐	Less than 2,500	☐

Has your school adopted a whole school improvement initiative within the last 3 years?	Yes	No
	☐	☐

Has your school district adopted a new teacher evaluation system within the last 3 years?	Yes ☐	No ☐

Part 2. Readiness to Change Questions

*Instructions: Please answer the following questions. Select your answer by clicking each box to make an 'X' appear). S*ome questions may sound very similar, even so, be sure to answer ALL items. DO NOT omit any questions.

	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
I am currently changing something about my instructional practice that has been bothering me.	☐	☐	☐	☐
I am finally making some changes in my instructional practice based on the challenge or challenges that I am facing in my classroom.	☐	☐	☐	☐
I do not feel like it is necessary for me to engage in professional development regarding changing my instructional practice because any challenges in my classroom are not related to my instructional practice.	☐	☐	☐	☐
I'm hoping that professional development will help me to better understand my instructional practice and how it relates to the challenge or challenges that I am facing in my classroom.	☐	☐	☐	☐
My instructional practice may not be the best, but I do not think that there is anything that I really need to change right now.	☐	☐	☐	☐
I am really working hard to make changes in my instructional practice based on the classroom challenge or challenges that I am facing.	☐	☐	☐	☐
I wish I had more ideas on how to address the challenge or challenges that I am facing in my classroom.	☐	☐	☐	☐
I hope that any professional development that I engage in will have some good advice for the specific challenge or challenges that I am facing in my classroom.	☐	☐	☐	☐
I believe that teachers know what is best, and if allowed to do what they feel is right there would not be a need to spend time on learning about new ways to teach.	☐	☐	☐	☐
I have a challenge or challenges in my classroom, but so does every other teacher, and I do not think it is the best use of my time to focus on them right now	☐	☐	☐	☐
I have a challenge or challenges that I am facing in my classroom, and I really think that I should consider addressing by making changes to my instructional practice.	☐	☐	☐	☐
While I am not always successful in addressing the challenge or challenges that I face in my classroom, I am at least working on them.	☐	☐	☐	☐
I am currently making changes to my instructional practice, however the changes I am making are not motivated by classroom challenges.	☐	☐	☐	☐
I am working really hard at making changes to my instructional practice, but I have not been as successful as I had hoped in addressing the challenge(s) that I am facing in my classroom.	☐	☐	☐	☐

APPENDIX B

LEVELS OF REFLECTION (LARRIVEE, 2008)

Level 1: Pre-Reflection

- Operates in survival mode, reacting automatically without consideration of alternative responses.
- Views student and classroom circumstances as beyond the teacher's control.
- Dismisses students' perspectives without due consideration.
- Is willing to take things for granted without questioning.
- Attributes ownership of problems to students or others.
- Fails to recognize the interdependence between teacher and student actions.
- Enforces preset standards of operation without adapting or restructuring based on students' responses.
- Fails to consider differing needs of learners.
- Does not thoughtfully connect teaching actions with student learning or behavior.
- Sees oneself as a victim of circumstances.
- Does not support beliefs and assertions with evidence from experience, theory or research.
- Is preoccupied with management, control and student compliance.
- Describes problems simplistically or unidimensionally.
- Does not see beyond immediate demands of a teaching episode.
- Focuses on isolated facts, events, or data without broader understanding.
- Defends rather than analyzes teaching practices.
- Responds to conflicts with power assertions rather than engaging in problem-solving.
- Justifies teaching methods without exploring alternatives.
- Responds to classroom situations without connecting them to other events.
- Applies predetermined text templates for assessing information.
- Makes decisions based on immediate circumstances failing to anticipate for the future.
- Uses self-confirming reasoning rather than considering alternative plausible explanations.

Level 2: Surface Reflection

- Limits analysis of teaching practices to technical questions about teaching techniques.
- Modifies teaching strategies without challenging underlying assumptions about teaching and learning.
- Fails to connect specific methods to underlying theory.
- Supports beliefs only with evidence from experience.
- Provides limited accommodations for students' different learning styles.
- Reacts to student responses differentially but fails to recognize patterns.
- Adjusts teaching practices only to current situation without developing a long-term plan.
- Implements solutions to problems that focus only on short-term results.

- Makes adjustments based on past experience.
- Questions the utility of specific teaching practices but not general policies or practices.
- Provides some differentiated instruction to address students' individual differences.

Level 3: Pedagogical Reflection

- Analyzes relationship between teaching practices and student learning.
- Strives to enhance learning for all students.
- Seeks ways to connect new concepts to students' prior knowledge.
- Has genuine curiosity about the effectiveness of teaching practices, leading to experimentation and risk taking.
- Engages in constructive criticism of one's own teaching.
- Adjusts methods and strategies based on students' relative performance.
- Analyzes the impact of task structures, such as cooperative learning groups, partner, peer or other groupings, on students' learning.
- Searches for patterns, relationships and connections to deepen understanding.
- Has commitment to continuous learning and improved practice.
- Identifies alternative ways of representing ideas and concepts to students.
- Recognizes the complexity of classroom dynamics.
- Acknowledges what student brings to the learning process.
- Considers students' perspectives in decision making.
- Sees teaching practices as remaining open to further investigation.
- Acknowledges gap between what is being accomplished and what needs to be accomplished.
- Accepts responsibility for one's professional practice and learning outcomes.

Level 4. Critical Reflection

- Challenges status quo norms and practices, especially with respect to power and control.
- Views practice within the broader sociological, cultural, historical, and political contexts.
- Addresses issues of equity and social justice that arise in and outside of the classroom.
- Considers the ethical ramifications of classroom policies and practices.
- Acknowledges the social and political consequences of one's teaching.
- Acknowledges that teaching practices and policies can either contribute to, or hinder, the realization of a more just and humane society.
- Observes self in the process of thinking.
- Is aware of incongruence between beliefs and actions and takes action to rectify.
- Challenges assumptions about students and expectations for students.
- Encourages socially responsible actions in their students.
- Recognizes assumptions and premises underlying beliefs.
- Is an active inquirer, both critiquing current conclusions and generating new hypotheses.
- Calls commonly-held beliefs into question.
- Suspends judgments to consider all options.

APPENDIX C

SAMPLE OF DATA ANALYSIS RESEARCH QUESTION 1: LEVEL OF REFLECTION

The table below is a representative sample of coding for each of the three reflection levels that were coded in participants' responses. There were no responses that scored at a Level 4.

Participant	Response	Notes	Code Applied	Level of Reflection According to Larrivee (2008)
007VV	When a student comes in it changes the culture that is already established. Some students cannot handle change so it impacts their learning whether for positive or "negative".	Problem Only- No Control	Pre-Reflection	1.0
010NH	My short-term goal would be to have the students transition smoothly from Recess when coming back to the class because this is when the behavioral issues occur. I would like to try adding sponge activities from the article I read.	Problem and Solution – No Explanation	Surface Reflection	2.0
009KC	I believe by asking more open-ended questions and being purposeful will make positive impacts to my students learning. The questions will encourage students to think deeply and respond clearly. Students will have to actively listen to each other and learn to take risk with their thinking.	Problem, Solution, and Explanation	Pedagogical Reflection	3.0

APPENDIX D

SAMPLE OF DATA ANALYSIS RESEARCH QUESTION 2: TYPES OF CHANGE

The table below is a representative sample of coding for each of the types of change that were coded in participants' responses.

Participant	**Participant's Response Analyzed**	**Notes**	**Type of Change**	**Provisional Code Applied**
012JS	What stood out to me is that different classroom arrangements truly do have an impact on student learning and I've never thought about it this way. I always think of changing my classroom as an aesthetic element, but it actually plays a much larger role in the success of our students. One thing I'm doing with my classroom now is using a kidney table for small group instruction, which allows me to designate one area of my room to scaffolding and supporting my students who need extra help, and challenging my advanced learners in a private space.	States change in terms how something is thought about	Actual	Change in pedagogical belief.
11PR	In my classroom I am grouping my desks in fours So that I can encourage a collaborative environment during lessons and activities. Since I teach enhanced mathematics for Title 1 students I naturally have smaller class sizes to divide into two groups. This impacts my students' learning because while they work on math that they	States general change in knowledge, something learned	Actual	Change in pedagogical knowledge

	didn't understand from previous years they are also learning to communicate and share ideas with others. Something new I learned from reading the article was how the various classroom setups impact instruction. Also, the charter school in New Jersey had such an interesting set up for their grades. I would like to incorporate various sections to my classroom to bring movement and more activity to my lessons. Some of my Title 1 classrooms have the space for centers. This is something I can do to impact student learning.			
008CS	The changes I have made to my questioning practices is providing more talk that is student-led. I now have questions on reflections of the learning and purpose of the learning.	Actualized Change is stated, and explained	Actual	Change in Practice
002TA	The questions I asked differ from the questions the teacher asked the students had students to discuss their thought process and what are their reasons for their thinking. the teacher also asks students to acknowledge other students response. the question was similar and that the teacher asked some recall questions same way I asked. I like that the teacher provided wait time, which I have trouble with and want to get better at.	Problem Identified, No Specific Solution	Desire	Desire to Change - General
005KS	Most of my questions are low level questions that require students to recall information. I ask each question in quick	Problem Identified, Specific Solution Conceptualized	Desire	Desire to Change - Planned

	succession and do not give my students time to think. I very literally asked them to give reasons why they said what they said. I just go on quickly to the next student. these strategies that I use do not lend themselves to reflective thinking. I **need to rethink** how I question students and ask them to do something with their knowledge instead of just remembering it. **for example**, if I had students use the vocabulary to describe something that they do on a daily basis but using the directional vocabulary that would require high level higher level of thinking. then as they work**, I could use probing questions** and redirect them if necessary. I can ask what vocabulary did you use to explain.			
012JS	I don't really have any changes for what we have been doing this far. We are already constantly challenging and questioning our kids through book clubs and inquiry-based work, I will just keep doing what we are doing now.	States doesn't need to change, states desire to keep current practice	Desire	Desire to Keep Current Practice