FOSTERING PROBLEM-SOLVING SKILLS DEVELOPMENT:

AN ARABIAN GULF STUDY

by

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Abstract

As the United Arab Emirates (UAE) aspires to become a knowledge-based economy, further understanding of Emirati teachers' pedagogical content knowledge, teacher self-efficacy beliefs, and how to best support teachers towards developing child-centered instruction as needed to foster problem-solving skills development (PSSD) is necessary. The empirical research literature is specifically lacking in studies which aim to understand Emirati teachers' sense of efficacy towards fostering PSSD in early years. A needs assessment found that (a) Emirati early years teachers (EEYTs) showed low teacher self-efficacy (TSE) in fostering PSSD in young children, and (b) teachers had limited access to PSSD during pre- and in-service training. Teachers who had more training had higher perceptions of confidence than the teachers who received less training. Hence, this study used a contemporary early years professional development program (CEYPD), a professional development on pedagogical content knowledge grounded in the learning sciences and teacher peer-coaching guided by the teacher efficacy theoretical framework, to explore (a) changes in EEYT's self-efficacy for instructional strategies, (b) EEYT's experiences with the Brain-Targeted Teaching (BTT) pedagogical framework for child-centered instruction, (c) EEYT's experiences with peer coaching when using the BTT model to plan instructional design, and (d) EEYT's experiences through reflection during the PD. Findings revealed (a) an increased teacher score change in TSE for instructional strategies after the CEYPD, (b) the BTT model provided participants with perceptions of change in child-centered instruction as needed for PSSD, (c) positive perceptions of collaboration, such as, clarification in understanding, development of new ideas, and

influenced TSE, and (d) through reflection, a shift in understanding towards child-centered instruction, salient decision making, and positive feelings of TSE.

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Dedication

This dissertation is dedicated to my mother, Jawaher Siam, for her support, love, and encouragement. Although she was never offered an opportunity to be formally educated, her appreciation for education radiates through me.

Acknowledgements

My dissertation journey began with the passion and desire to make a difference in one small public kindergarten school in the Arabian Gulf around developing teachers' abilities to foster problem-solving skills development in young learners. However, this difference would not have been possible without the support and investment of many individuals.

First and foremost, I would like to thank Allah for giving me the strength and blessing me with the honor of earning my doctorate with my children, Eman, Husam, and Raneem by my side.

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Table of Contents

List of Tables

List of Figures

Executive Summary

Background

Teachers in the United Arab Emirates (UAE) face challenges in fostering problem-solving skills development (PSSD) with kindergarten (KG) to Grade 12 learners (Irtiqa, 2016; Organisation for Economic Co-operation and Development [OECD], 2015). The National Council of Teachers of Mathematics (NCTM, 2000) defines problem solving as a process of engaging in a new task where the solution is unknown. The solution comes from drawing upon previous knowledge and experience (NCTM, 2000). The problem-solving process includes understanding, characterizing, and representing the problem, solving the problem, then reflecting on the problem, and finally communicating the solution (OECD, 2014). In the seven states that make up the UAE (Dubai, Abu Dhabi, Ajman, Ras al- Khaimah, Umm al- Qawain, Fujairah, and Sharjah), problem-solving skills have gained priority because of the urgency to expand the economy, envisioned through and by the Abu Dhabi Council for Economic Development (Aswad, Vidican, & Samulewicz, 2011; Chrystall, 2014; Hourani, 2011). With the intent of diminishing reliance on oil (Chrystall, 2014; OECD, 2015), the UAE has established a vision to develop a knowledge-based economy (Abu Dhabi Council for Economic Development 2030). Moving towards a knowledge-based economy implies a rise in the demand of higher-level skills, such as cognitive and interpersonal skills (Hourani, 2011; OECD, 2015). Therefore, UAE education may benefit from focus more on collaboration and real-life problem solving to develop the skills needed (Chrystall, 2014). In 2009, the New School Model (NSM) reform was introduced in Abu Dhabi and led to a policy change in instruction that required a pedagogical shift from traditional, teacher-centered rote learning methods to more child-centered methods that foster cooperative learning and higher-level thinking skills (Chrystall, 2014; Jackson, 2015).

1

The reform was managed under the government entity, Abu Dhabi Education Council (ADEC) in collaboration with the UAE Ministry of Education (MOE), whose key area of focus was to transform KG – Grade 12 programs to ensure that students are fully prepared to attend universities around the world and to compete in the global market (Aswad et al., 2011; Chen & Dahlam, 2005). All Emirati students are entitled to free public education, including early years up to the undergraduate level (Department of Education and Knowledge [ADEK], 2019). In the UAE, early years is defined as 3 years 9 months to 5 years 6 months (ADEC, 2008). As UAE students attempt to master PSSD, UAE early years teachers play an important role; hence, it is necessary to understand factors underlying effective problem-solving skills and how to foster its development.

Problem of Practice: Underlying Factors

The NSM reform was introduced in Abu Dhabi and led to a policy change in instruction that required a pedagogical shift from traditional, teacher-centered rote learning methods to more child-centered methods. The reform was mandatory in an attempt to sustain the economy, however, the reform faced challenges at the school level (Blaik- Hourani & Litz, 2018; Chrystall, 2014; Hourani, 2011; Ibrahim, Al-Kaabi, & El Zaatari, 2013). Salient factors related to the challenges included, (a) teachers' training both pre-service and in-service (Dickson, Riddlebarger, Stringer, Tennant, & Kennetz, 2014; Hourani, 2013) and (b) teacher self-efficacy (Perren et al., 2017). The pre-service teacher training was associated with three complexities: 1) high attrition (Dickson et al., 2014; Hourani, 2013), 2) sociocultural constraints (Dickson et al., 2014; Gallagher, 2011), and 3) the challenge of preparing to become reflective practitioners (Hourani, 2013; Richardson, 2004). In addition, the existing literature on in-service training emphasized the need for meaningful professional development for teachers throughout the

Emirates (Bond, 2016; Blaik-Hourani & Litz, 2018), especially in early years where national teachers in a 2015 survey claimed their dissatisfaction (Bond, 2016). Early years teachers, especially the ones under study, were advised by a national inspection team aligned to provide more opportunities for student growth in the area of problem solving and critical thinking (Irtiqa Report, 2016).

Needs Assessment Findings

Results from the exploratory needs assessment discussed in chapter two, which included a mixed method design of surveys, interviews, and document reports conducted with Emirati early years teachers (EEYTs) ($N = 10$) showed: (a) low teacher self-efficacy (TSE) in fostering PSSD in early years, and (b) teachers had limited access to PSSD training during pre- and in-service. The needs assessment showed that teachers who had more training had higher perceptions of confidence than the teachers who had less training. Participants indicated their willingness to learn about how to best foster PSSD to support the aspirations of the country to become a knowledge-based economy. These two issues regarding the underdevelopment of PSSD are at the root of the UAE problem of practice.

The Intervention

The proposed solution to this problem of practice was a 13-week professional development program interlaced with reflection wherein EEYTs ($N = 4$) collaborated with a researcher to learn the Brain-Targeted Teaching framework (Hardiman, 2012), and then co-constructed lesson plans that aligned to the BTT pedagogical framework within a peer coaching model. The CEYPD program was developed and aimed at increasing teachers' pedagogical content knowledge of the learning sciences and teaching self-efficacy for child-centered instruction needed for PSSD. The intervention design was based on: (a) the relationship between TSE and

behavioral changes (Bandura, 1977), (b) research on effective professional development (Darling-Hammond, Hyler, & Gardner, 2017; Desimone & Garet, 2015), and evidence that peer coaching is a form of high-quality professional development (Bruce & Ross, 2008), and (c) the positive relationship between pedagogical content knowledge of the learning sciences and teaching self-efficacy (JohnBull, Hardiman, & Rinne, 2013).

Research Purpose and Objective

The purpose of this study was to explore: (a) changes in EEYT's self-efficacy for instructional strategies, (b) EEYT's experiences with the BTT pedagogical framework for child-centered instruction, (c) EEYT's experiences with peer coaching when using the BTT model to plan instructional design, and (d) EEYT's experiences through reflection during the CEYPD. Guided by the research questions the research design for the intervention study was a mixed methods convergent design (Creswell & Clark, 2011). Research questions in this study included the following:

RQ 1: To what extent is there a change in EEYT's self-efficacy scores for instructional strategies after participation in the CEYPD?

RQ 2: What were EEYT's experiences with pedagogical content knowledge during the CEYPD?

RQ 3: What were the EEYT's experience with collaboration during the CEYPD when using the BTT model?

RQ 4: What were the EEYT's experience with reflection during the CEYPD when using the BTT model?

RQ 5: How has the implementation of the study adhered to or differed from the proposed implementation procedures?

Data Analyses

Data collection for this study included both qualitative and quantitative sources. The quantitative data included pre- and post-intervention scores of teacher's self-efficacy for instructional strategies using the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Hoy, 2001). The data analysis included descriptive statistics and paired sample t-tests performed on SPSS and Microsoft Excel. Qualitative data included interviews, weekly reports, reflection sheets, and researcher's journal. For the qualitative data, the researcher used conventional content analysis coding (Saldana, 2009).

Findings

Quantitative findings - TSE. EEYTs (TSES, 2001) demonstrated an increased score change in TSE for instructional strategies after the CEYPD. Analysis of the qualitative data revealed that active engagement in collaboration and reflection, as well as vicarious and social persuasion experiences grounded in BTT pedagogical knowledge needed for child-centered instruction may have influenced the score change in teachers' sense of efficacy.

Qualitative findings. Qualitative data from semi-structured interviews and reflections revealed EEYT's positive perceptions of the BTT model as needed for child-centered instruction, collaboration, and reflection. These results are described below.

Results of BTT model implementation. The study revealed that the BTT model provided participants with perceptions of change in child-centered pedagogical content knowledge. The findings showed that the BTT model was as an effective pedagogical framework for knowledge building as needed to apply child-centered instruction. Teachers' reflections and interview responses showed an increase in knowledge about the BTT pedagogy framework, including: (a)

the importance of the socio-emotional climate, the physical environment and (b) the BTT as an interconnected model.

Teachers also experienced increases in knowledge of instructional strategies that foster PSSD, including: (a) the basic problem-solving process and (b) types of questions to ask children.

Results of collaboration. Teachers described that because of collaboration, they were able to: (a) clarify understandings of the BTT model and (b) develop an emergence of new ideas. Exposure to peer coaching also resulted in social persuasion and vicarious experiences, which may have influenced their TSE for instructional strategies.

Results of reflection. EEYT's reflections revealed experiences such as: (a) a shift in understanding of the BTT model as a framework that supports a child-centered environment, (b) salient decision making, and (c) positive feelings of TSE.

While this was a small mixed method case study that faced several limitations including but not limited to small sample size, absence of a comparison group, and constrained intervention length, this study offered an opportunity for EEYTs to increase their pedagogical content knowledge as needed for child-centered instruction. This study's findings suggest that EEYT's pedagogical content knowledge, self-efficacy beliefs, and child-centered instructional practices needed to foster PSSD are amenable to positive change.

Chapter 1

Introduction to Problem of Practice

The researcher's problem of practice (POP) focuses on the challenges teachers face in preparing students to meet the societal needs of the UAE, one of the fastest developing countries (Aswad et al., 2011). Students in the UAE, for example, have demonstrated lower levels of student achievement in problem-solving skills than other countries around the world (Irtiqa Report, 2016; Knowledge & Human Development Authority [KHDA], 2012; Mullis, Martin, Foy, & Arora, 2012; OECD, 2014). In 2012, the International Program for Student Assessment (PISA) results showed that more than half of the high school students scored below a basic proficiency in problem solving (OECD, 2014). The 2011, Trends in International Mathematics and Science Study (TIMSS) worldwide assessment of reasoning skills of Grade eight students yielded similar results for the UAE with students scoring well below the international average (Mullis et al., 2012). In 2016, a biennial inspection report recommended allowing more opportunities for growth in the area of problem solving and critical thinking (Irtiqa Report, 2016).

Theoretical Framework

Bronfenbrenner's ecological systems theory (EST, 1979) guided this study as it provides a comprehensive perspective for investigating the underlying factors contributing to understanding the challenges early years teachers face in applying pedagogical skills designed to promote problem-solving skill development in the UAE. Bronfenbrenner (1979) uses a systems analysis to examine the environment of a focal individual. In the educational context, the focal individual is the teacher, who develops and functions within five spheres, or systems, of influence.

The five major systems that influence a teacher's development are the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. Bronfenbrenner asserts that influences between the systems are reciprocal, meaning that these systems influence the individual (the teacher), and the teacher has an influence on them. Bronfenbrenner's (1979) microsystem refers to those structures and interpersonal relationships that are closest to the individual and have a direct influence upon them, such as religious institutions, home, and the school. The mesosystem is the interface across which structures within the microsystem interact. It provides the connection between various microsystems, a school principal meeting with parents, for example. Within the exosystem, the larger social system interacts with structures in the teacher's microsystem. For example, teacher training, professional development, regulations, or social policies established by policymakers who never personally enter the classroom but may exert influences on instructional pedagogy and teachers. The macrosystem reflects the cultural values that interact with the teacher's microsystem or mesosystems. For example, if the cultural norm is that the teachers are the authoritative figure in the classroom, parents will be less likely to object to traditional pedagogy. The last level of EST is the chronosystem. This system refers to events occurring over the individual's lifetime as well as over the historical context of time. These time-related changes affect the daily life experiences, growth and learning of the teacher. They can be social and cultural changes; therefore, the chronosystem influences the teacher's microsystem, mesosystem, and macrosystem. Bronfenbrenner's EST (1979) is a comprehensive perspective that guided this study.

In essence, Bronfenbrenner's EST (1979) provides a more expansive framework for understanding teachers and the context of their lives. Understanding the reciprocity between the

elements of EST and their current practice may influence teachers' professional learning and

development.

Figure 1. 1

Conceptual Ecological Systems Theory
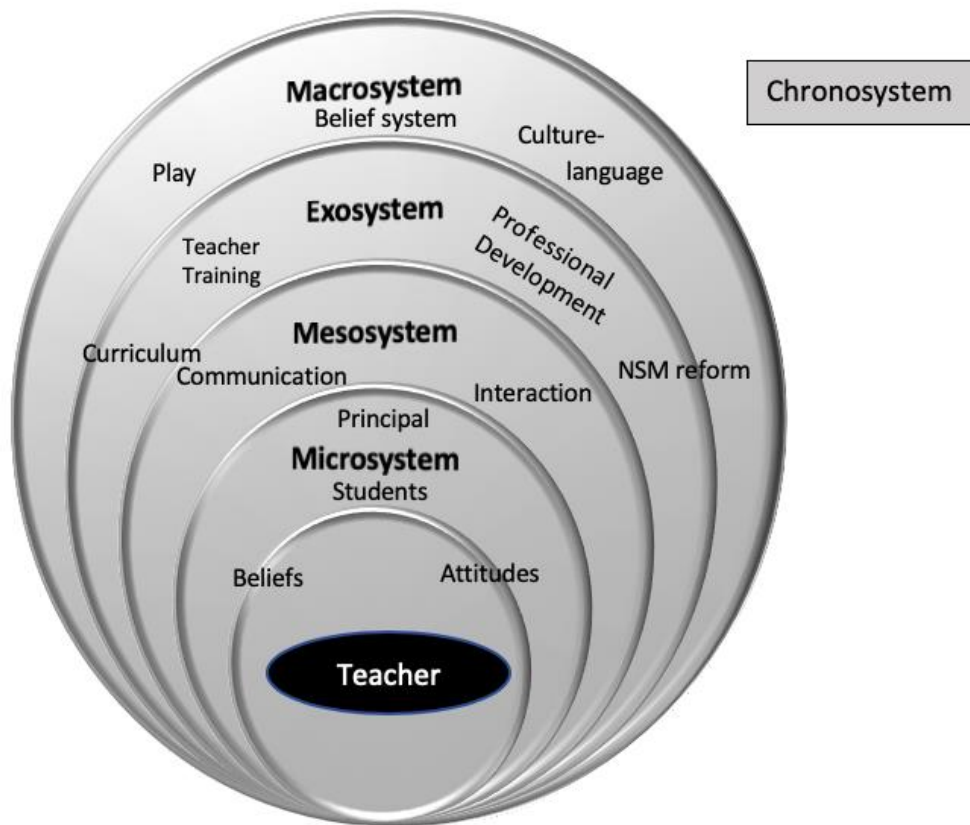
Note. Each level is situated within the next and centered on a focal teacher. This figure details the contributing factors associated with teachers' challenges in fostering PSSD. The chronosystem is outside the figure because this system represents that natural changes that occur over time. Adapted from "The Ecology of Human Development Experiments by Nature and Design, "U. Bronfenbrenner, 1979. Copyright 1976 by Harvard Press.

<center>**Literature Review**</center>

Historical Legacy of Rote Learning

The UAE's historical legacy of rote learning may have ultimately limited the opportunities for students to develop their abilities to think independently, creatively, or solve novel problems. During most of the twentieth century, the UAE was a British protectorate and the first formal school, a Kuwaiti Mission school, opened in 1953 (Daleure, 2011). As elsewhere in the Gulf Region (Bahrain, Kuwait, Iraq, Oman, Saudi Arabia, & Qatar), UAE education was traditionally taken up as a religious study in small groups, like the [madaras] or schools of the Islamic world (Jackson, 2015). Teachers [Imams] were usually members of a religious order who used the Qur'an (the holy book) to teach ethical and moral lessons (Gardener, 2005). Hence, the educational model in the UAE is linked to Islam, which is a teaching pedagogy synonymous with memorization (Hourani, 2011).

However, the origin of Islamic education was not at first solely synonymous with memorization. In fact, it was social constructivist in orientation (Jackson, 2015; Reagan, 2004). Hourani, Diallo and Said (2011) underscore this assertion as they explain that it reflected the process of using thinking during the teachings; even though it was based on memorization and strongly contextual, it implemented critical thinking and inquiry. To expand, Reagan (2004) highlights social construction of knowledge based in student experience in his general discussion of Islamic education as,

> [a] ll children have the capacity to learn … the purpose of education is not viewed as one
> of 'correcting' or 'remediating' a sinful nature but rather one of guidance … like the
> American philosopher of education John Dewey centuries later, [Ibn Khaldun] focused on

<center>10</center>

the social nature of education … [and] addressed the role of reason in the learning process … (p. 191–192).

Hourani (2011) goes beyond the work of Reagan (2004) and posits that in the middle of the nineteenth century, the conventional ways of teaching became synonymous with memorization, which did not allow opportunities for critical thinking. The lack of critical thinking implementation in teaching resulted in education becoming synonymous only with memorization and recitation, and this style of teaching spread through to the UAE, which until today, has become a dilemma for the educational system.

Aspiring to become a knowledge-based economy, leaders of the UAE faced increased pressure to create 21st century learning environments (National Qualifications Authority [NQA], 2013; OECD, 2012) with the aim to sustain the economy through education (Aswad et al., 2011; Ewers, 2015). Problem solving is an essential skill for the success of work-ready graduates (Barhem, Saleh, & Yousef, 2008; Casner-Lotto & Barrington, 2006; OECD, 2011), who want to develop and participate in a knowledge-based economy; however, problem solving poses problems within teacher-centered learning environments that impose only rote methods of instruction (Sawyer, 2006). Sawyer (2006) asserts that for students to actively participate in a problem-solving society, the instructional paradigm of teacher-centered pedagogy, where learning revolves around rote memorization and recitation (Hourani, 2013), requires a shift. This shift needs to include an environment that is conducive to PSSD, such as, opportunities for student agency, autonomy, and an engaging learning environment (Chrystall, 2014). Without teachers recognizing that learning is an active and constructive process and that their role is to design dialogue-oriented learning environments, students will be unable to fully

develop their problem-solving skills. Consequently, a student cannot be expected to take on the role of a problem solver if their environment does not support that capability.

To support a more contemporary approach to learning, educational reform under the government entity, Abu Dhabi Education Council (ADEC), introduced beliefs about teaching and learning which were reflective of a child-centered pedagogy (CCP) (ADEC, 2008; Baker, 2014). A child-centered teaching approach is defined and contained in three subscales: (a) child participation, (b) child as an active learner (AL), and (c) learning environment (LE) (Perren, et al., 2017). The child participant subscale is described as a child who is seen as an individual, with special characteristics and value. When a teacher implements this subscale effectively, the teacher is taking the time to attend to the child and addresses the child's concerns with care. The child as an active learner describes to what extent the teacher allows the child to explore and interact with the environment. The teacher will be seen as allowing the child opportunities to be a part of the decision making, allowing opportunities for the child to overcome challenges, and allow space for the child to solve problems. The subscale learning environment describes to what extent the teacher creates a stimulating and engaging environment with appropriate learning resources and affordances (opportunities for action within that environment) that motivates children to use them. Teaching with the objective for students to memorize content does not support a child-centered approach. Instead, a child-centered environment is what may be required to development students' problem-solving skills.

Early years education. Child-centered pedagogy for teaching and learning is important at all grade levels for the mastery of solving new problems, however, they are especially important in early years education because the quality of a child's learning environment prior to age six has an influence on later academic success (Campbell, Pungello, Miller-Johnson, Burchinal, &

Ramey, 2001; Tippett & Milford, 2017). This is highlighted in Richland and Burchinal's (2013) article which posits that strong executive functioning (EF) resources, such as, planning, carrying out conscious actions, and inhibiting responses during early childhood are related to long-term gains in fundamental reasoning skills. Since the prefrontal cortex is associated with higher order thinking skills, such as problem solving, and is associated with executive functions such as planning, carrying out conscious actions, and inhibiting responses (as discussed in Hardiman, 2012), the development of problem-solving skills in early years becomes critical.

The UAE's historical legacy of memorization negatively affected policy at the KG level and ultimately the promotion of PSSD at the classroom level. In the UAE, the first public kindergarten was established in 1955 in Ras Al-Khaimah (UAE emirate). By 1974, there were seven kindergartens; by 2004, there were 97, accommodating about 2,300 children (National Childhood Committee, 2005). Currently (2018-19) there are 15,547 children enrolled in Abu Dhabi kindergartens (KG1/2) (ADEC, 2019). In 2003-4 as part of a centralized system, public kindergarten teachers were specifically mandated to implement a direct instructional approach, in other words, teacher-centered instruction (Al-Momani et al., 2008). This trend continued as teachers and students passively received and accepted what decision-makers in the highest hierarchy decided. Although Spillane and Callahan (2000) describe this hierarchical decision-making as a characteristic of many countries, it has been problematic for a country such as the UAE, who aspire to become a knowledge-based economy. This is problematic because teachers were excluded from decision-making and were solely implementors of policy (Al-Momani et al., 2008). This top-down direct instructional approach may have reduced the early years teachers' opportunities to foster PSSD in their students. Within the EST, policy changes (NSM reform)

and curriculum are nested within the exosystem and in this case, had a negative indirect influence on the early years teachers' meso- and microsystems (see Figure 1.1).

Although studies linked the implementation of rote-memorization curriculum to top-down policy, teachers' cultural understanding of play-based pedagogy and training may also have been a factor to the lack of child-centered teaching and enrichment of learning (Baker, 2014; 2015; 2018). In 2004, Al-Momani and colleagues (2008) surveyed 120 UAE kindergarten teachers about their perceptions of the official curriculum. Findings revealed that teachers wanted more focus placed on approaches to learning, such as, socio-emotional and problem-solving skills, however, early years teachers' lacked an understanding of play, a critical approach to learning in the early years. The next section will further define play as a crucial construct intertwined in culture.

Play – a culturally defined construct. Understanding the Emirati population beliefs and meanings of play will be crucial in understanding how play is defined and its adverse effect on PSSD. The Encyclopedia on Early Childhood Development (2013) defines play as spontaneous, voluntary, pleasurable, and flexible activity involving a combination of body, object, symbol use and relationships. Piaget (1962) explains that there are numerous benefits of play across the domains of young learners development; he theorized that play and cognitive skills are inseparable. Vygotsky (1978) explains how through play within their social environment, children are functioning close to their optimal developmental level, and successful play interactions lay the foundations for crucial life skills. Examples of these life skills include empathy, imagination, and problem solving (Rogers, 2011). Early years teachers, the ones under study, are recommended to allow more opportunities for student growth in the area of problem solving and critical thinking (Irtiqa Report, 2016), which may be achieved through play.

Globally, to meet the goals of a 'whole child philosophy' in KG education, the importance of play has been recognized as the foundation of learning, named developmentally appropriate practice (DAP; Bredekamp & Copple, 1997). Recall how in 2010, the Abu Dhabi Education Council (ADEC) embarked on a 10-year education reform process termed the New School Model (NSM). The NSM bilingual KG curriculum was based on DAP and all Emirati students (citizens) were offered a two year voluntary KG education, which consisted of a two-part framework (ADEC, 2012) that aligned to the whole child. The first component was approaches to learning (ATL), which involved observable and measurable skills, classified under social, emotional, attitudinal, innovation and problem-solving (NSM, 2010). The second component is academic performance, which involved the development of literacy and numeracy skills in both the Arabic and English (NSM, 2010). However, to meet the needs of this bilingual approach, ADEC welcomed English medium teachers (EMTs). Hiring expatriates to teach English, math and science became problematic as it represented a major source of concern for the UAE's social and cultural values, including the meaning of play (Aras, 2016; Baker, 2014, 2015, 2018; Ihmeideh & Al- Qaryouti, 2016).

Teachers' perspectives of play are integral to the role of play in pedagogy and the ways in which personal theories of play effect teacher practices. Each culture has its unique style of representing to children what the social and cognitive skills are that are required of them, including play (Roopnarine, 2012). Marfo and Biersteker (2011) explain the importance of the cultural-historical foundation of play and acknowledge today's contextual realities of how different traditions define play. This acknowledgement becomes necessary for our understanding of play.

In the UAE, expatriate teachers described children's readiness to engage in play as insufficient. Teachers from North American origin, qualified in the early years, claimed that in the UAE play has the same meaning as "getting one's hands dirty and some of the children have no experience of any education so they just know what play is amongst their family" (Baker, 2014, p. 18). Play is often assumed to be a universal, biological phenomenon, yet play is also seen as widely embedded in culture and the nature of play across cultures has wide variations (Baker, 2018). One may infer from the literature that play in the context of the UAE is not linked to cognitive skill development; this may be one reason for the constraints and inhibitions seen in the classrooms. UAE KG teachers may not implement play in the classroom because of its sociocultural meaning, and/or lack of training in understanding the value of play in learning (Baker, 2018). While this is reflected in the EST model and is nested within the macrosystem (see Figure 1.1), UAE policy makers within the exosystem may require supporting teachers with quality teacher training pathways, while being aware of the societies' cultural understanding of play when designing CCP. The next section will further explore the underlying factors of teacher training pathways and the problem of practice: lack of problem-solving skill development in the early years space.

Pre-Service Teacher Training Pathways

Pre-service training pathways in the UAE have led to undesirable results in the development of CCP (Ibrahim, 2012; Dickson et al., 2014). UNESCO (2019) defines pre-service training as programs that are recognized and organized, private and public educational programs designed to train future teachers to formally enter the profession at a specified level of education. Graduates receive a government recognized teaching qualification. In the UAE, pre-service training was associated with three complexities: (a) high attrition, (b) socio-cultural constraints

16

and inhibitions, and (c) the low preparation of reflective practitioners. The three complexities are particularly important in understanding the experiences and challenges faced by pre-service teachers which hinder the implementation of CCP.

High attrition. Since 2005, attrition among teachers has been a major problem that has limited the ambition of the country to develop its educational system, and the current data reflected no signs of improvement. Before 2006, pre-service teachers' trainings at the Emirates College for Advanced Education (ECAE) engaged primarily in teacher-centered pedagogy. When ADEC initiated a plan to raise academic outcomes to foster a child-centered learning environment (ADEC's Strategic Plan, 2010), ECAE partnered with ADEC in 2007 to be one of the first teachers' training college in the UAE to align teaching methodology to child-centered instruction. Moving forward with the NSM, English became the medium of instruction at the colleges (Hourani, 2013). The mission of ECAE is to prepare high quality teachers and educational leaders through research based, responsive professional training. As ECAE and ADEC worked on this partnered training, ECAE claimed that teaching graduates were equipped to teach ADEC's New School Model and that they represented the first teachers to be trained in the NSM methodology in the English language in the UAE (Al-Khaili, n.d.). However, shortly after entering the workplace, many novice teachers left within three years (Dickson et al., 2014). Although teacher attrition in the early years of a teacher's career is a universal problem (Guarino, Santibanez, & Daley, 2006), Al Kaabi (2005, as cited in Dickson et al., 2014) pointed to the sociocultural factors as being a reason of teacher high attrition. Al Kaabi (2005) prefaced his doctoral thesis, "In 2005, attrition among teachers is a major problem in the UAE, a problem that limits the ambition of the country to develop its educational system" (p. 1). One factor that was associated with high attrition was the sociocultural element of language (Dickson et al., 2014).

17

Pre-service teachers whose first language is Arabic studied at the ECAE's training program in English. Emirati teachers were then expected during their in-service to teach English, math, and science all in the English language. Dickson and colleagues (2014) posit that the element of language was a challenge, which may have hindered the implementation of the NSM.

Sociocultural constraint. The skill-set pre-service teachers needed to successfully transform their beliefs about pedagogy in pre-service teacher training aspired by policy makers at the exosystem level was challenged by the teachers' limitation of language. Gallagher (2011) and Al Hazmi (2006 as cited by Hourani, 2013) identified the tensions in the UAE between embracing English as an international language and preserving the Arabic language and culture. Vygotsky (1978) argues how the sociocultural context effects learning, and language is at the core of dialogue and critical thought. The exosystem and mesosystems interactions play a critical role in achievement for Emirati pre-service teachers, especially when considering the various microsystem interactions that Emirati pre-service teachers have with non-Arabic speakers.

Hourani (2013) describes the limitations to language specifically as it applies to writing, she describes how pre-service students had, "difficulty and inability to express ideas in English-writing since students couldn't find the appropriate vocabulary; thus, students' reflections were off task and ideas were distorted and expressed incorrectly" (p. 21). These language barriers became a major issue as reflection is a useful tool for transformative learning (Wink, 2011) and has taken prominence in teacher education (Korthagen, 2001).

Reflective practices. In the UAE, teacher reflective practice has hindered the implementation of the NSM, which aims to align teacher instruction to child-centered pedagogy. Richardson (2004) posits that "reflective practice is incongruent with the values of Arab-Islamic culture and is therefore an inappropriate approach to promote teacher education in the UAE" (p.

18

111). Reflection and reflective practices, which builds meaning, can be defined as a process that has a systematic way of moving a learner from one experience to the next while fostering a deeper understanding (Wink, 2011). Clarke and Hollingsworth (2002) also posit the importance of effective teacher reflection and its effect on teacher change that leads to positive student outcomes. Reflection has gained increasing prominence within teacher education, to the point where they are now very much integrated within teacher education programs across a wide range of international settings (Clarke & Hollingsworth, 2002; Korthagen, 2001). For instance, a reflective approach to teaching may involve student teachers collecting data about teaching, examining their teaching practices and beliefs, thinking, rethinking, and then improving their practice (Wink, 2011).

Since 2000, the Higher Colleges of Technology (HCT) in the UAE has attempted to embed reflective practice and discourse of critical reflection in their new teacher education program (Hourani, 2013). Although Clarke and Otaky (2006) agree that HCT student teachers are incorporating and undertaking reflective practice in all of its basic forms, Minnis (1999) underscores Richardson (2004) and indicates that in countries where educational institutions are thoroughly embedded within a fusion of Arab-Islamic values, teaching and learning become unaligned with the underlying assumptions of reflective practice. As the UAE attempts to build a knowledge-based economy, it is important that teacher preparation programs are interlaced with reflection and that student teachers are given the opportunity to both receive and express themselves in their first language. By removing the language barrier, this may allow opportunity for teachers to both deeply learn about and shift their pedagogy towards child-centered instruction.

In conclusion, the sociocultural complexities and preparation of reflective practitioners created a challenge in terms of the gap in the learning experience and processes student teachers faced in UAE colleges (Hourani, 2013), which in turn may have affected teacher attrition rates. The ongoing process of shifting teachers' pedagogy through knowledge and reflection within teachers' existing experiences is crucial if teachers want to see themselves as agents of change in UAE education (Clarke & Otaky, 2006), helping to promote a knowledge-based economy where students are prepared for real life skills.

Teachers experienced challenges with pre-service trainings which are nested within the exosystem of EST (see Figure 1.1) and the literature claims that some the factors lie in the socio-cultural understandings of the teachers (Dickson et al., 2014). As shown in Figure 1.1 above, the macrosystem, which includes cultural values and lies in Bronfenbrenner's final level, contains the set of people and factors most remote to a teacher, but which still have great influence over the teacher. The macrosystem can affect the teacher either positively or negatively and as described above, has affected teachers in a negative way.

In-Service Teacher Training Pathways

The UAE reform which lies in the teacher's exosystem called for a shift from the teacher-centered to the CCP, and supported teachers through professional development (Bond, 2016), however, the misalignment to multiple capacities left PD unsuccessful in serving the NSM methodology (Blaik-Hourani & Litz, 2018). The indirect interaction between the exosystem professional development policies and the various microsystem interactions resulted in a minimal effect for teachers' professional learning (Blaik-Hourani & Litz, 2018). Teacher professional development is defined as the enhancement of the status of the profession as a

whole, which may improve teachers' knowledge, skills and practice (Darling-Hammond et al., 2017).

The professional company, Tamkeen, was a major initiative conducted in collaboration with five provider companies and one U.S. university partner as an essential component of the NSM and ADEC reform efforts. The Tamkeen program attempted to support the development of qualified and skilled school leaders and teachers as it aimed to enhance the quality of educational outcomes achieved by students (Bond, 2016). ADEC Research office (2014-15) surveyed 9,402 teachers who took part in the Tamkeen during the 2014-2015 school year to determine teacher satisfaction with professional development between demographic groups such as gender, level taught, teacher nationality, and geographic region. For this context, the relationships between level taught and teacher nationality was highlighted. The response rate was 27%, which concluded that the satisfaction rates were lower for KG teachers than teachers of Grades 5-12 (Bond, 2016). Furthermore, the study concluded that nationals were less satisfied than expatriates with the professional development training (Bond, 2016).

Although the source for the early years teachers dissatisfaction was unknown, researchers in the UAE proposed the following as solutions to the setbacks of PD during the reform: (a) UAE PD should not be viewed as a *quick fix or one size fits all* rather it should be based on contextualized problems (Blaik-Hourani & Stringer, 2015a), (b) a design of PD that fits within an organic and pragmatic perspective and that incorporates coaching, teacher-peer learning, and mentoring programs with the aim of triangulating the schools' operation plan, academic quality units, and school improvement plan. (Blaik- Hourani & Litz, 2018), (c) that concerned parties at both the micro- and macro educational levels need to work on enhancing, developing, and practicing a culture of shared leadership, distributed management, and participative decision-

making (Willoughby and Tosey, 2007), (d) collaboration, which will triangulate the school improvement plan, the professional requirements, and the specific aims of each school (Blaik-Hourani & Litz, 2018). Hence, to resolve the dissatisfaction claimed by the early years teachers, PD should present a work-embedded, ongoing sustained approach that focuses on individual, school (site-based), and macro-level needs (Darling-Hammond et al., 2017; Guskey & Yoon, 2009; Learning Forward, 2011).

Although PD (knowledge and skills) is seen as essential for effective teaching (Darling-Hammond et al., 2017), the importance of teachers' self-efficacy (TSE) is not as widely recognized or as explicitly addressed in teacher training (Chen & McCray, 2012). TSE is important to shifting their practice and ultimately improving student outcomes which will be explored in the next section.

Teacher Self-Efficacy (TSE)

It is essential to understand the importance of TSE as it has been linked to student achievement and motivation (Tschannen-Moran, & Hoy, 2001). Teacher self-efficacy is a major factor in explaining a teacher's teaching practice (Jerald, 2007), such as, (a) teachers with high efficacy are able to invest more effort in teaching, persist longer when faced with challenges and implement more innovative teaching methods (Tschannen-Moran, Hoy, & Hoy, 1998), (b) teachers with high levels of self-efficacy work longer with students that struggle and attempt new teaching methods that support student learning (Ashton & Webb, 1986; Gibson & Dembo, 1984), (c) early years teachers with higher self-efficacy spend more time communicating with parents and teaching both cognitive and social-emotional skills (Fantuzzo et al., 2012), and (d) low teaching efficacy, however, has been associated with teachers having more controlled behaviors towards students (Woolfolk, Rosoff, & Hoy, 1990). JohnBull and colleagues (2013)

posit one avenue to increasing teacher efficacy can be found in professional development on knowledge from the learning sciences.

In 1986, Ashton and Webb created the constructs of personal teaching efficacy and general teaching efficacy, which are derived from Bandura's self-efficacy theory (1977). Bandura (1977) defines self-efficacy as an individual's belief about one's own ability to accomplish a goal to produce a positive outcome. Personal teacher self-efficacy is a teacher's judgement about her/his own abilities and general teaching efficacy is about what teachers believe about teaching in general. Teacher self-efficacy is important to consider when developing a better understanding of the low achievement of PSSD in the early years space. Since low student outcomes may be attributed to low TSE, identifying teachers' self-efficacy is important as it correlates with the opportunities in early years learners' academic culture in problem solving. Within the construct of teacher efficacy, confidence is particularly important to understanding how it effects teaching. Teachers' confidence is defined as teachers' knowledge and abilities and has been linked to having positive effects on learning (Chen, McCray, Adams & Leow, 2014).

Although there is literature on early years teachers' math efficacy beliefs (Chen et al., 2014) and on early years teachers' self-efficacy around child-centered educational practices (Perren et al. 2017), literature on teachers' self-efficacy for fostering PSSD in the early years' space has not been published. Also, in the UAE, no current literature is available that can be analyzed to understand teachers' beliefs and, more specifically, about how to best teach PSSD in early years. Ibrahim and colleagues (2013) also note the scarcity of research at this time of rapid educational changes in the UAE.

Summary

Empirical research and findings from preliminary and informal observations indicate that, (a) training pathways (Bond, 2016), (b) sociocultural constraints (Dickson et al., 2014), (c) teacher self-efficacy (Tschannen-Moran & Hoy, 2001), and (d) reflection (Hourani, 2013), have surfaced as salient underlying factors to this problem of practice: EEYT's challenges to fostering PSSD. Using Bronfenbrenner's (1979) ecological systems theory, this literature review covered the factors related to challenges faced by early years teachers fostering PSSD in the UAE. The factors covered in this literature review fall under Bronfenbrenner's (1979) ecosystems of microsystem, mesosystem, exosystem, macrosystem, and the chronosystem.

At the exosystem level, the policy and reform issues negatively affect classrooms (Chrystall, 2014), through misaligned and ineffective teacher training pathways, both pre- and in-service (Blaik-Hourani & Litz, 2018; Clarke & Otaky, 2006; Hourani, 2013). The macrosystem factors of culture, such as language, culture and heritage contribute to the negative resistance and inconsistent consequences of the reform (Dickson et al., 2014) and unsuccessful implementation of CCP, an environment where teaching and learning lends itself to PSSD. The microsystem level covered the main contributing factors to the challenges faced by teachers to shift towards CCP as needed for fostering of PSSD, teachers' sense of self-efficacy (Chen et al., 2014; Perren et al., 2017) and reflection (Hourani, 2013).

Child-centered pedagogy fosters an environment that promotes PSSD by offering students in the early years autonomy, agency, and a level of engagement with the environment, all of which are best driven by TSE and knowledge (Perren et al., 2017). In the UAE, early years teachers, especially those from teacher training programs which were teacher-centered in orientation, faced challenges in shifting their pedagogy towards child-centered instruction as

needed for developing problem-solving skills with the aim to fulfill the country's aspiration to become a knowledge-based economy. At the same time, professional development misalignment and ineffectiveness has limited the extension of teacher knowledge in CCP as needed to foster PSSD. Empirical research and findings from preliminary and informal observations indicate that, (a) training pathways (Bond, 2016), (b) sociocultural constraints (Dickson et al., 2014), (c) reflection (Hourani, 2013), and (d) teacher self-efficacy (Tschannen-Moran & Hoy, 2001), have surfaced as salient underlying factors to this problem of practice: Emirati early years teachers challenges to fostering PSSD. Given the gap in empirical research in these areas, the need for investigation of early years teachers' perceptions of PSSD and training has emerged.

Chapter 2

The Study

Context

In the spring, 2019 academic semester, teaching staff at a KG campus in the UAE completed surveys and semi-structured interviews about their perceptions, teaching and learning background of problem-solving skills development (PSSD). Findings from the survey and semi-structured interviews and from peer-reviewed literature will inform and drive an intervention to address understanding early years teacher's self-efficacy (TSE) in fostering PSSD. The purpose, design, participants, and results of the survey, or needs analysis, are described below.

Purpose of the Study

The purpose of this needs assessment was to investigate teacher perceptions of and training in PSSD with early years learners. The focus of this needs assessment was to determine what training was available and to determine the levels of TSE in fostering PSSD with early years learners. The findings from this needs assessment were used to conduct additional research to develop a targeted intervention designed to decrease the achievement gap between early years learners' development of problem-solving skills and non-identified peers around the world. This needs assessment attempted to answer the following research questions: 1) What are the differing training services provided for early years teachers in PSSD? 2) How does teacher epistemological beliefs influence PSSD degree of integration? 3) What are teacher self-efficacy beliefs about early years learners and math? 4) What are teachers' confidence and ability levels in teaching PSSD to early years students?

Method

In this section, the researcher describes the sample, setting, variables, measures, and data collection and analysis. A case study mixed method design was used to develop strength in the needs assessment (Creswell & Plano-Clark, 2017). The quantitative data in this study was collected prior to completing the interview. The qualitative data collected through an interview enriched and informed the quantitative findings from the survey.

Participants

Respondents ($N = 10$) are full time early years Emirati national teachers who teach, assist, and guide learners in the classroom. All teachers are (female) Emirati nationals who live in the United Arab Emirates and work full time in the public-school system. The teachers age ranges from 26 years to over 40 years old. Teachers have teaching experience ranging from three years to over 20 years. The ethnic background is predominately Emirati from diverse socioeconomic backgrounds.

Respondents are all qualified to teach early years students. Respondents all hold bachelor's degrees 10 out of 10 (100%) or master's degree 1 out of 10 (10%) as their highest qualification, the master's degree is in educational leadership. Nine out of 10 (90%) of teachers hold a bachelor's degree or bachelor's equivalent in Arabic and 1 out of 10 (10%) has a bachelor's degree in education.

Measures and Instrumentation

Based on the review of literature, variables were identified, and the survey adopted from Chen and colleagues (2014) was administered to early years teachers. This needs assessment focused on three main variables: (a) training services provided, (b) teacher pedagogical knowledge, and (c) teacher self-efficacy. For the purpose of this study, training was defined as

pre-service and professional development or in-service. Two different data sources were used to address the research questions. First, all 10 participants completed a survey and then five participants were randomly selected to participate in a semi-structured interview.

        Survey. The survey was printed on paper and distributed. The survey consisted of 28 questions and was anonymous (see Appendix A). The questions assessed three aspects of teacher belief and confidence: (a) teachers' beliefs about early years learners and math, (b) teachers' confidence in helping early years students learn math, and (c) teachers' confidence in their own math abilities. Teachers used a five-point Likert scale to indicate their degree of agreement or disagreement with each statement. The five points on the rating scale are labeled *strongly agree, agree, neutral, disagree, or strongly disagree*. The items included in the scale relate to these constructs: teacher beliefs and teacher confidence. In the questionnaire, the research participants had the opportunity to indicate their voluntary interest in participating in a semi-structured interview protocol.

        Interview. The interview questions were based on the survey questions and the review of literature (see Appendix B). Teachers completed (n = 5) a 20-minute semi-structured interview protocol that addressed items related to teacher training, both pre-service and in-service in PSSD, teacher pedagogical knowledge, teachers beliefs about early years learners and PSSD, teachers' confidence in helping early years students learn, and teachers' confidence in their own abilities. The informed consent form, the needs assessment survey, and the interview protocol were legally translated into Arabic, the native language of the population.

        Finally, respondents provided data on demographics (e.g., age, gender, nationality, ethnicity, education), employment (e.g., discipline/area, time with current employment).

        Examples from the instrument. Beliefs about early years students and math examples

28

include, subset (A):

1) Most children need early years math instruction.

2) Most children need to learn math in early years to be ready for grade 1.

3) Most children have the cognitive abilities to learn math.

Confidence in helping early years students learn math include, subset (B):

1) I am confident in my knowledge of reasonable goals for early years.

2) I am confident in my ability to plan activities to help early years learn math.

Confidence in teacher math ability include, subset (C):

1) I like coming up with creative ways to solve math problems.

2) Math was one of my best subjects in school.

Interview questions include, set (D):

1) What kind of problem-solving pedagogy training did you receive in college/university?

2) How do you know when problem-solving skills development is occurring in your classroom?

Procedure

This section reviews the data collection and analysis processes used in this needs assessment to address the research questions. Participant recruitment, through collaboration with the executive sponsor, ran from mid-May to late May 2019 are outlined below.

Data collection. The data was collected over a 2-week period by the researcher who was not an employee at the setting. The data from the interview was an extension of the questions from the survey.

Survey. The executive sponsor announced a professional development session via messaging communication- WhatsApp. At the meeting, the researcher informed the teachers

about the needs assessment study through reading a recruitment script in Arabic. The consent

form and survey were distributed to all the Emirati KG full time teachers in the building. Twelve

surveys were handed out and 10 were returned. Participants had 1 week to return the surveys. In

addition to the meeting, reminders were sent to school contacts as many times as permitted (one

to two). Respondents all completed the same survey and interview. No duplicates were provided.

Participants returned the surveys by giving them to the researcher or by leaving them with one

school administrator.

Interview. Five semi-structured interviews were conducted. The interview took place in

the professional development room and lasted approximately 20 minutes each. The interview

was recorded, and the researcher took notes. Enhancements questions were selected based on the

findings from the current literature.

Data analysis. The survey results and interview questions were analyzed simultaneously.

Survey. Data analysis involved the statistical software, Statistical Package for the Social

Sciences (SPSS) and Microsoft Excel program by hand. The SPSS program provided the

variables' descriptive statistics, the mean, median, and mode report, and the frequency

distribution. Excel served as the central resource for coding and calculating (sums, means)

comments.

Interview. The records taken during the interview, in Arabic, were transcribed and

reviewed to evaluate the major themes of discussion. Thematic analysis was used to understand

the data collected during the interview (Saldana, 2009). The qualitative analysis was coded

through emergent coding (Saldana, 2009) and Luft & Roehrig's (2007) scale which categorized

teacher responses from traditional to reform-based teacher. The researcher read and re-read the

transcribed notes from the interviews. The researcher identified the themes that emerged from

the text of interview transcripts. Lastly, the quantitative and qualitative analysis were used to inform the four research questions of the needs assessment.

Findings and Discussion

The survey and interview data provided important information about the needs within the given setting. Teacher training pathways and TSE for this population emerged as major factors when evaluating the underdevelopment of PSSD in early years learners.

Teacher Self-Efficacy

Survey results. The survey data revealed that teachers ($N = 10$) ranked their belief levels of early years math as generally positive, with a combined overall mean rating of 4.0% on a Likert scale from *strongly disagree* (1) to *strongly agree* (5). Table 2.1 indicates that all teachers *agree* to *strongly agree* ($M = 4.6$) that children should be helped to learn math in early years and need structured early years math instruction ($M = 4.2$).

Rating their beliefs about the importance of early math instruction, all teachers agreed or strongly agreed ($M = 4.5$) that children need to learn math to be ready for 1st grade. Underscoring the need for early math education, 6 out of 10 ($M = 3.5$) teachers felt that most children in their class entered early years education with very little math knowledge.

Table 2. 1

Belief About Early Years Students and Math

Beliefs component	Mean	SD	N
Most children in my class…enter school with little math knowledge	3.50	.972	10
have the cognitive abilities to learn math	3.70	1.059	10
should be helped to learn math in early years	4.60	.516	10
are very interested in learning math	3.90	.876	10
need to learn math in early years to be ready for grade 1	4.50	.527	10
learn a great deal about math through everyday activities	4.10	.876	10
need structured early years math instruction	4.20	.422	10
should be helped to learn math using a published math curriculum	4.00	.667	10
M	4.063	.739	10

Note. Likert scale (1= *strongly disagree*, 2= *disagree*, 3= *neutral*, 4= *agree*, 5= *strongly agree*)

Teacher interviews. The importance of PSSD in early years was agreed upon by all the participants. Five out of 5 (100%) reported acknowledgment of the importance of problem-solving skills in early years. However, 2 out of 5 (40%) reported it was not more important than reading and writing. **(**Teacher 3) states, "We create a student who is a thinker, problem solver. A problem solver in the world. But not more important, but just as important, it complements the other subjects". The teachers who disagreed that it is more important than other subjects aligned with the empirical research indicating that early years teachers find social-emotional factors most important followed by literacy. Kowalski, Pretti-Frontczak and Johnson's, (2001) report asserts,

early years' teachers believed social-emotional skills were more important for early years learners to learn than either literacy or early math. In sum, this information indicated that early years problem solving is important to all teachers' everyday work with young children (teaching, experiences, transfer of learning).

Teacher Self-Efficacy: Confidence in Knowledge

Survey results. Figure 2.1 compares teachers' confidence in knowledge versus their confidence in ability to teach early years learners math. Teachers reported a greater overall confidence in their ability ($N = 10$, 80%) to teach early years children math than they did in their knowledge of teaching it. Specifically, 7 out of 10 (70%) teachers agreed that they were confident in their ability to plan activities to help early years learners learn math, incorporating math learning into familiar activities such as dramatic play. This data revealed that there may be some discrepancy in the understanding of how to teach math to early years learners. These analyses are all consistent with findings from other early years studies (Chen et al., 2014).

Figure 2. 1

Comparison Related to Confidence in Helping Early Years Learners Learn
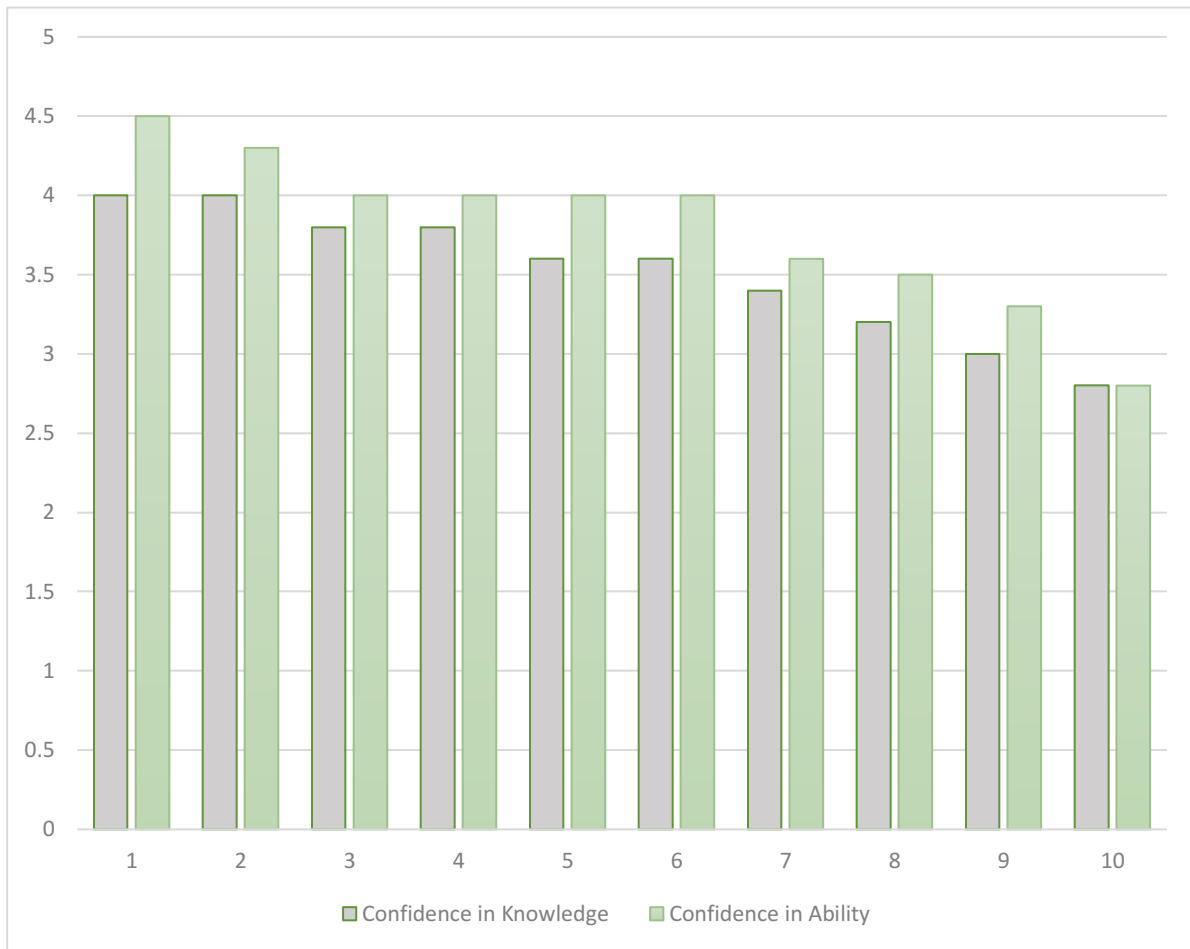
A comparison between teachers' confidence in ability and confidence in knowledge from highest to lowest. *Note*: the response rate ($N = 10$).

Teacher Self-Efficacy: Confidence in Helping Children

Survey results. Figure 2.2 compares teachers' confidence in their own math abilities to their confidence in helping students learn math. Teachers' ($N = 10$) confidence in helping early years children learn math was compared with their confidence in their own math abilities. The results indicate that the teachers' confidence in their own math abilities with a mean rating of 2.8 out of five (5 = *strongly agree*) was lower than their confidence in helping early years children

learn math with a mean rating of 3.5 out of five (5= *strongly agree*). This data revealed that

teachers' confidence in their own math abilities is lower than their confidence in helping children

learn math. This analysis is consistent with the findings of empirical studies (Copley, 2004).

Figure 2. 2

Teachers' Confidence in Their Own Abilities Compared to Their Confidence in Helping Students
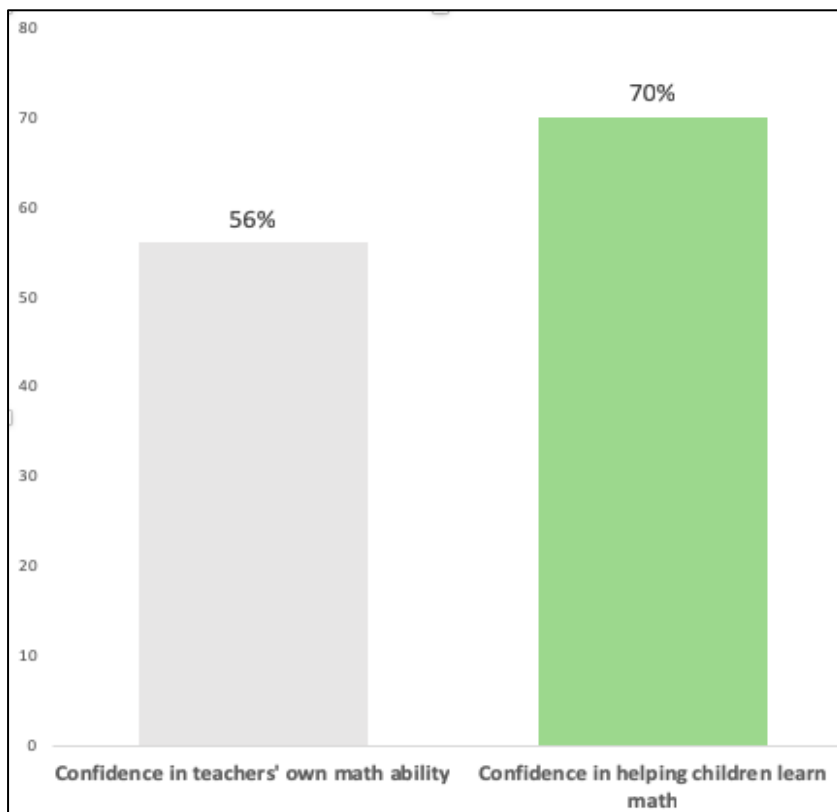
Learn

Note: Teachers' confidence in their own ability on a Likert scale was 2.8 out of 5 (56%);
Confidence in helping children learn math was 3.5 out of 5 (70%). The teachers who participated
to each of the questions was 10.

Teachers' Pedagogy

    Teacher interviews. Contrary to general empirical research explored in the UAE asserting

that most teachers are traditional in their pedagogy (Hourani, 2011; Chrystall, 2014), the

majority of teacher beliefs at the KG level are in between instructive and the responsive category (80%), compared to traditional which was lower at 20%. The initial questions focused on teacher epistemologies and probed the beliefs of beginning and experienced teachers, while the process of interviewing utilized methods common in qualitative research. In reviewing and refining the interview process, the researcher adopted a developed map that allows one to describe and define various beliefs held by beginning and experienced teachers. Ultimately, the map allowed the researcher to track the development of these early years' teachers, while providing feedback regarding their beliefs. Each asterisk represents a question answered in that category. The researcher was seeking to categorize teacher responses from traditional to reform-based teacher, according to the Luft and Roehrig's (2007) scale. Overall, contrary to general empirical research explored in the UAE asserting that most teachers are traditional in their pedagogy (Hourani, 2011; Chrystall, 2014), the majority of teacher beliefs at the KG are between instructive and responsive, with 44% in the responsive category, compared to traditional which was lower at 20%. Although the responsive category was double that of the traditional category, none (0%) of the teachers responded as reform-based (see Table 2.2). Findings in the research contradicted the findings in this context and this could be due to the fact that the previous research did not explicitly report these finding in the context of early years.

Table 2. 2

Beliefs Profile of Teachers

	Traditional	Instructive	Transitional	Responsive	Reform-based
Teacher 1	***	**			
Teacher 0		*	*	***	
Teacher 3	*	*	*	**	
Teacher 5		*		****	
Teacher 6	*	*	*	**	
M	20%	24%	12%	44%	

Teacher Training Pathways

Pre-service training. The semi-structured interviews and support from other empirical

studies suggest teachers were given little to no training during student teaching. The teachers

who were given training 2 out of 5 (40%), participated in superficial, surface-level learning in

which they had little interest or, at a minimum, willingness to interact with the problem-solving

pedagogy learning activities. A crucial factor to consider and balance these views is the Emirati

early years teachers' sociocultural upbringing, which may have had an effect on their

engagement in learning. This may represent a category of factors perceived to effect problem

solving development. Over half of teachers 3 out of 5 (60%) referred to the limitations in

problem solving pedagogy training. One respondent directly states, "I did not receive any

training. I have no background" (Teacher 1).

In-service training. The majority of teachers, 3 out of 5 (60%), reported receiving

professional development on problem solving in the past, however, time, location, and benefits

varied for the teachers. For example, one stated she learned the core of problem solving from her

previous school training on Reggio Emilia (Teacher 5), which the KG teachers in the context of the research study did not receive. Another teacher expressed getting a few months of training the previous year and when prompted to say what she learned, she replied, "I have to encourage children to think critically" (Teacher 0). One teacher who was working in the building in the previous year stated, "some PD covered problem solving but nothing I needed as I was a new graduate and already knew these simple PDs" (Teacher 6). Another teacher who verified taking professional development in the past, identified with training that was over 10 years old. As she states, "Yes, I was trained when our school was owned by SABIS. I was trained in understanding math and learning problem solving related to math" (Teacher 1). From the teachers' statements above, professional learning in UAE schools lacks coherence, which is corroborated in the literature findings (Blaik-Hourani & Litz, 2018). The data also suggested that teachers lack agency regarding their professional learning, as many constraints seemed to hold them back from engaging in further professional learning opportunities. Literature in the UAE also shows that hinderance to professional development include lack of administrative support, lack of time as well as lack of choice in the school's professional development programs (Bond, 2016). A graph representing the low training teachers received on PSSD mentioned in the interview can be seen in Figure 2.3.

Figure 2. 3

Teacher Training on Problem-solving Skills Development in Early Years
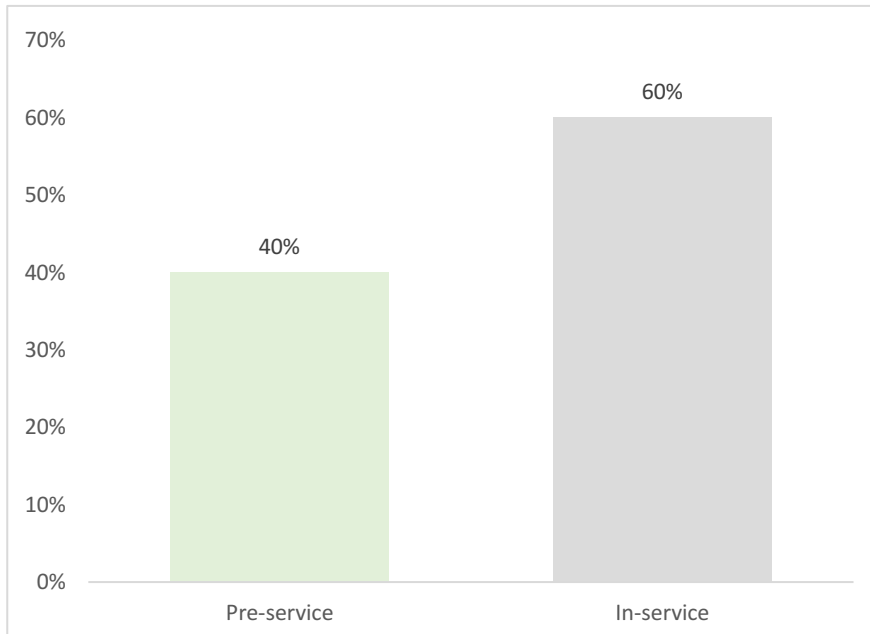
Note: This graph represents participants (n = 5) and the percent total is out of 100%.

Conclusion

Early years Emirati teachers encounter obstacles to entering 21st century classrooms, in support of sustaining the economy through a knowledge-based economy. These teaching positions require the skills, knowledge, and dispositions associated with CCP as needed for problem solving. However, these developments are challenged by a mismatch between their pre-service training, TSE, and professional development lack of effectiveness. Furthermore, although teachers recognize the importance of problem-solving integration in the classroom, school inspection reports (Irtiqa, 2016) claim an underdevelopment of practice. Second, a major proportion 3 out of 5 (60%) of teachers indicate that they are limited in their understanding of PSSD, while 2 out of 5 (40%) rated themselves at a good level. Results from this exploratory

needs assessment revealed, (a) low TSE in fostering PSSD in early years, and (b) teachers had

limited access to PSSD training during pre- and in-service. The needs assessment showed that

teachers who had more training had higher perceptions of confidence than the teachers who had

less training. Thus, the need to further explore solutions to solve the early years teachers problem

solving problem of practice: the lack of knowledge on how to foster PSSD in early learners is

recommended.

To address these factors, and to respond to the teachers indication for a need of growth in

the area of PSSD, a collaborative professional development design may be effective. Based on

the empirical support of previous studies and the results of the current needs analysis, a

collaborative professional development design interlaced with reflection and based on

pedagogical content knowledge grounded in the learning sciences may be effective to shifting

teachers' sense of self-efficacy towards child-centered instruction as needed for PSSD. This

approach may narrow the gap between the policy makers' need to address the gained urgency to

improve PSSD and the Emirati teacher's self-efficacy for fostering PSSD in early years.

Limitation of the study

Challenges of translation are acknowledged from the perspective that interpretation of

meaning is the core of qualitative research. As translation is also an interpretive act, meaning

may get lost in the translation process.

Chapter 3

Synthesis of Intervention Research Literature

As discussed in chapter one, teachers in the UAE face challenges in shifting their pedagogy towards child-centered instruction as needed to foster problem-solving skills development (PSSD) (Chrystall, 2014; Hourani, 2011; Irtiqa, 2016; Organisation for Economic Co-operation and Development [OECD], 2014). The literature also shows that the definition of problem solving in early years has gained importance with the National Association for the Education of Young Children (Copple & Bredekamp, 2009) and this is especially true for the UAE KG context because of the urgency to expand the economy, envisioned through and by the Abu Dhabi Council for Economic Development (Aswad et al., 2011; Chrystall, 2014; Hourani, 2011; Jackson, 2015; OECD, 2015). Results from the exploratory needs assessment discussed in chapter two, which included a mixed method design of surveys, interviews, and document reports showed: (a) low TSE in fostering PSSD in early years, and (b) teachers had limited access to PSSD training during pre- and in-service. The needs assessment showed that teachers who had more training had higher perceptions of confidence than the teachers who had less training. Hence, the findings from the needs assessment revealed the necessity to further investigate potential solutions to solve the early years teachers' lack of understanding on how to foster problem-solving skills in early learners through child-centered instruction. Hence, it becomes important to understand teachers' potential changes in TSE and practices with the aim to shift their pedagogy towards child-centered instruction as needed for PSSD.

In this chapter, the researcher will examine potential solutions in the research literature on teacher professional development through the lens of the teacher efficacy theory, the chosen theoretical framework, to help in understanding Emirati early years teachers' potential changes

in beliefs and practices. Thus, a professional development model will be proposed as a potential intervention for the early years teachers.

Teacher Self-Efficacy

Research has shown that one goal of professional development should be to increase teachers' efficacy, and this may result in enhanced student achievement (Martin, Kragler, Quatroche, & Bauserman, 2014). Therefore, one may conclude that TSE may be an important construct in professional development because it is the root for any sustainable change in teaching practice which ultimately leads to change in student performance (Yoo, 2016).

Teacher self-efficacy was developed from Bandura's (1977) general self-efficacy theory, which is grounded in the social cognitive theory. Self-efficacy theory is composed of two constructs: self-efficacy and outcome expectancy. Bandura (1977) defined self-efficacy as an individual's belief about one's own capabilities to manage and achieve positive outcomes. Outcome expectancy is a person's predicted belief that a certain behavior leads to a particular outcome. Bandura's (1977) theory, which asserts that self-efficacy beliefs arise from and are changed through four sources: mastery experiences, vicarious, and social persuasion experiences, and physiological arousal, become important to the focal individual of my study, the teacher. The definitions of the constructs are as follows: (a) mastery experiences are experiences in which a person takes on new challenges and feels successful, (b) vicarious experiences is observing a role model successfully complete a task and believing in one's ability to replicate the experience, (c) social persuasion is when one is influenced by the comments of others, and (d) physiological response in teacher efficacy refers to one's stress and emotional reaction during the other three events and how this reaction informs their efficacy beliefs about their capabilities. Hence, in

order for teachers to change their beliefs, they must rely on the four sources of efficacy (Bandura, 1977).

Derived from Bandura's self-efficacy theory (1977), Ashton and Webb (1986) created the constructs of personal teaching efficacy and general teaching efficacy. Personal teaching efficacy is a teacher's judgement about her/his own abilities and general teaching efficacy is about what teachers believe about teaching in general. Self-efficacy is an important factor in explaining a teacher's teaching practice because research has shown that a teacher's judgement of her/his ability to affect student learning impacts instructional choice (Ashton & Webb, 1986; Fantuzzo et al., 2012; Gibson & Dembo, 1984; Tschannen-Moran et al., 1998; Woolfolk et al., 1990). For instance, Tschannen-Moran and colleagues (1998) found that teachers with high efficacy are able to invest more effort in teaching, persist longer when faced with challenges and implement more innovative teaching methods. Teachers with high levels of self-efficacy work longer with students that struggle and attempt new teaching methods that support student learning (Ashton & Webb, 1986; Gibson & Dembo, 1984). Fantuzzo and colleagues (2012) posited that early years teachers with higher self-efficacy spend more time communicating with parents and teaching both cognitive and social-emotional skills. However, low teaching efficacy has been associated to teachers having more controlled behaviors towards students (Woolfolk et al., 1990).

Furthermore, in the context of early years, if a teacher believes that a student is capable of problem solving, their likelihood to support this student and face challenges that arise is more likely than if they believe the student is incapable of problem solving. In which case, the teacher may have low teaching self-efficacy for working to develop problem-solving skills with early years learners and may not engage in the most effective teaching pedagogy to further support 21st century skills. Since TSE effects many different educational outcomes, determining how to best

support TSE is important to this study. Because of the correlation between TSE and student learning outcomes (Ashton & Webb, 1986; Gibson & Dembo, 1984), professional development has been one channel designed to increase TSE and foster teacher change. Therefore, TSE is further examined to help inform an intervention for understanding early years teachers' potential changes in beliefs and practices through a professional development model. In the next section, models of teacher professional development that influence or affect TSE are examined more carefully.

The majority of the studies mentioned above were carried out in settings that are very different from that of the problem of practice. Potential cultural issues that might affect application of this model professional growth have been identified in chapter one. These Western-informed approaches and the majority of published studies are most applicable to English speaking settings or other Western nations. Where possible, the researcher has identified non-Western studies but, by and large, research in non-Western settings is scarce. A blanket disclaimer is that the researcher is aware of the massive generalization challenges that exist but will not be stated for every study. If a study was done in the UAE or in a near cultural neighbor, it will be noted; otherwise, the reader may assume that these studies were performed in widely diverse settings. In describing this intervention, the researcher gives examples of strategies and will be more explicit about why this generalization or adaptation of a Westernized approach is proposed.

Teacher Professional Development

Whether a professional development program can lead to sustainable teacher practice change depends on the teachers' beliefs about her own abilities to directly affect student academic performance (Ashton & Webb, 1986; Gibson & Dembo, 1984). Teacher efficacy and

how it can be shifted presents valuable considerations when creating professional development

trainings for teachers of any content. Empirical studies have shown that many professional

development initiatives appear ineffective in supporting changes in teacher practices and student

learning (Darling-Hammond et al., 2017). Darling-Hammond and McLaughlin (1995) suggest

that this may be due to professional development incorporating hierarchical or top-down

approaches wherein the teacher does not have the valuable opportunity to reflect, collaborate, or

connect new concepts and strategies to their own unique contexts; all of which are necessary

aspects in deeply shifting teaching practices and yielding sustainable change (Clarke and

Hollingsworth, 2002; Danielowich, 2012; Darling-Hammond et al., 2017). Although some

studies showed that education or training can change teachers' beliefs and their educational

practice, only a few studies investigated the interplay between these factors in early childhood

education (Perren et al., 2017).

Early years teachers have the ability to set the foundation to promote children's

development and learning despite the challenges. Professional development is considered to be

an important factor in fostering developmentally appropriate educational practice in early

education settings (Sheridan, Edwards, Marvin, & Knoche, 2009), however, consensus on what

professional development means in early years education has not been reached (Buysse, Winton,

& Russ, 2009). Also, even when professional development for early years teachers is provided, it

rarely aligns with what is considered best practice to limited job-embedded supports and

feedback to promote sustained use of evidence-based practices (Pianta, Barnett, Burchinal, &

Thornburg, 2009). This may be especially true if the expert's approach is top-down and does not

consider context or teacher experience (Yoo, 2016). Since the content of instruction targeted in

early years professional learning has primarily focused on language and literacy, expanding the

content to other domains may be necessary to improve teacher knowledge and efficacy (Schachter, 2015). Hence, a socio-cultural approach (Gee, 2008), where the four themes in professional learning are considered: teacher self-reflection, collaboration, consideration for social and culture contexts and value in teachers learning experiences (Rohlwing and Spelman, 2014), may create the opportunity for teacher learning that leads to greater understanding regarding CCP and how that can foster PSSD in students.

Empirical studies have shown that the effect of professional development on general teacher efficacy has not shown much growth or movement (Crowther & Cannon, 2002; Fritz, Miller-Heyl, Kretzer & MacPhee, 1995; Posnanski, 2002), however, other studies are in contrast to this conclusion as they show how the length of professional development can impact TSE. For example, a study by Ross and Bruce (2008) stands in contrast to these results as they found that certain kinds of professional development can affect teacher overall self-efficacy if presented for over a period of more than two months. JohnBull and colleagues (2013) conducted research corroborating the findings that both personal and general teacher efficacy can be increased by including knowledge from the learning sciences and extending training over a period of several months. They examined teacher self-efficacy using the Teacher Efficacy Scale (Gibson & Dembo, 1984). This scale divides efficacy into personal efficacy and teaching efficacy. These findings are critical because they show that the researcher must consider length when aspiring for professional development to positively effect overall TSE. Although these findings are encouraging and teachers who receive training increased their self-efficacy more than teachers who do not have access, it should be noted that, as JohnBull and colleagues (2013) argued, the effects of professional trainings on TSE are still underdeveloped.

In this chapter, professional development programs that apply collaborative peer coaching frameworks interlaced with reflection and those that focus on TSE as well as the rationale for the professional development content knowledge are explored. Exploring such programs helped to inform the design of a pedagogical development program wherein early years teachers will reflect and collaborate with one another to create lesson plans that align with CCP and that foster PSSD.

Embedded Professional Learning

Over the last three decades, classroom embedded professional learning has come to be more widely recognized (National Comprehensive Center for Teacher Quality, 2010), and refers to deep-rooted teacher learning within day-to-day teaching practice that is constructed through experience of sustained iterative cycles of goal setting, planning, practicing and reflecting (Sankaran, Dick, Passfield, & Swepson, 2001), with the intent to positively affect student learning (Darling-Hammond & McLaughlin, 1995; Hirsh, 2009). A three-year mixed-methods study utilizing the convergence model by Bruce, Esmonde, Ross, Dookie and Beatty (2010) explore the relationship between classroom-embedded teacher professional learning (PL) for mathematics teaching, TSE, and student achievement in two contrasting districts in Canada with 200 teachers and 1000 students. A closer look at the qualitative data revealed that "two of the most clearly beneficial aspects of the PL activity were the context-embedded experiences during the research lessons that occurred in the classrooms, and the conversations that occurred between colleagues as they shared examples of student work" (p. 1603). The concept of embedded professional learning aligns with Vygotsky's (1978) situated learning perspective because teachers are making new connections within the context of authentic teacher learning experiences (Webster-Wright, 2009). This study illustrated that sustained professional learning

programs that are collaborative and classroom-embedded support effective professional learning that leads to student achievement gains and related gains in teaching quality. Although studies on embedded professional learning are limited, they have potential empirical implications for understanding the role of context when they are applied in a non-Western Arab Bedouin context. Therefore, context embedded professional learning will be heavily considered as it may influence TSE, early years learners, and CCP as needed for PSSD. Moving away from traditional teacher professional development to models of collaborative knowledge and sharing is recommended as one way to bring professional learning to the classroom (Darling-Hammond & McLaughlin, 1995).

Collaboration

The definition of collaboration has been expressed in multiple ways across many different fields. In Montiel-Overall (2005), collaboration is defined as the process in which two or more individuals with individually unique skills come together to construct an understanding that neither is able to yield on their own. Hargreaves and Fullan (2012) describe the culture of collaboration as "not pressure cookers of guilt and perfectionism, but slow-boiling pots that allow vulnerabilities to be voiced and doubts to be articulated" (p. 114). Although the definition of collaboration differs across fields, in education it has been identified as an important feature of a school culture, a process that fosters professional development, teacher satisfaction, teacher effectiveness, and student achievement (Clement & Vandenberghe, 2000; Cowley & Meehan, 2001; Huffman & Kalnin, 2003). Collaborative professional learning for teachers is defined as any occasion where a teacher works with or talks to another teacher to improve their own or others' understanding of any pedagogical issue (Duncombe & Armour, 2004). A collaborative environment mirrors teachers working together to examine and question their own practices,

reflect on outcomes, and share their personal learning journeys with others to improve their general practice (Mitchell & Sackney, 2009). Within the process of collaboration, teachers learn together by engaging in reflective, problem-solving activities. This model of collaborative professional learning has been described as a *growth in practice* model (Lieberman & Miller, 1999). One important gain of collaboration is that it may provide teachers with opportunities to feel safe in deepening and expanding their understanding of curriculum and pedagogy (Chassels & Melville, 2009).

The needs assessment discussed in chapter two showed that Emirati early years teachers' confidence in their ability to promote PSSD depended on their previous educational training. A collaborative inquiry process where teachers can learn from one another in a non-threatening and familiar environment can begin the process of social persuasion (Bandura, 1977), and thus effecting TSE (Tschannen-Moran & Hoy, 2001). It becomes critical that teachers work together and then reflect on their personal journeys with one another as part of teacher growth and change (Clarke & Hollingsworth, 2002; Coleman, 2011). Furthermore, the teachers' shift in self-efficacy as described in Bruce and colleagues (2010) and curriculum as described in Chassels and Melville (2009) is relevant to the mapping of pedagogy and PSSD as a co-construction with potential to lead the UAE to 21st century educational practice and its aspirations of becoming a knowledge-based economy.

Lesson Study

As research cited above indicated, collegiality and TSE are correlated, and they predict student achievement (Edward, Greens, & Lyons, 2002; Taylor & Tashaddori, 1995). York-Barr, Ghere and Sommerson (2007) posit that teachers who collaborate are more likely to change behaviors and try new practices compared to teachers who are in isolation. *Lesson Study* is a type

of peer collaboration mainly used in elementary teachers' professional development originally adopted in Japan. It is usually carried out by a group of 3-5 teachers who collect data on teaching and learning and collaboratively analyze it.

In a collective case study methodology examined by Puncher and Taylor (2006), teachers reported a positive effect of lesson study on teacher self-efficacy in an environment where engagement and incorporation of critical thinking skills were present. Data collection involved participant observation, interviews, and collection of documents. Collection of documents included: (a) responses from teachers to the feedback given by researchers, (b) reports prepared by the groups and by their advisors after the lesson study, and (c) audio transcripts of the debriefing sessions. The two variables that effected TSE were observations of other teachers' performance and positive feedback from colleagues. This is what Bandura (1977) refers to as vicarious experiences and social persuasion.

Puncher and Taylor (2006) collaborated with 17 teachers from five groups from public rural elementary pre-kindergarten through eighth grade in southern Illinois. The groups contained four elementary school teachers, most of whom had little or no prior experience with teacher lesson study. The groups carried out two lesson studies from March to May, and one from September to November the same year. Teachers met once a week (two hours per meeting) for two to three months after school to plan a single lesson that they then taught by the end of the semester. Their advisor attended the meetings as well as the teaching of the lesson and the debriefing session immediately following. The experiences of two teacher groups and their lesson study are explored in the study and the study revealed how TSE changes as the teachers discover through planning and working together, the effect they can have on their students.

Despite the positive effect of collaboration on both teachers and learners, Puncher and Taylor (2016) as well as Ostovar-Nameghi and Sheikhahmad (2016) warn that collaboration should not be hierarchically imposed on teachers as it may be perceived as a threat to professional autonomy. For example, demanding teachers to collaborate disturbs their right to work in isolation and can result only in forced friendliness rather than a true collaborative culture. To facilitate teachers' cooperation and allow them to exchange support, feedback, and assistance in a reciprocal and non-intimidating understanding (Ackland, 1991), teachers can collaborate through what is called peer coaching.

The study by Puncher and Taylor (2016) is particularly relevant when exploring solutions to improve early years teachers' self-efficacy regarding their ability to shift teacher-centered practice to child-centered practice in order to promote PSSD. First it will offer a possible channel to navigate with the aim of avoiding outside researchers presenting a directive from higher administration. And it offers a way to avoid outsider training by people they do not know and cannot relate to. The next section will further explore another type of collaborative professional development practice that takes these factors into account, teacher peer-coaching.

Teacher Peer-Coaching

Huston & Weaver (2008) define teacher peer-coaching as a formative, collegial process whereby pairs of teachers voluntarily work together to improve or expand their approaches to teaching. Other researchers used a teacher peer-coaching practice to encourage collaboration and shift TSE (Bruce & Ross, 2008; Kohler, Ezell, & Paluselli,1999; Licklider, 1995), which then influenced teaching practice (JohnBull et al., 2013; Slater & Simmons, 2001). This professional development model aligns with the sociocultural perspective of learning, which states that learning occurs through social interaction (Vygotsky, 1978). In this context, interaction refers to

51

more than just participation with others; it refers to a deeper process of active engagement in and reflection on new learning, which is predicted to lead to a change in a teacher's frames of reference. Furthermore, allowing teachers to volunteer is a necessary component. Individuals feel secure when they are given autonomy, and the teacher peer-coaching model provides a space wherein those individuals can share their experience, allowing for a safe and confidential opportunity to question assumptions and practices (Berstein, Johnson, & Smith, 2000).

Joyce and Showers (2002) posit that peer coaching is a process in which teachers work collaboratively to solve problems and answer questions pertaining to the implementation of innovations. A teacher peer-coaching study by Bruce and Ross (2008) oriented around mathematics teaching which included 12 teachers from grades three to six. Due to the small sample size, the effect size was not statistically significant. The six-month long qualitative study examined the capacity peer coaching practices and teacher beliefs to have an effect on student learning. Data sources included classroom observations, teacher self-assessments, interviews, and field notes. The study implemented a two-pronged approach where teachers participated in PD sessions on mathematical pedagogy and peer coaching training. The teachers then had an opportunity to peer coach three times. Research questions included: 1) Did the treatment have an effect on teacher practice? 2) Which elements of the treatment had the greatest impact on teachers' instructional practice and beliefs about their capacity? 3) Was the treatment implemented? Participants observed their peer teaching mathematics, gave feedback, received feedback from their partners on their own teaching, helped their peers set teaching goals, and were then given support in creating their own goals. The ultimate goal of the study was to examine the effect peer coaching had on mathematics teaching practices and teacher beliefs. Data was analyzed using a two-level qualitative coding strategy and showed that (a) the

professional development had positive effects on TSE, (b) teachers changed their practice, and (c) peer coaching caused participants to reflect more explicitly. However, a study that same year by Murray, Ma and Mazur (2009) examined peer coaching and its effect on students' mathematics achievement (K-12) using a mixed method design and revealed no evidence of improvement in mathematics achievement in students whose teachers participated in peer coaching. The experimental design consisted of six teachers (with 202 students) receiving peer coaching and five teachers (105) students in the control group. Qualitative data collected included a teacher survey to measure teachers' perceptions and a pre- and post-test quantitative measure to explore the relation between peer coaching and student achievement. Although these results are contradictory, Sparks and Bruder (1987) note that for studies to show student improvement is affected by peer coaching, more than one year is necessary for such improvement to occur.

Due to some success of the teacher peer-coaching model, other schools and teachers have implemented peer coaching with early years learners with the aim of better meeting the needs of students in developing math skills. In a study by Rudd, Lambert, Satterwhite and Smith (2009), the researchers' primary objective was to study to what degree teacher peer-coaching following training improves the level of implementation of the usage of math mediated language usage in an early years' space. Twelve teachers participated in an experimental design (with no control group) consisting of professional development followed by a two-week coaching period. The data collected for this study included a demographic survey and an Observational Coding Matrix specifically developed for the study. The results indicated a 56% increase of math-mediated language following professional development; however, the greatest increase, which was 39% over the professional development phase, occurred over the coaching phase of the study. These

quantitative aggregated data results support previous studies showing that strategies presented in professional development can be enhanced when followed up by teacher peer-coaching on the use of new strategies. The use of descriptive statistics yielded quite positive results, however, visual analyses of single-subject data are quite convoluted. Therefore, the analysis of data is a limitation to this study.

Overall, Bruce and Ross's (2008) article is relevant to this study's problem of practice, i.e. Emirati early years teachers (EEYTs) lack of knowledge on how to foster PSSD. It demonstrates that teachers can successfully share, collaborate, reflect, and learn. It also demonstrates that teacher peer-coaching models can lead to changes in teachers' self-efficacy. This latter point is relevant to the problem explored in this study: How do Emirati early years teachers' self-efficacy effect their ability to foster PSSD in their students?

The peer-coaching process. The peer coaching team process involves: (a) consultation to identify the focus of the coaching, (b) classroom observation by the coach, and (c) debriefing session where the coach shares his or her observations. Some teams may not use classroom observation, but instead review instructional materials or grading practices (Chism, 1999; Millis, 1999).

Also, Galbraith and Anstrom (1995) described four different working models for teacher peer-coaching pairs to employ: (a) technical coaching, (b) collegial coaching, (c) challenge coaching, and (d) team coaching. Technical coaching refers to the support given when teachers transfer from in-service training to classroom practice. This model of teacher peer-coaching promotes collegiality and sharing of professional dialogue. Collegial coaching addresses growth of the desired goal through application of teacher learning. The coach collects data on the desired goal and suggests strategies that would help realize the desired goal. Challenge coaching refers

to reaching a goal through the application of future learning by key stakeholders in the building. This may include the librarian, teachers' assistants, academic vice principal, etc. All stakeholders participate in the resolution as a team. Team coaching refers to a combination of peer coaching and team teaching. The relationship in team coaching is very close because the teacher and coach plan, teach, and evaluate each other as partners. Coaches must be seen as peers, otherwise they may be perceived as evaluators rather than collaborators. For this early years context, technical coaching would take precedence because teachers will support each other through collegiality and sharing of professional dialogue. This would allow teachers an opportunity to experience social persuasion and vicarious experiences, which were described by Hoy (2000) as being the two major factors that shape TSE.

Teacher peer-coaching advantages. Teacher peer-coaching is applicable to the researcher's context because it allows for collegiality in a safe space with familiar people. First, research has identified peer coaching as a contributing factor to increases TSE, specifically through social persuasion and vicarious experience (Bruce & Ross, 2008; Kohler et al., 1999; Licklider, 1995). Furthermore, as mentioned earlier, increased TSE positively effects student learning (Ashton & Webb, 1986; Gibson & Dembo, 1984). Another benefit of peer coaching includes ongoing support from experienced faculty to engage in problem-based, contextualized opportunities for reflecting on teaching and learning (Licklider, 1995; Huston & Weaver, 2008). Licklider (1995) explained that teachers may have developed a deeper level of reflection because they were asked to give a colleague feedback, which may cause the observer to think about the techniques and appropriate usage in a different way or at deeper level than could have been reached by receiving feedback. This suggests that when teaching a concept, one must understand it more thoroughly in order to explain it than if only needing it for one's own understanding.

Moreover, peer coaching accommodates effective problem solving by giving full control of the process to the participating teachers (Daley, 2000; Huston & Weaver, 2008). Another important benefit of peer coaching is that it requires very little financial investment. Hence, cost of teacher release time can be reduced, especially if organized planning coincides with already scheduled teacher planning times (Bruce & Ross, 2008).

The goal of this integrated model is to enhance teacher practice through vicarious experiences and social persuasion leading to an influence in TSE for instructional strategies and, thus, a change in pedagogical practice. It uses a collaborative approach with teachers interacting with each other as they work towards making decisions that improve or reconstruct their professional knowledge in order to increase their capacity for adopting strategies that foster PSSD for their own students. One of the goals in mapping of CCP is to allow teachers an opportunity to understand how they can promote PSSD so that they can support their government and nation, who aspire to become a knowledge-based economy. A collaborative approach may appeal to Emirati teachers as they are a communally-minded community. To meet this goal the next section reviews several models of teacher peer-coaching in greater depth with the aim of identifying the optimal strategy for implementation of one which is effective and most appropriate for the research context.

Best practices of teacher peer-coaching. Although success has been achieved in all four models of peer coaching mentioned in the previous sections, Galbraith and Anstrom (1995) posit that successful coaching programs can only be created in an environment where there is trust, support, and a feeling of safety to experiment, fail, reflect, question, help, modify, and attempt again. In order to successfully implement a peer coaching program that supports in building a community of teaching experts, teachers will need to allow: (a) a complete pre-observation

56

meeting, (b) classroom observations, (c) data collection, (d) data analysis, (e) a post-meeting, and (f) the creation of an observation criteria. Unlike traditional evaluations that yield judgements, coaching consists of assistance and professional support that includes trust, and to facilitate trust, teachers should be able to choose their coaches. Kinsella (1993) explains that supportive instructional leaders are a necessary component of a teacher peer-coaching success.

To this end, for this context of intervention, EEYTs will be given the opportunity to choose their coaches as a channel to allow for the best outcomes. Also, the supportive instructional leader will be the instructor in the study, who is the researcher and KG trained in CCP. The steps mentioned above will be carried out in the intervention to allow for the best outcome possible.

Teacher peer-coaching disadvantages. While there are clear findings of the advantages of teacher peer-coaching, there is limited substantive data regarding the effectiveness of peer coaching (Weaver & Huston, 2008). Peer coaching has not been found to be universally successful. For example, some teachers have been found to have difficulty with the specific communication skills needed for peer coaching (Perkins, 1998). Another challenge may arise in finding dates and times when all coaches could gather for workshops (Huston & Weaver, 2008). Bruce and Ross (2008) explain that teacher peer-coaching may be ineffective if the process is not aligned to the school improvement plan. They also address their concern by explaining how peer coaching models can be expensive in terms of release time for teachers to observe one another (Bruce & Ross, 2008). Another important component addressed is that for some teachers, initial reaction to peer coaching is reduced confidence, which may rebound over time with extended coaching cycles (Bruce & Ross, 2008). Although there are some disadvantages to teacher peer-coaching, the benefits of increased student achievement appear to be promising.

To remedy the disadvantages of teacher peer-coaching in the early years space, the researcher has checked with the executive sponsor about the school improvement plan (SIP). It has been noted that a recommendation was made in 2016 to allow students more opportunities for problem solving (Irtiqa, 2016); therefore, finding a solution to the improvement of PSSD in the early years space is an ongoing part of the SIP. Another important variable associated with teacher change and growth (Clarke & Hollingsworth, 2002), reflection, will be discussed.

Reflection

Researchers continue to provide more details about reflection, a crucial variable in supporting change-orientated (Clarke & Hollingsworth, 2002; Guskey, 2002), teacher-driven professional learning (Darling-Hammond et al., 2017; Desimone & Garet, 2015). Reflection is defined as an active and deliberative cognitive process, encompassing sequences of interconnected ideas which account for underlying beliefs and knowledge (Hatton & Smith, 1995), which when practiced supports the development of a teacher (McAlpine, Wetson, Beauchamp, Wiseman & Beauchamp, 2000). Reflective thinking usually addresses practical problems, allowing for uncertainty and confusion before a possible solution is reached (Hatton & Smith, 1995). For teachers, reflection is a purposeful active thought process that slows teachers' decision-making process (Rodgers, 2002), identifies their intentions and actions, and draws on context-based knowledge to foster change in their practice (Danielowich, 2012). According to Harste, Leland, Schmidt, Vasquez, and Ociepka (2004) teachers who can theoretically justify their actions are more successful in making change in their classrooms. Thus, change occurs when thoughts and beliefs about teaching and learning are examined closely, and changes are made to implement new beliefs to improve practice. According to Mohamed (2011), reflective skills can be acquired gradually through maintaining a teaching journal, recording lessons,

58

obtaining feedback through peer observation and through obtaining feedback from the teacher's journal which acts as a reflection forum. Given that the underlying factors to the problem of practice discussed in chapter one showed that Emirati teachers lack reflective practice in both pre-service (Hourani, 2013) and in-service contexts (Clarke & Otaky, 2006), a reflective inquiry process as described by Mohammed (2011) is relevant to the mapping of TSE and pedagogy change. UAE's educational system, which is mainly teacher centered (Jackson, 2015), has been a source of frustration for policy makers who are aspiring to shepherd the process of the UAE becoming a knowledge-based economy. Although reflection is not a general practice in the UAE educational circles as described in chapter one, reflection is generally accepted elsewhere as an essential practice for growth of teacher practice and developing effective teachers (Clarke & Hollingsworth, 2002; Cimer, Cimer and Vekli, 2013). Thus, reflective thinking is one skill that can help teachers change, grow, and learn to be more successful with students. The reflection process is important to consider when thinking about pedagogy and the implications it has on student achievement related to PSSD.

Pedagogy Knowledge & Teacher Self-Efficacy

Content courses designed to support a teacher's development of content knowledge and pedagogy can be a valuable way to increase levels of self-efficacy (Swackhamer, Koellner, Basile, and Kimbrough, 2009). Content courses that also focus on how to teach the content have been successful in raising pre-service teachers' efficacy levels (Appleton, 1995; Palmer, 2001). Additionally, Pierro (2015) found that TSE and teacher beliefs play salient roles in science and math education with in-service teachers. These findings showed that teacher knowledge or understanding can have an impact on TSE. The importance of this extends to my context because the chapter two needs assessment revealed that lack of sufficient knowledge was a factor

59

associated with low TSE for fostering PSSD in teachers' teaching. Moreover, JohnBull and

colleagues (2013) investigated whether in-service teachers' levels of personal efficacy and/or

general efficacy changed as a result of completing courses in mathematics and/or science that

integrated content with pedagogy. In this study, 88 teachers completed the Science Teaching

Efficacy Belief Instrument (STEBI-B), a survey based on Bandura's self-efficacy theory and as

developed by Riggs and Enochs (1990), before and after course content delivery. Results showed

that increasing the level of content knowledge and demonstrating teaching methods appropriate

for conveying this message to a diverse group of students contributed to an increase in the levels

of general efficacy. Their research corroborated the finding that both personal and general

teacher efficacy can be increased with learning science knowledge when training extends over a

period of several months. The study is different in that it was not domain (math, science, or

English) specific, rather it was teaching methods specific. Although most PDs are domain-

specific and designed for the purpose of supporting teachers in changing their efficacy beliefs,

this intervention will not focus on subject domains but rather on teaching pedagogy, traditional

versus child-centered.

Pedagogy - Child Centered

Pedagogy may be important to consider in the mapping process as teachers begin thinking

about how they can shift their practice from teacher centered to child centered. As discussed in

chapter one, in the early years, a child-centered teaching approach is important for fostering

problem-solving skill development. A child-centered learning environment is defined through

three subscales: (a) child participation, (b) child as an active learner (AL), and (c) learning

environment (LE) (Perren et al., 2017). The subscale, child participation, is described as a child

who is seen as an individual, with unique characteristics and value. When a teacher implements

this subscale successfully, she or he takes time to attend to the child in the environment and addresses the child's concerns with care. The child as an active learner subscale describes to the extent to which the teacher allows the child to explore and interact with the environment. The teacher will be seen as allowing the child autonomy in decision making, thus providing the opportunity for the child to overcome challenges and problems presented in the classroom environment and allowing space for the child to resolve these challenges or problems. The learning environment subscale recognizes the importance of a stimulating and engaging environment for enabling a student to act and behave as an autonomous individual within that environment. The teacher is responsible for providing appropriate learning resources and motivating children to use them. Hence, taken together these subscales align with problem-solving skill development which can be fostered in an environment that is child centered. For this intervention, the Brain-Targeted Teaching (BTT) model (Hardiman, 2012) is proposed as a practical pedagogical framework that may foster problem-solving skill development. The next section will describe the BTT model and its connection to a CCP.

Brain-Targeted Teaching Model

The Brain-Targeted Teaching (BTT) model (Hardiman, 2012) may be a useful framework for this intervention study because it is a teaching approach that aims to lead students not only to mastery of content knowledge but also to application of knowledge that leads to solving problems in a creative way, a tenet of 21st century skills (see Table 3.1). The BTT model is a practical six target framework that guides teachers in planning academic environments, units of study, and lessons plans that are grounded in evidence-based practice. The BTT model comprises six stages of the teaching and learning process and they are as follows: 1) establishing the emotional climate for learning, 2) creating the physical learning environment, 3) designing the

learning experience, 4) teaching for mastery, content, skills, and concepts 5) teaching for the extension and application of knowledge-creativity and innovation in education, and 6) evaluating learning (Hardiman, 2012, p. 28).

Brain-target one establishes the emotional climate for learning and recall the first subscale of CCP (Perren et al., 2017), child participation, explained as a child who is seen as an individual, with unique characteristics and value. When a teacher implements this subscale (child participation) successfully, she or he takes time to attend to the child in the environment and addresses the child's concerns with care. In practice, this would like a teacher who can identify each child as an individual and with this comes the careful recognition and attention to emotions. In an extensive analysis of literature, Shonkoff and Phillips (2000) emphasize the importance of secure emotional relationships with caring adults in emotional regulation and development of children. This aligns with the BTT model, which regards establishing the emotional climate as a first target (Hardiman, 2012). Instructional strategies in this target promote positive, joyful and a purposeful climate for the learner. In the early year's classroom, this may be seen as a problem posed with an emotional connection to subject matter. This, in turn, can make learning more meaningful and memorable. This is important because positive emotion has been shown to advance student learning outcomes (Hardiman, 2012; Pekrun, 2006). Moreover, the child as an active learner subscale describes the extent to which the teacher allows the child to explore and interact with the environment. In the BTT model this is emphasized in target two and five. Target two describes how students are encouraged to move around and engage in learning tasks that may influence their attention. Part two of this subscale describes the teacher as allowing the child autonomy in decision making, allowing the opportunity for the child to overcome challenges, and allowing space for the child to solve problems. This is a core concept of BTT five, which

explains the importance of application of learning to real-world problem-solving tasks. These tasks that are meaningful to learners and are situated in what the learners understand. Brain target five focuses on instructional practices that foster divergent thinking and problem solving. The third subscale of a child-centered learning environment is the physical environment. It describes to what extent the teacher creates a stimulating and engaging environment with appropriate learning resources and motivates children to use them. This subscale also addresses brain target two, the physical environment and its importance to learning. This target engages the learner in self-directed movement and a desire to move, which is natural for children to develop in the early years space.

Table 3. 1

Brain Target Connection to Child-Centered Pedagogy and Problem- Solving Skills Development

Subscale	Brain Target	Description
Child participation- a child who is seen as an individual, with unique characteristics and value. The teacher is seen as attending to the child's concerns with care.	Brain target one- regards establishing the emotional climate as the first target. Positive emotion has been shown to advance student learning outcomes.	In fostering problem-solving skills development this subscale and target emphasize the importance of emotional relationships to child development.
Child as active learner- describes to the extent to which the teacher allows the child to explore and interact with the environment. Teacher will be seen as allowing autonomy in decision making and allowing space for the child to resolve challenges and problems.	Brain target one- autonomy (choice) in content is associated with increased levels of motivation and achievement. Brain target two-students are encourages to move around and engage in learning tasks that may influence their attention. Brain target five- core concept of this target is the application of learning to real-world problem solving, creativity, and innovation. Brain target six- emphasizes the importance of choice in assessment taking which may allow for deeper thinking.	An example of fostering problem-solving skills development is in allowing students autonomy in decision making, solving problems creativity and innovatively.
Learning environment- recognized the importance of a stimulating and engaging environment for enabling a student to act and behave as an autonomous individual. The teacher is responsible for providing learning resources and motivating children to use them.	Brain target two- emphasizes the importance of the physical environment. Engages the learner in self-directed movement and desire to move, which is natural for children to develop in the early years space.	In fostering problem-solving skills development, the teacher would be seen as creating an environment where autonomy is expended and availability of resources that stimulate thinking are utilized efficiently.

Furthermore, early years education research is grounded in developmental psychology and the learning sciences (Copple & Bredekamp, 2009). And the Brain-Targeted Teaching model aligns with the current research surrounding early years education based on the Developmentally Appropriate Practices (DAP) developed through the National Association for the Education of Young Children (NAEYC). The goals of NAEYC includes systems and strategies that enhance and promote children's optimal learning and development. Holding true for EEYTs that are aspiring to find their optimum effectiveness, the BTT model is a rationale choice for early years curriculum development as it is based upon a sociocultural perspective of learning in which learning occurs through social participation (Vygotsky, 1978). Also, curriculum decision-making rests well within the sociocultural theory as it allows for consideration of young learners' cultural experiences (Gee, 2008). Hence, through developing CCP within a unique cultural context such as that of this study, opportunity to promote children's optimal learning may be achieved.

Though not student driven, the BTT model is a practical framework that allows for teachers to consider and address each target while keeping the focus of teacher's attention on students. The BTT model synthesizes relevant research into a comprehensive but flexible interconnected pedagogical framework that can be used for effective practices in early childhood (Hardiman, 2012), across diverse contexts. For the community of teachers in this study, however, certain challenges will need to be overcome.

The most critical challenge will be motivating teachers to adopt this practice, as their understanding of good teaching is often viewed as *controlling the students* in the classroom through teacher-centered pedagogy. However, this may not be such an issue with the design of the BTT pedagogical framework (Hardiman, 2012), and through exposure to vicarious experiences and social persuasion, as described by Bandura (1977). Giving teachers the

opportunity to gain knowledge in effective teaching practices (BTT model) and engage in positive social experiences is expected to contribute to enhancement of their TSE, which will then influence their future teaching practice in a positive way.

Summary and Proposed Intervention

This review of literature outlined how change in beliefs and practices, TSE, may offer potential changes for teachers to implement CCP as needed to foster PSSD in the early years space through a collaborative professional development model interlaced with reflection. It further reviewed potential research on the implementation of teacher professional development programs and those that targeted the learning sciences as well as those that used context specific teacher peer-coaching frameworks. The potential interventions were studied carefully for their usefulness to inform a solution to the source of the EEYT's pedagogy problem of practice: the lack of knowledge on how to foster CCP as needed to foster problem-solving skills in early learners. In light of this chapter's literature review and the cause of the problem, the two-fold proposed solution to this problem is a pedagogical development program interlaced with reflection wherein EEYTs collaborate with a researcher to experience a BTT-based (Hardiman, 2012) pedagogical training and then co-construct lesson plans that align to the BTT pedagogical framework within a peer coaching model.

As discussed earlier, although most PDs are domain-specific (math, science, and English) and designed to support teachers in changing their efficacy, JohnBull et al. (2013) found that both personal and general teacher efficacy can be increased with knowledge from the learning sciences, and the BTT model (Hardiman, 2012). Since the focus of my content is specific to knowledge on effective pedagogy, the BTT model is a rationale choice.

66

Emirati teachers will collaborate through teacher peer-coaching, in which they will observe and guide one another in the transfer of BTT knowledge to child-centered instruction as needed for PSSD. Teacher peer-coaching to build collegiality and sharing of professional dialogue is essential as Emirati policy makers are urging for a shift from teacher-centered pedagogy to CCP. To change teachers' perceptions of CCP as needed for fostering PSSD in early years, understanding TSE is a necessary step in understanding the manner in which their perceived self-efficacy for fostering PSSD may have an immediate effect on their formulated ideas of CCP.

According to the research mentioned above, a pedagogical framework rooted in the learning sciences followed by teacher peer-coaching where teacher professional development is examined through the teacher efficacy theory is acknowledged as the most practical solution to improving students' PSSD. As depicted in Figure 3.1, teacher training and knowledge influences teachers' pedagogy choice (Perren et al., 2017). However, without adequate knowledge of how to foster CCP as needed for problem-solving skill development, the proper development of early years learners is problematic.
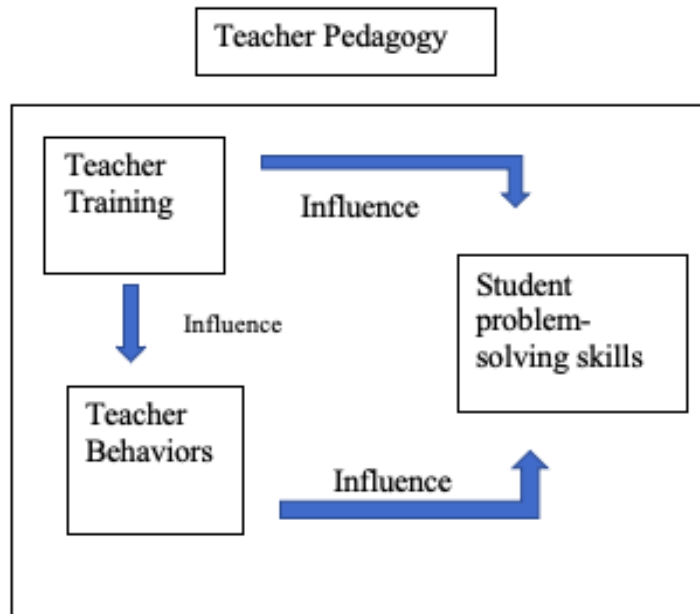
Figure 3. 1. Teacher pedagogy and its influence on student problem-solving skills. Teacher trainings influence teacher behaviors and student problem-solving skills to determine a teacher's effect on learning (Perren et al., 2017).

To resolve this setback, Figure 3.2 shows the process of how teachers need to gain knowledge in the learning sciences, such as applying the BTT pedagogy, to understand how to foster CCP as needed for PSSD in early years. Hence, the exploration of teachers' knowledge and education level of PSSD was needed. The teachers' training/knowledge influences TSE, which then influences teachers' pedagogy choices, thus influencing student behavior in the classroom (Ashton & Webb, 1986). In this context, this training may influence students' PSSD.
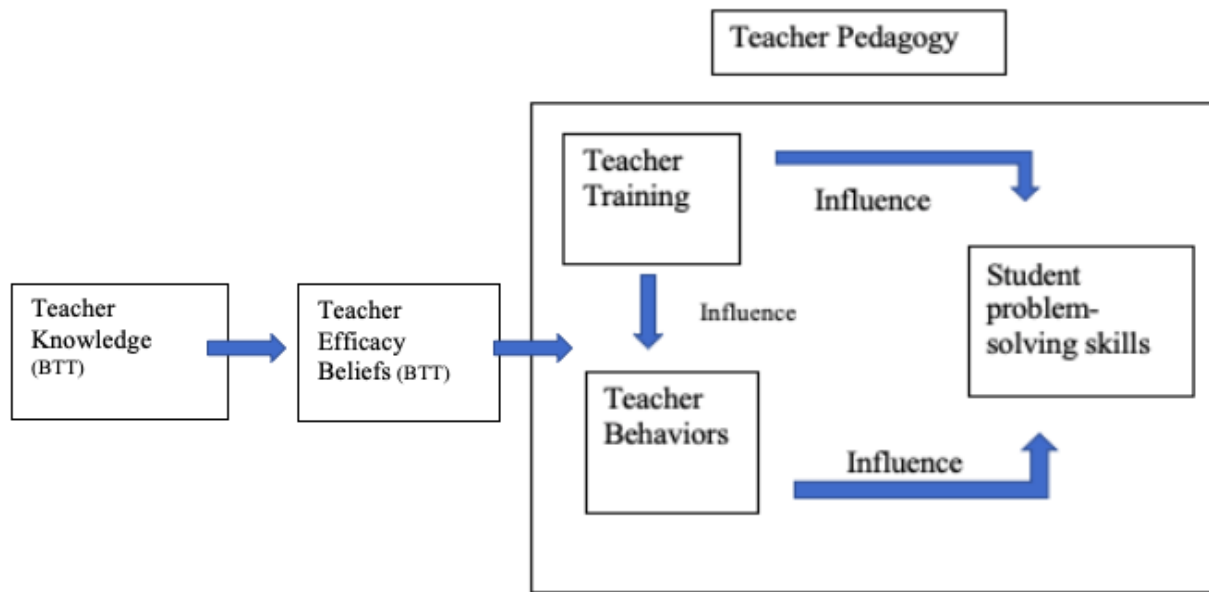
Figure 3. 2. The steps by which knowledge and TSE influence teacher pedagogy. First, knowledge influences TSE, which then influences how teachers instruct in the classroom, which then influences students' PSSD.

Teacher knowledge can be influenced by the BTT model and teacher peer-coaching practices (Joyce & Showers, 2002), and the increase in knowledge may lead to change in TSE (JohnBull et al., 2013), which then influences teacher practice (Ashton & Webb, 1986), and in turn, may influence student PSSD. Hence, the knowledge in the BTT model and teacher peer-coaching practice may increase teachers' self-efficacy towards CCP as needed for fostering PSSD. Furthermore, examining CCP as a construct related to TSE (Perren et al., 2017) may support teachers in creating a better educational system (Developmentally Appropriate Practices, 1986) for the UAE. Figure 3.3 outlines the complete concept map for this study.
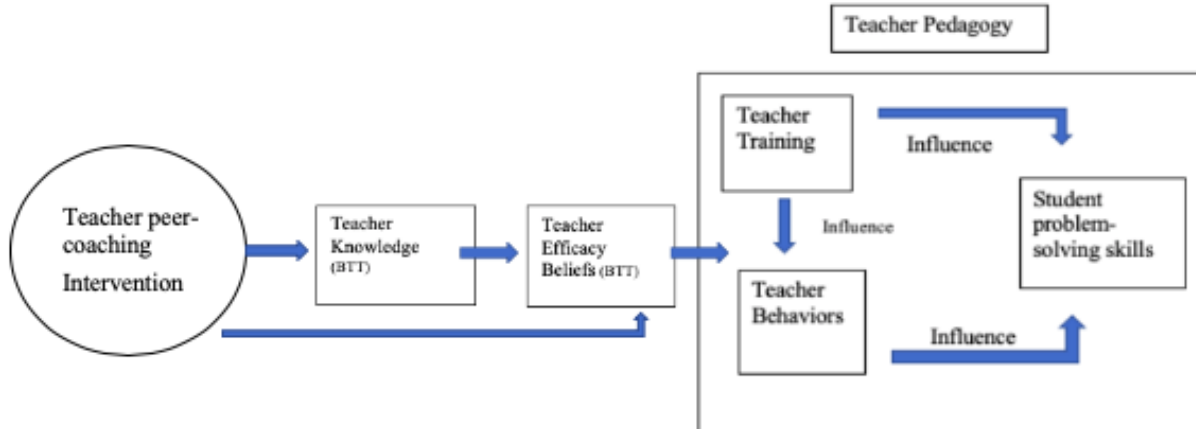
Figure 3. 3. The concept map of the two-fold pedagogical program rooted in collaboration and interlaced with reflection is guided by the teacher efficacy theory and reflects a potential solution to the Emirati teacher pedagogy problem of practice. The BTT knowledge can influence TSE (JohnBull et al., 2013) and teacher peer-coaching will influence teacher self-efficacy (Joyce & Showers, 2002). A change in TSE will change teacher classroom behavior, which, in turn, will influence their instruction, ultimately influencing early year learners' PSSD.

In conclusion, the connection between Emirati teacher training and CCP as needed for PSSD allows for an opportunity in empirical research for the UAE early years' education context. The dearth of research specific to EEYTs and PSSD makes this exploration of professional development research more worthwhile and important.

Chapter 4

Intervention Procedure and Program Evaluation Methodology

A review of the intervention literature and results of the needs assessment revealed that some early years education teachers are limited in their ability to foster child-centered pedagogy (CCP) as needed for problem-solving skills development (PSSD). The early years teachers that participated in the needs assessment discussed that they had limited access to pre-service and in-service training opportunities to prepare them to become more effective in PSSD, however, they welcome the opportunity to become more effective early years teachers. Based on the needs assessment results and literature supporting these findings, a component of the intervention was designed to apply the BTT framework (Hardiman, 2012) in a professional development program interlaced with reflection aimed at increasing teachers' pedagogy content knowledge as needed for PSSD teaching self-efficacy. Additionally, peer coaching provided space for teachers to observe and model instructional planning, delivery, and data analysis. Early years teachers will need professional development to develop their capacity in child-centered instruction because they will have the responsibility of writing lesson plans aligned to the BTT model. The intervention design is based on: (a) the relationship between perceived TSE and behavioral changes (Bandura, 1977), (b) research on effective professional development (Darling-Hammond et al., 2017; Desimone & Garet, 2015), (c) evidence that peer coaching is a form of high-quality professional development (Bruce & Ross, 2008), and (d) that pedagogical content knowledge grounded in the learning sciences has a positive effect on teachers' self-efficacy (JohnBull et al., 2013).

Through an online format of pedagogical professional development and peer coaching over two months, the early years intervention focused on lesson design and delivery aligned to each of

six BTT targets (Hardiman, 2012). The researcher predicts that delivering a BTT-based professional development will provide a practical pedagogical framework for the early years teachers to strengthen their understanding of pedagogical content knowledge aligned to child-centered instruction as needed for PSSD. In chapter three, the researcher explained that the features of the brain targets align with Perren's et al. (2017) definition of CCP and that a combination of the BTT model target one, two, and five combined, lend to a child-centered environment needed to foster PSSD. Moreover, peer coaching will provide an opportunity for participating teachers to apply new learning and to focus on designing lessons that are child-centered and effectively promote problem-solving skills. The early years intervention will include four early years teachers whose experience range from 18 to 24 years, from one public kindergarten school. The sections that follow include an overview of the intervention, purpose of study, research design, and methodology.

Intervention Framework

The early years intervention design was based on a conceptual plan (Figure 4.1) proposing that professional development using the BTT framework and participation in peer coaching interlaced with reflection would lead to both potential changes in TSE and improved instructional practice. TSE and instructional practices have a reciprocal relationship whereby TSE and instructional practice influence each other. This conceptual plan was supported by the research literature regarding: (a) teacher self-efficacy (TSE) (Ashton & Webb, 1986), (b) effective professional development implementation practices (Desimone et al., 2002; Guskey, 2002), (c) reflection (Clarke & Hollingsworth, 2002), (d) peer coaching (Bruce & Ross, 2008), and (e) Hardiman's (2012) research regarding the BTT pedagogical framework. The intervention design was focused on developing early years teachers' pedagogical content knowledge to

72

increase teachers' ability to foster problem-solving skills by offering opportunities to learn

pedagogical content knowledge aligned to CCP, to participate in dialogue and reflection about

effective instructional design strategies, and to share early years learners progress to help

increase teachers' self-efficacy in fostering PSSD. With this design plan, the researcher, who was

also the instructor, will herein be referred to as the researcher, engaged with participants in a

learning community that aimed to influence teacher change through what Desimone et al. (2002)

referred to as a collegial relationship embedded with active learning, coherence, duration,

voluntary participation, and activities focused on shifting teachers' knowledge towards child-

centered instruction through a BTT pedagogical framework.

Figure 4. 1.

Intervention Conceptual Framework
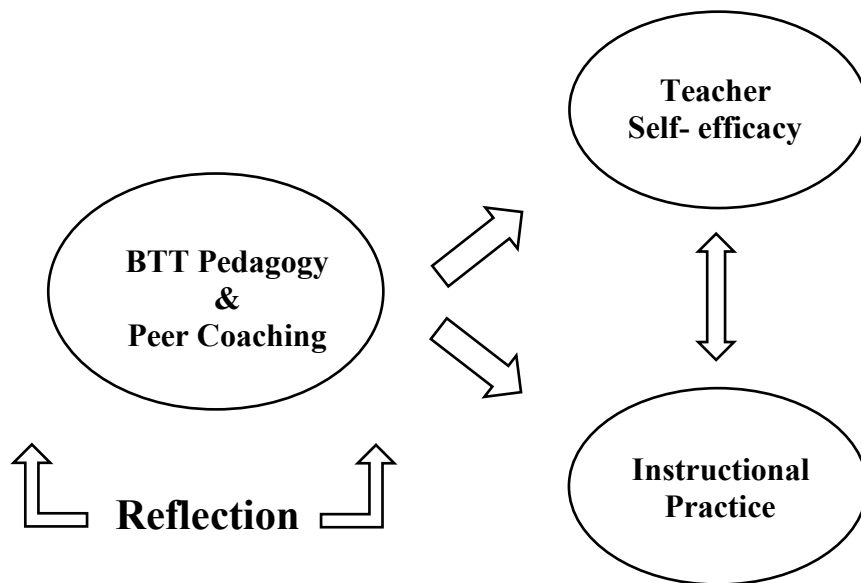
Bruce and Ross (2008) have found peer coaching to be globally successful. Teacher peer-

coaching is defined as a formative, collegial process whereby pairs of teachers voluntarily work

together to improve or expand their approaches to teaching (Huston & Weaver, 2008). Peer

coaching provides teachers with guidance for how to engage deeply and influence self-judgements in multiple ways (Kohler et al., 1999; Licklider, 1995). Peers are often best able to direct teachers' attention to specific dimensions of practice and levels of goal attainment and also to influence teachers' practice by attempting particular strategies simultaneously (Bruce & Ross, 2008), allowing for a safe and confidential opportunity to question assumptions and practices (McLymont & da Costa, 1998). Although many forms of professional learning through peer coaching have been applied (Galbraith & Anstrom, 1995), researchers believe "that the conceptual framework of the model embodies content focus, active learning, coherence, and collective participation in ways that meaningfully bolster teacher's capacity and increase student learning" (Desimone & Pak, 2017, p. 5). This framework offered early years teachers the opportunity and space to engage in reflection and professional discourse with their peers, develop a solid understanding of pedagogical content, and design lessons that would translate curriculum standards into aligned child-centered instruction for early years learners.

Purpose of the Study

The purpose of this study was to explore (a) changes in EEYT's perceptions of self-efficacy for instructional strategies, (b) EEYT's experiences with the BTT pedagogical framework for child-centered instruction, (c) EEYT's experiences with peer coaching when using the BTT model to plan instructional design, and (d) EEYT's experiences through reflection during the CEYPD. Research questions in this study included the following:

RQ 1: To what extent is there a change in EEYT self-efficacy scores for instructional strategies after participation in the CEYPD?

RQ 2: What were EEYT's experiences with pedagogical content knowledge during the CEYPD?

RQ 3: What were the EEYT's experiences with collaboration during the CEYPD when using the BTT model?

RQ 4: What were the EEYT's experiences with reflection during the CEYPD when using the BTT model?

RQ 5: How has the implementation of the study adhered to or differed from the proposed implementation procedures?

Research Design

Pragmatism was the overarching philosophical theoretical framework that guided the outcome evaluation of the research design (Creswell & Plano Clark, 2011). Pragmatism is a philosophical partner for mixed method research and offers the best opportunity for answering essential research questions (Johnson & Onwuegbuzie, 2004). "A key feature of mixed methods research is its methodical pluralism or eclecticism, which frequently results in superior research, compared to monomethod research" (Johnson & Onwuegbuzie, 2004, p. 14). Accordingly, guided by the research questions (Onwuegbuzie & Leech, 2006), the research design for the intervention study was a mixed methods convergent design (Creswell & Clark, 2011). The intent of the convergent design was to obtain different but complementary data on the same intervention in order to give the researcher a complete understanding of the problem. Creswell and Plano-Clark (2017) describe this type of design as a concurrent collection of qualitative and quantitative data that are analyzed separately then merged together. This design was chosen because it allows for equal value from both the qualitative and quantitative in answering the research questions. The research design, convergent, matches the research questions because with the convergent design data, validation is possible when the results from the open-ended questions are used to confirm or validate the results from the closed-ended. This design was

preferred over the mixed method sequential design because the intent of the research was not for the qualitative and quantitative data to depend on each other; for example, the qualitative interview will not be informed by the results from the quantitative data. The independent variables in the matrix are professional development and teacher peer-coaching.

The intervention addressed the need for early years' teachers in Sunshine public kindergarten (which enrolls approximately 300 students in the United Arab Emirates) to receive professional development and peer coaching. Ideally, participants would become knowledgeable in pedagogy that is aligned to CCP through the six BTT targets (Hardiman, 2012). Therefore, a one-group pre-and post-test design (TSES, 2001) was implemented to determine this intervention's effectiveness (Shadish, Cook, & Campbell, 2002). Outcomes were measured on the same targets prior to participation and following an appropriate amount of professional development and teacher peer-coaching for the effects to be determined. This design allowed the researcher to compare score changes pre- and post- intervention efficacy and knowledge ratings as a means of determining the intervention's effect. The intervention was conducted during the 2020-2021 school year and included four voluntary, early years Emirati research participants who represented a non-random sample of the greater district early years teachers' population. Although the data collection method addressed the research questions, the data collection method will not allow for definitive conclusions to be drawn (Shadish, Cook, & Campbell, 2002).

Figure 4. 2

Logic Model

			Outcomes		
Inputs	**Participants/Activities**	**Outputs**	*short-term*	*medium-term*	*long-term*
-Early years Emirati teachers (Tt) at the school -professional development (PD) Online with technology and internet -SLT support for meeting time for PDs and time for teachers to plan lessons built into the master school schedule -time for the teachers to meet with researcher-instructor (R-I) for debriefing -instructional, theoretical, and empirical resources to inform design and development of activities and materials based on Hardiman's (2012) pedagogical framework on the BTT model: target the domain of child-centered pedagogy - collaboration & reflection among peer teachers/ peer teacher coaching (Robbins, 1991)	-Public school principal (PSP) allow for up to n = 4 Tt (2 pairs) for Tt peer coaching (PC) -Teacher (Tt) will voluntarily consent to attend intervention workshops and trainings -early years child (3yrs 9mnths – 5yrs 6mnths) -Tt engage in learning and activities related to brain targeted teaching model (BTT)- targets and how this can be realized in the classroom through child-centered pedagogy (six consecutive wks of PD 90 mins each) -Tt will engage in (1 session) learning about peer-coaching techniques and benefits of collaboration/reflection (one PD- 90mins each) - R-I develops child centered learning materials + instruction tailored for child (Cc) cultural background and Tt experiences - Tt will meet with R-I to receive support with PC debriefing with a focus on reflection (1 session)- 60 minutes each) -R-I documents BTT- related instructional processes + reflections on teacher to child-centered modifications	- Tt develops the ability to engage in BTT model related to *lesson plans* for future application of child-centered pedagogy -BTT activities + materials to develop skills that target child-centered learning, tailored for Cc level (play) -Process + outcome measures (self-efficacy) and materials that inform and support PD training on child-centered learning using the BTT pedagogical framework, specifically target fostering problem-solving skills -Tt documents reflection/weekly reports prompt at the end of each PD session and PC debriefing (total of 12 qualitative responses from each)	- Tt increased knowledge and understanding of effective early years pedagogical content (BTT model + PC collaboration and reflection) increases Tt self-efficacy in child-centered pedagogy	- Increase in Tt awareness and understanding of the use of the BTT model - instruction to foster problem - solving skills development in early years learners and their instruction from didactic teacher pedagogy to child-centered pedagogy	-Increase in Tt application of BTT instruction principles to facilitate an environment that fosters play as a way to effect child problem-solving skills achievement, and to change their own instruction from didatic teaching to child-centered
Assumptions	Tt PC may positively effect Tt self-efficacy intermediate stage because of teacher peer-coaching features of collaboration and reflection.				
External Factors	Overcoming challenges of Tt PC, time and scheduling. Some Tt may not be novices to the BTT pedagogical model or child-centered pedagogy. Tt may not attend voluntary PD session, and may be those who do attend will not apply BTT- to their teaching				

Process Evaluation

Conceptualizing fidelity within the context of this study and in accordance with the ministry of education (MOE) began with the alignment between the proposed professional development and the logic model as presented in figure 4.2 above. Process evaluation was an avenue for asking how factors of interest relate to how an intervention is both implemented and received, which can provide valuable insights into external and internal evaluation validity (Baranowski & Stables, 2009). Implementation fidelity is the degree to which a program was implemented as designed (Dusenbury et al., 2003). The four components of process evaluation that were examined in this intervention are participant responsiveness, project implementation, context within the component of fidelity of implementation, and dose.

Participant responsiveness. Participant responsiveness refers to the degree that the participants were actively engaged and participated in the activities for the intervention (Dusenbury et al., 2003). Effective participation was determined by the participants' participation and engagement. Engaged participation was reflected by the teachers' application of targets as artifacts, videos, voice notes (total of six), developed *lesson plans* (total of three) for their application of components of the BTT model aligned to CCP. Teachers' personal reflection to prompts after PD and teacher peer-coaching debriefing (total of 12 qualitative responses each) were used as an indicator of engagement. A researcher's journal was used by the researcher as it monitors fidelity of implementation (Banks-Wallace, 2008), and is critical in case study research (Baxter & Jack, 2008). Hence, both qualitative and quantitative aspects related to this component were measured. These indicators (seven PDs, 90mins) were aligned to the logic model and, if implemented at high fidelity, will lead to the outcomes of the TOT.

Project implementation. Fidelity can be described as the extent to which an intervention was delivered as it was intended to be implemented (Nelson, Cordray, Hulleman, Darrow, & Sommer, 2012). Assuring fidelity was important to this intervention due to the numerous challenges associated with Arab-Bedouin culture and its surrounding misconceptions about child-centered practice (Hourani, 2011). The major challenges associated with similar PDs require that programs delivered include culturally appropriate content knowledge, language translation, planning time, and ensuring that teachers are aware of the best practices related to various teacher-peer coaching techniques. The goals of the implementation included: (a) at least four out of 10 teachers participate in the PDs, (b) seven out of the seven topics be covered, and (c) all the PD sessions be delivered with high quality as determined through observation. The researcher's data sources which align to the matrix and logic model, included: (a) qualitative PD online attendance forms with implementation checklists and observation notes, (b) implementation artifacts such as lesson plans (three), and (c) presentation slides. The indicators (number of teachers and topic covered) were aligned to the logic model and if implemented correctly will lead to the outcomes in the TOT.

Context. Consideration of context was a useful component of process evaluation (Fitzpatrick, 2012). Context is the aspect of the environment within which the intervention functions (Baranowski & Stables, 2000). Context is the site, location, environment, population, and culture of participants of this intervention and its evaluation. The population for this study is early years Emirati teachers (who are female), who live in the United Arab Emirates and work in the public-school system. The ethnic background is predominately Emirati from diverse socioeconomic status and the medium of instruction for the Emirati teachers is Arabic. Fitzpatrick (2012) stresses the importance of being responsive to local needs of the participants

79

by increasing their knowledge and enhancing their control over the program. An example of such responsiveness was learning the language and values of the participants. Context was measured using qualitative and quantitative sources. Surveys, reflections, lesson plans and presentation slides were all translated into Arabic. A semi-structured exit interview also provided opportunities for participants to speak about their experiences in the intervention in regard to enhancements related to language and culture, and this was designed to provide a sense of validation for the participant. This component aligned with both the logic model and TOT, represented in Appendix C. These indicators were components of the logic model and were implemented at high fidelity which led to the outcomes in the TOT.

Dose. Another component of implementation fidelity that was examined in the implementation of the intervention was dose (Dusenbury et al., 2003). Dose was a component of implementation fidelity assessment that evaluated both the amount of intended program content delivered and the amount received by participants (Dusenbury et al., 2003). The data collection tool, which was quantitative (attendance record), was used at all six PD sessions and one peer coaching session (see Appendix D). Dose aligns with the TOT and logic model because the specific number of PDs was mentioned. These components specify that all four participants completed seven, 90-minute development sessions. The logic model included the necessary components for implementing the intervention with fidelity.

Outcome Evaluation

The 13-week intervention was designed to enhance the capacity of voluntary participants to design child-centered lessons that align to the BTT goals and objectives and to share best practice in the implementation of BTT pedagogy. The intervention consisted of two components: (a) online pedagogy professional development, and (b) online teacher peer-coaching. BTT

pedagogy (six sessions) and peer coaching (one session) professional development included weekly, online professional learning sessions from October to December. The teacher peer-coaching included the opportunity for participants to receive six, one-on-one online coaching, where the participants coached one another in sessions as a follow-up to the 7-week online professional learning sessions from December to February.

Strengths and Limitations of Design

There were several threats to validity in this intervention study design. The external validity threats included the absence of a comparison group and the sample size of participants. The absence of a comparison group meant that the study's results cannot be generalizable to other contexts. Shadish and colleagues (2002) posited that if outcomes could be compared to a control group, external validity of the results would increase. Therefore, in order to establish generalizability, the sample size would have needed to be approximately tripled compared to the current sample size (Faul, Erdfelder, Lang, & Buchner, 2007). The study population sample consisted of four early years Emirati teachers who were full time at Sunshine KG public school in the United Arab Emirates. Although this sample size was by default based on the fact that the school only has 14 full time teachers and on geographical location, a larger sample size was most likely needed for transferability.

Furthermore, an internal validity threat included the 13-week PD and teacher peer-coaching intervention. This was a limitation because it did not follow the Darling-Hammond et al. (2017) recommendation for effective PD designs for sustained job-embedded professional learning opportunities. Future research on this intervention should occur over a longer period of time such as an entire school year. Although the researcher has seen short term change, future

research could focus on some of the long-term objectives presented in the logic model (see Figure 4.2).

A strength of the chosen design was that the design as well as data collection instruments had high validity and reliability if implemented with fidelity. The convergent mixed-method design allowed for integration of subjective and objective knowledge in order to understand phenomena that neither the quantitative nor the qualitative measures could have done alone (Creswell & Plano Clark, 2011), thus providing a more complete understanding of data obtained by each. Therefore, the design facilitated triangulation of the data (Creswell & Plano Clark, 2011) by directly comparing and contrasting quantitative results with qualitative results. Also, following recommendations by Shadish et al. (2002), threats to validity were avoided by including data collection instruments that had high validity and reliability if implemented with fidelity. A valid measure was the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001), which was used as the pre- and post-intervention measurement. The survey is used frequently in research involving TSE and co-teaching (Gray, 2009) and is a valid and reliable measure of TSE (Tschannen-Moran & Hoy, 2001).

Effect Size

According to Lipsey et al. (2002), effect size from interventions that share common characteristics and are executed under comparable conditions offer an empirical base that can be valuable for quantifying the effectiveness of a particular intervention. Effect size is simply a way of quantifying the size of the difference between two groups. While the 155 participants needed to reach sufficient power to detect the preferred minimally detectable effect of 0.2 in this intervention was unattainable and would limit what the researcher would need to know to answer my research questions, examining the qualitative data supported an understanding of the

82

phenomena. Other empirical research on professional development studies with external validity using control groups and treatment groups on TSE, teacher knowledge, and instructional practice range from .19 to .80 (Ross & Bruce, 2007; JohnBull et al., 2013). If the intervention study accepted the higher end of the minimally detectable effect size found in Ross and Bruce's (2007) study of .5, then the sample size required for my intervention should have been approximately 26 participants. However, since this study did not have a control group, the ability to reach a statistically valid conclusion was not possible.

Method

The context of this mixed methods study was a public kindergarten school in the UAE that served approximately 300 students in KG 1 and KG 2. This section outlines the participants, measures, and the procedures of this proposed study.

Participants

The four research participants in this study were recruited from Sunshine public kindergarten school in the United Arab Emirates during the COVID-19 pandemic, October 2020. To avoid participant coercion, the executive sponsor announced an online Microsoft Teams meeting via messaging communication- WhatsApp on my behalf. Although the researcher was previously an English Head of Faculty at Sunshine KG (2017), the researcher was not the line manager for these participants and was no longer an employee at this building since October 2018. At the online Microsoft Teams meeting, the researcher informed the teachers about the intervention study through reading a recruitment script in Arabic. The commonality of language and religion allowed for a shared rapport with the participants. The consent form and survey were delivered via WhatsApp to participants who met the study eligibility requirements. Participant eligibility requirement included: (a) being a full-time Emirati KG public school

83

teacher at Sunshine KG, and (b) being a participant of the needs assessment, both survey and interview. Four surveys were handed out and four were returned. The four participants came from an ethnic background that was predominately Emirati from diverse socio-economic statuses and had early years teaching experience ranging from 18 to over 24 years. These teachers were chosen for recruitment because the 2016 inspection report was from this school. Additionally, the lack of experience in problem-solving skill development training revealed in the needs assessment was also a cause of concern and indicated that professional development and peer coaching was a reasonable action to take.

Instruments

Five instruments were used to collect data in this study. The first was the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001) legally translated to Arabic. The second data collection tool were author-constructed questions for the semi-structured interview (Gibson & Dembo, 1984; Tschannen-Moran et al., 1998). The third data collection instrument were weekly reports completed by the participants (Bruce & Ross, 2008; Villa, Thousand, Nevin, 2004). The fourth data collection instrument was the reflection sheets completed by the teachers. Reflection sheets have been used in research previously to establish fidelity of implementation (O'Donnell, 2008). The fifth data collection instrument was the researcher's journal which allowed the researcher to record information about the context of specific discussions throughout the intervention. It allowed the researcher to monitor the fidelity of implementation and fostered the development of research (Banks-Wallace, 2008).

Teachers' sense of efficacy scale. The Teachers' Sense of Efficacy Scale was used at the pre- and post- intervention (TSES; Tschannen-Moran & Hoy, 2001). This efficacy scale is a valid and reliable survey for measuring TSE (Tschannen-Moran & Hoy, 2001). The TSES

84

consisted of three dimensions of teacher efficacy: efficacy for instructional strategies, efficacy for collecting information on student engagement, and efficacy for student management. The TSE scale is more aligned with CCP than other efficacy measures (Gibson & Dembo, 1984) because its questions do not relate to grades or tests. Finally, this measure has been used in a research study on peer coaching and efficacy showing the effect of non-evaluative collaborative peer coaching as compared to traditional administrator evaluations and its influence on teacher's perceptions of their own self-efficacy (Murphy, 2012). The TSE survey can be found in the Appendix E.

Interviews. One-on-one interview questions consisted of seven questions (see Appendix F). These interviews provided the opportunity for the researcher to go deeper into each participants' perspective and experience regarding the BTT model, instructional design and PSSD. Specifically, the researcher was interested in gaining a richer and more detailed understanding of how pedagogy as learned during their intervention training influenced their teaching self-efficacy (Gibson & Dembo, 1984; Tschannen-Moran et al., 1998). The first five questions focused on questions pertaining to teaching, professional development experiences or expectations, and teaching self-efficacy. In the interview teachers were asked questions such as, "What were your expectations regarding PSSD when you first began remote teaching after training?" and "How have your beliefs about your ability to use BTT instructional practices to develop early years learners' problem-solving skills changed as a result of this professional develop session?" The last two questions pertained to process evaluation and asked about teachers' comfort level with the language of the material presented.

Weekly reports. The research participants were asked to use Microsoft forms to submit a weekly report about how long they spent on collaboratively planning and peer coaching (see

Appendix G). To be completed by the peer that is taking on the role of the coach (total of three). The two section 17-question survey was adapted from "A model for increasing reform implementation and teacher efficacy: teacher peer-coaching in grade 3 and 6 mathematics" by Bruce and Ross (2008) and Villa and colleagues (2004), "Are we really co-teachers?" This measure was considered an acceptable measure for evaluating partnership in teaching (Cramer & Nevin, 2006). For section two, the researcher used the term peer coaching instead of co-teaching as peer coaching implies one teacher will be teaching while the other is observing. The question, "Which co-teaching model will you use this week?" was replaced with, "Which BTT targets will you use this week?" These reports helped the researcher adjust the peer coaching sessions to best meet the needs of the research participants while simultaneously allowing the researcher to monitor fidelity within the peer coaching pair.

Reflection sheets. Fidelity of implementation (O'Donnell, 2008) was measured through participant reflections. One of the reflection sheets was used after each PD session and the other at the end of each peer coaching session (when the teacher is not taking on the role of the peer coach). The PD reflection sheet consisted of four questions. For example, was the PD session effective? Why or why not? These questions allowed the researcher to measure fidelity of implementation through the reflection sheets as well as provide data for research question three. The PD reflection sheets can be located in the Appendix H. At the end of a peer coaching session, the researcher asked, for example, "Over the past few weeks, how do you think your mindset has changed about teaching and learning? Why do you think this happened?" The connection to a coaching session may be, "How do you think you will apply what we discussed today?" (see Appendix I).

Researcher's journal. After every PD session, the researcher took notes to document the PD process and whether it was implemented with fidelity. The notes were read before the next PD session to inform the next PD session and address any questions that needed clarification or further explanation. The researcher also took notes of the peer coaching debriefing sessions. The researcher's journal was chosen as a measurement tool because it allowed the researcher to monitor the fidelity of implementation (Banks-Wallace, 2008).

Procedure

In this section, a summary matrix (see Table 4.3) is presented to highlight the alignment between the research questions, measures used to operationalize constructs of interest, data collection, and data analysis methods. The intervention timeline is included in Table 4.1. Also, professional development activities, the peer coaching component, and complete descriptions of the data collection and analysis methods are included for the qualitative and quantitative measures.

Early years intervention. The intervention delivered in the Arabic language, took place over a 13-week period. It consisted of two components: (a) professional development in the BTT framework, and (b) teacher peer-coaching. BTT professional development included online weekly sessions from October to December. Peer coaching included opportunities for two participants to complete peer coaching sessions for collaborative lesson planning for problem-solving skill development using the BTT model as follow-up to the professional development sessions from December to February. The intervention design was provided as a way for the participants to collaborate as they planned lessons that aligned to the BTT model aligned to child-centered instruction to support problem-solving skill development in early years learners. The section below (Table 4.1) describes the BTT professional development and peer coaching.

87

Table 4. 1

Intervention Timeline

Component	Timeframe	Duration	Activity
PD Session 1	October 2020	90 minutes	BT One
PD Session 2	October 2020	90 minutes	BT Two
PD Session 3	October 2020	90 minutes	BT Three
PD Session 4	October 2020	90 minutes	BT Four
PD Session 5	November 2020	90 minutes	BT Five
PD Session 6	November 2020	90 minutes	BT Six
PD Session 7	November 2020	90 minutes	Introduction to Peer Coaching
Peer Coaching	On-going December 2020-February 2021	40-minute sessions	Paired- Peer Coaching (Six Sessions)

Note. PD = Professional Development; BTT = Brain-targeted (Hardiman, 2012).

Contemporary Emirati Early Years Professional Development (CEYPD)

The BTT-based professional development consisted of six component identified in the table above. The first component laid the foundation for the importance of the work that took place for the six professional development sessions. Participants were introduced to the professional development learning goals, objectives, and resources for each session (see Appendix J). The TSE pre-intervention assessment was also included in the first session.

Sessions two through six followed the same sequence as target one. Each session consisted of an overview of the target and activities where participants discussed and completed application-related questions on each target. Teachers were asked to discuss how to teach or prepare the environment for each target and included lesson development to translate the target into aligned instruction for early years learners. The four teachers completed a reflection exercise

88

via Microsoft Forms and throughout the week teachers showed evidence through artifacts, voice notes, and videos of how they applied this target in their online classrooms (see Appendix K).

Professional development session one. Session one began with the introduction/overview of the six important domains or "brain targets" of the teaching and learning process and a survey about how much teachers knew about the topics included in the BTT pedagogical framework (Hardiman, 2012). The study began with a PowerPoint presentation of Brain-Target One, which was an exploration of the interconnection of emotions and learning. The presentation provided research from the brain sciences and explained how the neural systems underlying emotion influence attention, memory, and higher-order thinking. Teachers engaged in activities through the Mentimeter interactive presentation platform (see Appendix L) and were asked questions such as: How can teachers create a positive/emotional climate? What are factors that create a negative climate in the classroom and what are the consequences of that climate? As a group, we discussed that emotion, cognition, and behavior are interdependent as described by Immordino-Yang, Darling-Hammond and Chrone (2018) and that each component exerts a powerful influence on the others. Teachers were given a sample template showing how to apply a practical strategy to help students reflect on their emotions with the intent to achieve best performance (see Appendix M). Teachers completed a reflection exercise via Microsoft Forms to describe their current practices, thoughts, views about the BTT instructional design, and experiences with collaboration.

Professional development session two. Session two comprised a close look at how to create a physical environment that encourages attention and engagement in learning. The session began with a PowerPoint presentation of Brain-Target Two, which focused on how the classroom environment can be designed to help students stay engaged, attentive, and interested

in learning. As discussed in chapter one, in the early childhood years, a child-centered teaching approach is important for fostering problem-solving skill development. Perren et al. (2017) defines a child-centered learning environment through three subscales, one of which is the learning environment. The learning environment subscale recognizes the importance of a stimulating and engaging environment for enabling a student to act and behave as an autonomous individual within that environment. For instance, a teacher would be seen as responsible for providing appropriate learning resources and motivating children to use them. And so, in fostering PSSD, the teacher would be seen as creating an environment where autonomy is encouraged and the availability of resources that stimulate thinking are utilized efficiently. Approximately 30 minutes of the session was devoted to helping teachers understand why this is an important target for learning. Through the Padlet platform (see Appendix L), teachers engaged in discussions around: 1) How can the environment help learning? 2) How can the teacher balance novelty and consistency in the classroom? 3) What elements of the physical environment block learning? 4) What sensory conditions in the classroom can foster attention and inattention? In helping the teachers map out how the environment effects learning, an emphasis was placed on autonomy, movement, and resources. Moreover, the session ended with the importance that "when the outside surroundings are varied, information is enriched and retention of content is improved" (Hardiman, 2017, p. 61). Retention of content is important because it paves the way for development of higher order thinking skills. In closing, the four participants completed a reflection exercise via Microsoft Forms.

Professional development session three. The purpose of session three was to develop the teachers' deep understanding of brain target three: guiding learning by providing students with a broader view or "big picture". This target helps to promote an understanding of the connections

between prior knowledge and new learning and shows the relationships among learning goals (Hardiman, 2012). To demonstrate the idea of the big picture and the importance of it, teachers engaged in an activity through Mentimeter where they had to look at a list of words for less than a minute and then write down all the words they remember (teachers possibly wrote a word that was not on the list). And in doing so, this activity is intended to help teachers understand that the brain processes global thinking. In citing Caine and Caine (2002), Hardiman (2012) explains that for the brain to create new knowledge, it undergoes a process called patterning, whereby the brain's neural systems organize new information according to categories or concepts that are already familiar. Hence, prior knowledge acts as a filter that establishes meaning. This is beneficial as "the common elements in different pieces of information helps us to categorize content, remember information more effectively, comprehend concepts more deeply, and solve problems more efficiently" (Hardiman, 2012, p. 82). As a major component of the application of this target, teachers participated in completing a concept map on the Nearpod platform (see Appendix L) on the theme they were currently teaching. In closing, the four participants completed a reflection exercise via Microsoft Forms.

Professional development session four. The purpose of session four was to develop and further strengthen teaching for mastery, skills, and concepts. This target is built upon the notion that the importance of mastery of knowledge is necessary promoting mastery helps students learn how to apply knowledge in creative ways in real-world problem-solving tasks (Hardiman, 2012). A quote from Noble prize winner, Eric Kandel's book, *In Search of Memory* was presented to teachers which said, "If you remember anything in this book it is because your brain is slightly different after you have finished reading it" (p. 276). Next, a PowerPoint was presented on examining ways students acquire and retain information with a focus on the arts and how it can

serve as a channel for learning and memory as it provides opportunities for learners to actively engage with material and apply ideas in both unique and different ways. A guided question on Mentimeter included, name variety of activities that if repeated will allow for mastery of the learning objective? This question guided a discussion about developing students' skills through activities in the arts that support mastery. In closing, the four participants completed a reflection exercise via Microsoft Forms.

Professional development session five. The purpose of session five was to develop participants' understanding of teaching for extension and application of knowledge. Session five featured a PowerPoint with topics that covered: comparison, classifications, divergent thinking, creative application of content, analysis and synthesis, analogies, cause and effect, investigations, experiments, and lastly, problem-solving using real world contexts. To build upon checking on teachers' emotional well-being while allowing room for creativity, the session began with the question, describe how you feel using an object and explain why you chose that object? Teachers also completed an activity on analogies through Whiteboard.fi (see Appendix L). Teachers were reminded of the importance of building habits where they create learning goals with the frame sentence: "Students will apply their knowledge of… by…". In closing, the four participants completed a reflection exercise via Microsoft Forms.

Professional development session six. Session six provided teachers an opportunity to develop a deep understanding of how to evaluate learning- the final element of the BTT model. Teachers were introduced to the effectiveness of appropriate evaluation and that students should be evaluated at all stages of the learning process. "Evaluation in various forms should be happening during every phase of the teaching and learning process in order to . . . continually improve instruction" (Hardiman, 2012, p. 145). At the beginning of the session, (as a review

92

from the previous session) teachers were asked to explain a problem they faced this week and how they approached solving it. As a group, we discussed the importance of the problem-solving process, starting with the importance of understanding the problem, planning a solution, experimenting the solution, and then knowing if it worked. Next, participants were introduced to the PowerPoint presentation on evaluating learning. The purpose of evaluation, which is to enhance learning, was explored. Teachers discussed how evaluations should happen during every phase of the learning process and how providing feedback informs this learning process. Teachers were introduced to the benefits of portfolio assessments, which are collections of students work that track progress over time. In early years, this is a strong tool to effectively evaluate and demonstrate learning. Using rubrics to evaluate a performance assessment project (designing a plan of action to solve a real-world problem) was discussed by teachers as a current best practice. To apply the learning, teachers were encouraged to create a rubric and share it with their students. The four participants completed a reflection exercise via Microsoft Forms. Furthermore, teachers were sent an electronic copy of all PowerPoints and links via email. In addition, practical application strategies for each target (PowerPoint presentation) were sent via email for all participants.

Professional development session seven. The purpose of session seven was to develop teachers' understanding of the peer coaching process from Pam Robbins (1991), *How to implement a peer coaching program*. The guidelines of the peer coaching process were presented and included:

1) Teachers should choose whether or not to participate in coaching.

2) Because most teachers' only experience in having another adult in the classroom has been in an evaluative capacity, it was clarified that . . .

93

3) Peer coaching has nothing to do with evaluation. It is observation-based and specific.

4) The coach collects only the specific data that the inviting teacher has requested.

5) The inviting teacher ultimately decides what to do with the data.

6) Peer coaching is professional, not social dialogue. It is focused on teaching and its consequences.

7) Interaction is collegial not competitive.

8) It is characterized by a stance of equality. The coach is working just as hard as the teacher does in the teaching role.

9) Coaching is supportive rather than evaluative.

10) The coach's function is to ask questions that encourage the teacher to reflect, analyze, and plan.

11) Interactions between the coach and the inviting teacher should be confidential (builds trust).

The focus of the online sessions should change to meet the needs of the inviting teacher. The coach as collaborator weekly report and the peer coaching reflection template links on Microsoft Forms were delivered via email and WhatsApp. The teachers were asked to complete the forms after each peer coaching session. Further details of the peer coaching process can be found in Appendix N.

Peer coaching. The peer coaching component of the intervention was conducted on a one-to-one basis via a Microsoft Teams online platform from December to February. Teachers had an opportunity to engage in peer coaching (Bruce & Ross, 2008) for six sessions, which meant that each teacher was the peer coach three times. The peer team collaborated and helped each other set teaching goals and created lesson plans. Participants observed their peer implementing the

lesson plans aligned to the BTT model via Microsoft Teams, took notes, and allowed an opportunity for the peer model to read the notes and self-reflect on her own teaching. Probing questions from the researcher and self-assessment was chosen to facilitate reflection between teachers because these strategies have been shown to be effective in promoting reflection and ultimately teacher change (Clarke & Hollingsworth, 2002). The peer team debriefed, and then the other peer modeled the next lesson. The goal was to examine the influence of peer coaching had on the development of child-centered teaching practices in order to promote acquisition of problem-solving skills in early years learners.

Data Collection

Data collection for this study included both qualitative and quantitative sources. Data was collected using five methods: (a) surveys, (b) interviews, (c) weekly reports, (d) reflection sheets, and (e) researcher's journal. A timeline of the data collection can be seen in Table 4.2.

Table 4. 2

Mixed-Methods Data Collection Timeline

Research Question	Timeline	Description
Pre-survey	October 2020	Research participants will take an e-survey before the beginning of session one PD.
Weekly Reports	October 2020 to February 2021	Research participants will be prompted to submit weekly reports via Microsoft Forms.
Reflection Sheet	October 2020 to February 2021	Research participants will complete a reflection sheet after each PD session and peer coaching session via Microsoft Forms.
Researcher's Journal	On-going October 2020 to February 2021	The researcher will take notes during PD sessions.
Post-survey	February 2021	Research participants will take an e-survey.
Interviews	February-March 2021	The researcher will conduct a one-on-one interview with each teacher

Surveys. The Teachers' Sense of Efficacy Scale (TSES), legally translated in Arabic, was delivered via an online platform (WhatsApp), pre- and post- intervention (October 2020 and February 2021).

Weekly reports. The research participants completed weekly reports through Microsoft Forms, a survey tool, which was sent out to teachers. The teachers submitted the form at least one day after the peer coaching session.

Reflection sheet. The Microsoft Forms reflection sheets were given to the research participants at the end of each PD session and at the first peer coaching meeting. The participants were asked to complete the reflections at the end of each PD session and at the end of the peer coaching sessions (for the peer who is not the coach at the session).

Researcher's journal. The researcher took notes in the researcher's journal during the PD sessions. The researchers journal was used to measure the fidelity of implementation for the intervention. The researcher used the notes to prepare and inform the following PD sessions by clarifying or expanding on targets presented.

Interviews. One-on-one interviews were conducted in February-March 2021 via an online platform (Microsoft Teams). Interviews were audio recorded and transcribed.

Data Analysis

The data analysis section consists of the quantitative and qualitative coding and statistical tests that were used during the intervention. The tests were used in response to the research questions (Creswell & Clark, 2011). The table below outlines the research questions, measures, constructs, and analysis.

Table 4. 3

Summary Matrix

Research Question	Measure	Constructs	Analysis
RQ1: To what extent is there a change in EEYT's self-efficacy scores for instructional strategies after participation in the CEYPD?	TSES Survey (Tschannen-Moran & Hoy, 2001)	Teacher self-efficacy	Descriptive statistics, paired sample t-test
RQ2: What were EEYT's experiences with pedagogical content knowledge during the CEYPD?	Interview, Researcher's journal, reflection sheets, weekly reports	Pedagogical content knowledge	Conventional content analysis (Saldana, 2009)
RQ3: What were the EEYT's experience with collaboration during the CEYPD when using the BTT model?	TSES Survey Researcher's journal, reflection sheets, weekly reports	Collaboration experience, Teacher self-efficacy	Conventional content analysis (Saldana, 2009) Descriptive statistics, paired sample t-test
RQ4: What were the EEYT's experience with reflection during the CEYPD when using the BTT model?	Interview, Researcher's journal, reflection sheets, weekly reports	Reflection experience	Conventional content analysis (Saldana, 2009)
RQ5: How has the implementation of the study adhered to or differed from the proposed implementation procedures?	Researcher's journal, reflection sheets, weekly reports	Fidelity of implementation	Conventional content analysis (Saldana, 2009)

Survey. The TSES was scored to assign a numerical value for each answer. The TSES consisted of 24 questions. The rating scale includes a 1 to 9 Likert-type scale with the anchors: not at all, very little, some degree, quite a bit, and a great deal. Descriptive statistics and paired sample t-tests were performed on Microsoft Excel to analyze participants' pre- and post-intervention mean self-efficacy ratings.

Weekly reports. The researcher reviewed the reports and determined if future adjustments needed to be made for the peer coaching sessions.

Reflection sheets. The researcher read the reflection sheets after every PD and peer coaching session. The researcher analyzed the reflection sheets using Saldana's 2009 conventional content analysis approach. Researchers regard content analysis as a flexible method for analyzing text data. Hsieh and Shannon (2005) define content analysis as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (p.1278). The researcher read and re-read the reflection sheets to achieve immersion. The researcher read to capture codes that are reflective of more than one key thought. Codes were then sorted into themes and sub-themes. Codes were then sorted into categories based on how the codes were related or linked to one another. The emergent categories were then sorted into meaningful clusters with the aim of answering the research questions. The researcher was unable to extend the data to a peer reviewer or a peer checker to increase trustworthiness as recommended by Cho & Trent (2006). Increasing the trustworthiness also increases the credibility and reliability of a qualitative study. The peer checker is not without fault; however, if completed would have served to decrease the incidence of incorrect data and interpretation of data.

Researcher's journal. The researcher read the notes after each PD session to inform upcoming decisions for PD elaboration or clarification. The researcher adjusted her strategies or questions to probe for participants' perspectives on issued raised in prior lessons, to address identified gaps in knowledge, and to address any noted engagement concerns.

Interviews. The data collected from the interviews was also analyzed using a conventional content analysis approach (Saldana, 2009). This approach was chosen because it allowed the researcher a richer understanding of the reality in a systematic way. The researcher also engaged in member checking to increase trustworthiness. The member checking took place during the interview session, where the researcher repeated the participant's answer to ensure accuracy of understanding.

Chapter 5

Findings and Discussion

Understanding the process by which educators learn and change is crucial to the successful implementation of any professional development program (Guskey, 1986). The teacher self-efficacy theory (Ashton & Webb, 1986) grounded in the social cognitive theory (Bandura, 1977) offered a delineated framework for how to motivate educators to participate in professional development and peer coaching sessions and provided a framework for understanding the process by which the early years Emirati teachers in this study may influence efficacy beliefs, change knowledge, and instructional design for child-centered pedagogy (CCP). In this intervention, 22 hours of online professional learning associated with the BTT pedagogical model and one-on-one peer coaching took place over 13 weeks, from October 2020 to February 2021. The Contemporary Early Years Professional Development (CEYPD) program consisted of seven online synchronous professional development sessions and six one-on-one online teacher peer-coaching sessions for four participants. The PD approach focused on the following: (a) to expose teachers to pedagogical knowledge grounded in the learning sciences, (b) to provide opportunities for reflection about the implementation of best practices informed by the pedagogical knowledge (c) to facilitate implementation of best practices informed by the new knowledge, and (d) to facilitate implementation of CCP during activities intended to foster problem-solving skills development (PSSD) in early years learners. In Chapter 4, the researcher presented the research study, BTT model planning activities, the PD and peer coaching reflection exercises (Gibson & Dembo, 1984; Tschannen-Moran et al.,1998; Hardiman, 2012), and weekly reports (Bruce & Ross, 2008; Villa et al., 2004). In this chapter, the researcher will present the

research findings and discuss the implications of the results for future practice. The following

five research questions are the basis for analyses within this study:

Research Question 1: To what extent is there a change in EEYT's self-efficacy scores for

instructional strategies after participation in the CEYPD?

Research Question 2: What were EEYT's experiences with pedagogical content

knowledge during the CEYPD?

Research Question 3: What were the EEYT's experiences with collaboration during the

CEYPD when using the BTT model?

Research Question 4: What were the EEYT's experience with reflection during the

CEYPD when using the BTT model?

Research Question 5: How has the implementation of the study adhered to or differed

from the proposed implementation procedures?

The following sections include the results from the data analysis of the CEYPD intervention

study.

Online Professional Development

The seven 90-minute professional development sessions were designed so that the four

EEYT participants (who need professional development to develop their capacity in child-

centered instruction) have opportunities to reflect on experiences and apply Hardiman's (2012)

BTT framework with the aim at increasing their basic cognitive and learning science knowledge,

pedagogical content knowledge, and child-centered teaching efficacy needed for PSSD.

Moreover, through an online format of peer coaching and reflection over six sessions, the

CEYPD intervention focused on lesson design and delivery aligned to each of six BTT targets

(Hardiman, 2012). Reflection exercises provided time for participants to reflect on their current

practices, thoughts, and views about BTT instructional design, and experiences with collaboration. Peer coaching provided an opportunity for teachers to model and observe the application of new learning focused on designing lessons aligned to best practice and that are child-centered.

Results

Research Question 1: Teacher Self-efficacy for Instructional Practices

This section examines the first research question: to what extent is there a change in EEYT's efficacy scores after participation in the CEYPD? The results with four teachers showed teachers' self-efficacy scores increased after the intervention. The post-intervention mean score (M = 7.7, SD = 0.88) increased as compared to the sample pre-intervention score (M = 6.38, SD = 1.58). A paired sample t-test demonstrated a change between pre-intervention and post-intervention EEYT's self-efficacy (t = 3.7, $p \leq .050$).

Descriptive statistics were used to analyze the quantitative EEYT's self-efficacy data. Table 5.1 presents the analyses of TSE scores including the mean, standard deviation, and range. Figure 5.1 graphically presents each teacher's self-efficacy scores in pre- and post-survey as well as the mean scores of all four teachers. Further details of EEYT's self-efficacy scores through participation in the CEYPD intervention are shown in Figure 5.2, which shows mean TSE scores for pre- and post-efficacy in student engagement, and Figure 5.3, which shows mean TSE scores for pre- and post-efficacy in student instructional strategies, and Figure 5.4, which compares change in efficacy between engagement and instructional strategies.

Table 5. 1

Summary of Means, Standard Deviations, Range of Scores on the TSES

Teachers' Sense of Efficacy Scale	n	M	SD	Range	
				Minimum	Maximum
Pre- test Overall	4	6.38	1.58	5.12	8.62
Post-test Overall	4	7.70	0.88	7.06	8.93
Pre-Efficacy in Student Engagement	4	6.46	1.46	5.5	8.62
Post-Efficacy in Student Engagement	4	7.62	1.01	6.7	9.0
Pre-Efficacy In Student Instructional Strategies	4	6.31	1.73	4.75	8.62
Post-Efficacy in Student Instructional Strategies	4	7.78.	0.77	7.12	8.87

Note. Likert scale (1 = *not at all*, 3 = *very little*, 5 = *some degree*, 7 = *quite a bit*, 9 = *a great deal*)

The pre-intervention mean scores for the overall TSE survey (M = 6.38, SD = 1.58), pre-intervention Instructional Strategies subscale (M = 6.31, SD = 1.73), and pre-intervention Student Engagement subscale (M = 6.46, SD = 1.46) fell between the 4th TSE rating scale mark of *Very Little* (4.75) and the 8th TSE rating scale mark of *Quite a Bit* (8.62) on the nine-category TSE (Tschannen-Moran & Hoy, 2001) scale. When we compare this to the post-intervention mean scores for the overall TSES survey (M = 7.7, SD = 0.88), post-intervention Instructional Strategies subscale (M = 7.78, SD = 0.77), and post-intervention Student Engagement subscale

(M = 7.62, SD = 1.01) fell between the 6th TSE rating scale mark of almost *Quite a Bit* (6.7) and the 9th TSE rating scale mark of *A Great Deal* (9.0) on the nine-category TSES (Tschannen-Moran & Hoy, 2001) rating scale. This supports the conclusion that EEYTs had higher self-efficacy beliefs in their post-intervention survey than in their pre-intervention self-efficacy survey.

The Teacher Sense of Efficacy Scale measures an overall score for each teacher's pre and post results. The results showed that all teachers' self-efficacy increased after the intervention. Teacher 1's average score increased from 6.37 to 7.75, Teacher 2's average score increased from 8.62 to 8.93, Teacher 3's average score increased from 5.12 to 7.06, and Teacher's 4 average score increased from 5.43 to 7.06 (see Figure 5.1). Within the subset of participants, Teacher 2 demonstrated the lowest overall TSES efficacy change of 0.31. Teacher 3 demonstrated the highest overall TSES efficacy change of 1.94.

Figure 5. 1

Teachers' Efficacy Scores in Pre- and Post-Survey
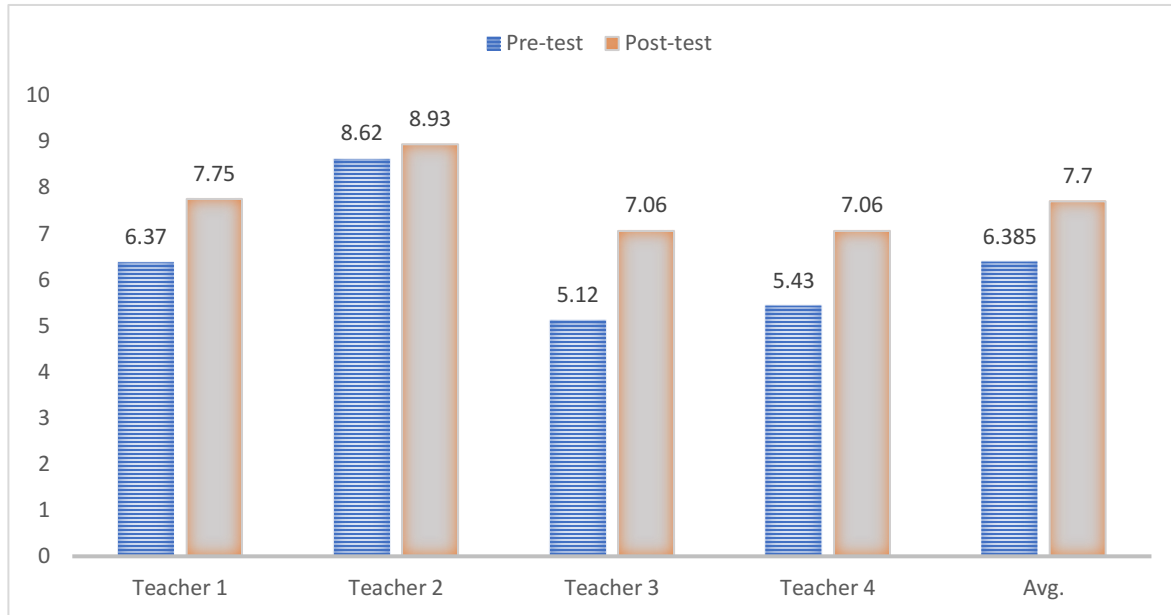
A comparison between teachers' *(N = 4)* overall self-efficacy beliefs pre- and post-intervention with no specific order of display.

In addition to the TSES identifying an overall score for each teacher's pre and post results, it also identifies two sub-scores (i.e., Student Engagement and Instructional Strategies) to provide a more targeted and detailed breakdown of TSE. The results showed that all teachers' self-efficacy in Student Engagement increased after the intervention. Teacher 1's average score increased from 6.12 to 7.75, Teacher 2's average score increased from 8.62 to 9.0, Teacher 3's average score increased from 5.5 to 6.75, and Teacher's 4 average score increased from 5.62 to 7.0 (see Figure 5.2). Within the subset of participants, Teacher 2 demonstrated the lowest overall TSES efficacy change of 0.38. Teacher 1 demonstrated the highest overall TSES efficacy change of 1.63. As for the overall TSE score, no apparent correlation explains the difference in increase in teacher's self-efficacy in Student Engagement averages.

Figure 5. 2

Pre- and Post-Efficacy Scores in Student Engagement
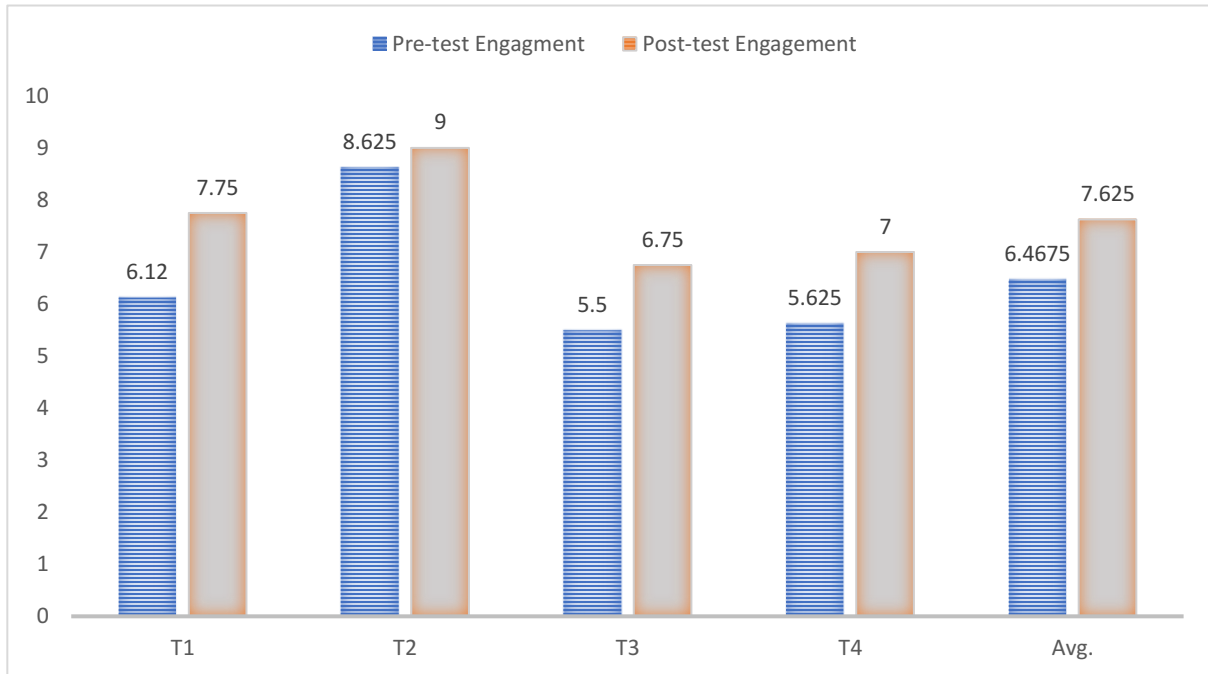
A comparison between teachers' (*N* = 4) efficacy beliefs in student engagement pre- and post-intervention with no specific order of display.

Moreover, the results showed that all teachers' self-efficacy in Instructional Strategies increased after the intervention. Teacher 1's average score increased from 6.62 to 7.75, Teacher 2's average score increased from 8.62 to 8.8, Teacher 3's average score increased from 4.75 to 7.37, and Teacher's 4 average score increased from 5.25 to 7.12 (see Figure 5.3). Within the subset of participants, Teacher 2 demonstrated the lowest overall TSES efficacy change of 0.18. Teacher 3 demonstrated the highest overall TSES efficacy change of 2.62.

Figure 5. 3

Pre- and Post-Efficacy Scores in Student Instructional Strategies
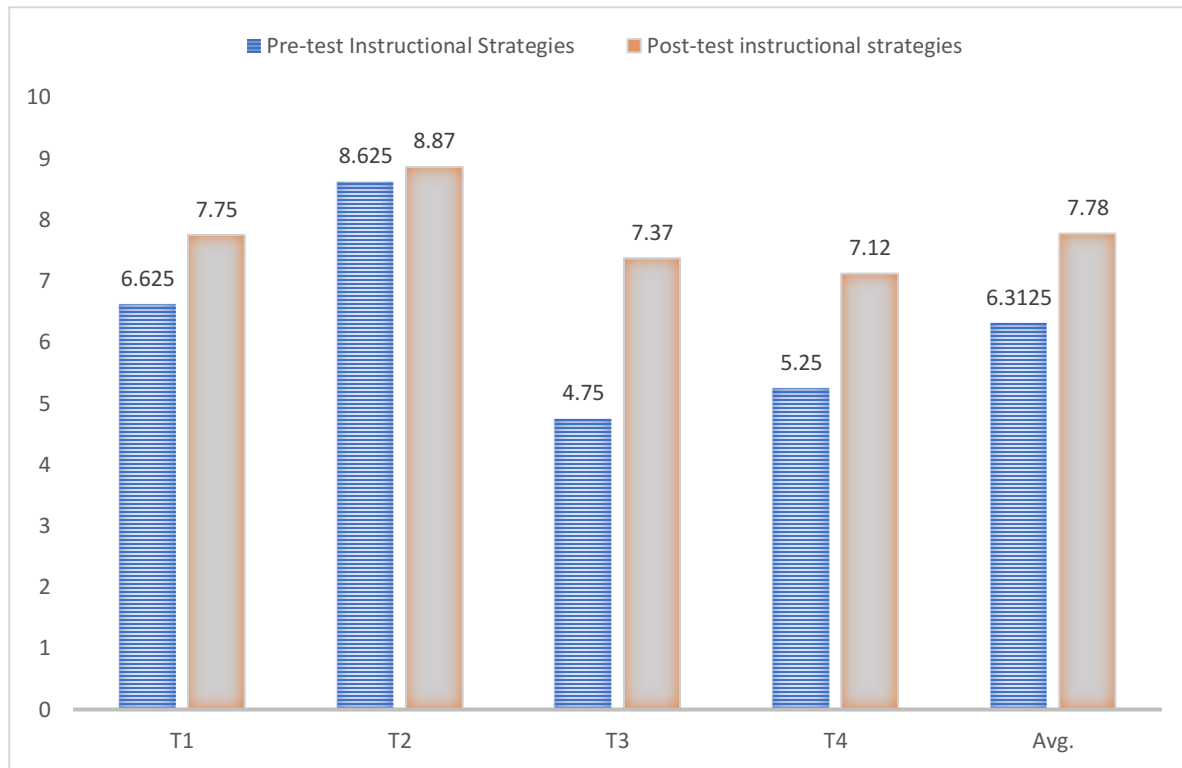
A comparison between teachers' *(N* = 4) efficacy beliefs in student instructional strategies pre- and post-intervention with no specific order of display.

The difference in EEYT's self-efficacy subscales for Student Engagement from pre- to post-intervention was 1.15 and the Instructional Strategies difference from pre- to post-intervention was 1.46 (see Figure 5.4).

Figure 5. 4

Comparison of Pre- to Post Efficacy Change for Engagement and for Instructional Strategies
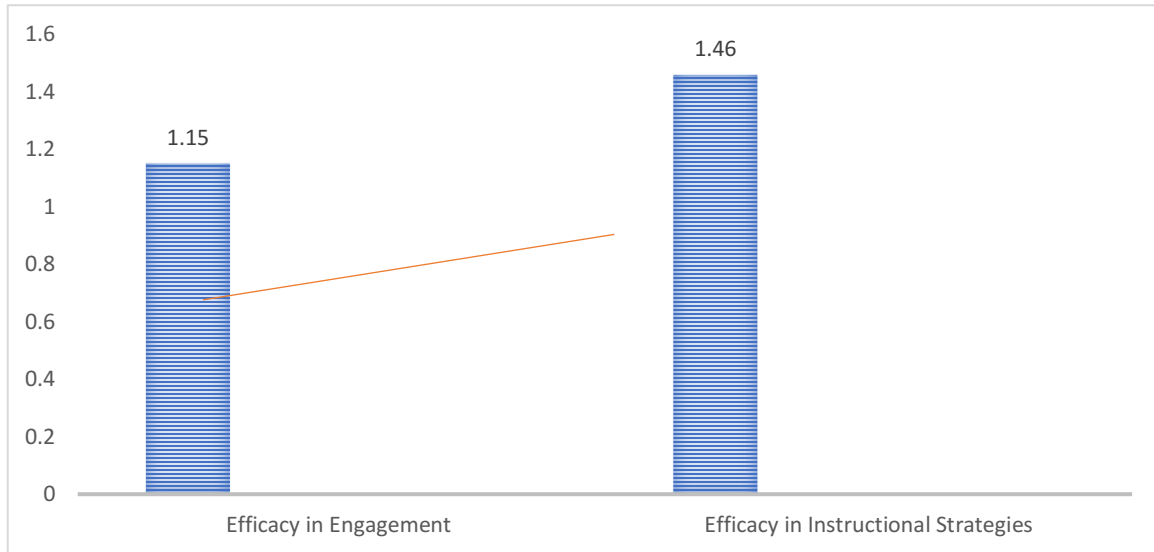
Note: Teachers' ($N = 4$) change in self-efficacy beliefs in their instructional strategies was 1.46 compared to 1.15 in change of efficacy of engagement.

The findings for research question one (RQ1) indicated a statistical significance ($p \leq .05$) in EEYT's overall self-efficacy as measured by the TSES. Furthermore, the data showed visible improvement in the overall TSE change from 6.38 to 7.70 as well as for each of the subscales presented, Instructional Strategies from 6.31 to 7.78 and the Student Engagement efficacy change from 6.46 to 7.62. To determine whether the teachers' change in self-efficacy were associated with demographic characteristics, such as degree, years of teaching, and experience with early years students, a one-way ANOVA could have been conducted. However, because there were only four teachers represented in this study as well as that the teachers were not different with respect to teachers' educational level (all had a bachelor's degree), education experience (all teachers had 15+ years of experience), and teaching experience with early years students (all teachers had 15+ years of experience in early years), further analysis was not

expected to provide additional information and was not performed (see Appendix O). As noted earlier, the same teacher (Teacher 2) had the lowest overall TSE efficacy change in both subscales; however, Teacher 2 began (pre-test) with the highest self-efficacy rating of 8.62, which was a 3.5 level higher compared to the lowest pre-test score of 5.12. Teacher 3, on the other hand, showed the highest overall change in self-efficacy score as well as the highest change in the subscale, Instructional Strategies. Teacher 1 showed the highest change in self-efficacy score in Student Engagement. Since the teachers started the intervention with varying levels of self-efficacy and Teacher 2 had the highest level of self-efficacy to begin with, therefore, there was not much room for improvement. And given the small sample size of the group, this variability in starting place of each teacher also contributed to the difficulty in finding statistical significance.

In conclusion, the overall results from the quantitative analyses in this section indicated that EEYTs of this study demonstrated a significant change in TSE of instructional strategies with participation in the CEYPD intervention study when using the BTT pedagogical model for instructional practices.

Research Question 2: Changes in Pedagogical Content Knowledge

In this section, the researcher investigated the second research question: what were the EEYT's experiences with pedagogical content knowledge during the CEYPD? Triangulation, the integration of subjective and objective knowledge, supports better understanding of phenomena that neither a quantitative nor qualitative design can do alone (Creswell & Plano Clark, 2011). Combining both kinds of data allowed each arm of the study to mutually inform interpretation and validate conclusions drawn from the other. The semi-structured post-intervention interviews, provided a structured time for participants to reflect on their current practices, describe their new

knowledge and views about instructional design. The reflection exercises after every PD and

peer coaching session, as well as the weekly peer coaching reports, provided time for participants

to reflect on their current practices, thoughts, views about BTT instructional design, and

experiences with collaboration. Once the participant interviews, reflection exercises, and weekly

reports were conducted they were translated and transcribed to English. Research shows that it is

difficult to fully understand how translation procedures in qualitative research are implemented

to maintain rigor, while being culturally sensitive (Regmee, Naidoo, & Pilkington, 2010). The

researcher chose to do the translation process with the support of one competent Arabic

translator, who is fluent in English. The translator read the excerpts to the researcher and the data

was translated simultaneously by both the researcher and translator. The process of translation

was repeated using the same process with the aim for quality and accuracy. Translation to put

words in context was required and this interpretation process is demonstrated throughout chapter

five with words in brackets.

The data was then analyzed using conventional content analysis (Saldana, 2009).

Researchers regard content analysis as a flexible method for analyzing text data. Hsieh and

Shannon (2005) define content analysis as "a research method for the subjective interpretation of

the content of text data through the systematic classification process of coding and identifying

themes or patterns" (p.1278). The researcher followed the Hsieh and Shannon (2005) steps for

coding qualitative data: (a) to read and re-read the translated transcripts with the intent to achieve

immersion and familiarity with the data, (b) to code the data with the Microsoft tool highlighter

while reading to help identify, organize, and to categorize data, (c) to read and to capture codes

that are reflective of more than one key concept, (d) to sort codes into themes and sub-themes,

(e) to sort codes into categories based on how the codes were related or linked to one another,

and (f) to sort emergent categories into meaningful clusters with aim of answering the research questions.

Different themes arose from EEYT's perceptions of knowledge including, perceived knowledge of the BTT pedagogical framework and perceived knowledge on how to foster problem-solving skills (see Table 5.2). Examples of teacher responses for these codes are provided in Table 5.2.

Table 5. 2

Emirati Early Years Teachers' Perceived Changes in Knowledge

Themes	Codes	Description	Example
Perceived Knowledge of the BTT Pedagogy Framework	Importance of the Socio-emotional Climate and Physical Environment	The importance of socio-emotional climate for higher order thinking & elements in the physical environment – and how they can influence students' attention in learning tasks (Hardiman, 2012).	"I was excited to be able to use these targets to deepen my instruction. Especially the importance of social emotional understanding and its impact on the climate [student]… A lesson is just not academic, but I learned from the targets how to interconnect my lesson…" (Teacher 3).
			"I pay more attention to the socio-emotional climate. For example, I change the environment in my classroom and add things from nature because it supports learning. Even with distance learning, I made sure my lessons had background pictures of plants. I even encouraged students to take their lesson outdoors. Some students went outside to learn. Or even a corner at home that is more natural. I also used songs that make students feel happy that relate to hope and happiness" (Teacher 4).

	The BTT as an Interrelated Pedagogical Model	"Although each of the targets is presented as a separate component, all six are interrelated. Thus, the model should not be viewed as linear, but as an organic system that guides and informs an approach to instruction…" (Hardiman, 2012, p.26)	"Through studying the six targets and its connection to the brain - the ways the teacher can use the six targets helps a student become innovative". "From now forward, I will make sure to prepare all my lessons making sure I include all six targets…. now I am aware of what the students need" (Teacher 1).
Perceived Knowledge on How to Foster Problem-solving Skills Development	The Basic Problem-solving Process	Four-step process: understanding the problem, plan, carry out the plan, and check (Polya, 1957).	"First, we must select the problem, then brainstorm, be creative with solutions and choose a solution to implement. The students and I look at the steps together and I help build their skills of problem solving" (Teacher 4).
			"First thing I do is select the problem at hand and make it clear. I make sure the student answers with a step-by-step process, so he/she understands the problem clearly. I make sure to imply this problem may have more than one answer. I encourage the students to have a wider scope to viewing the problem from research. I tell them if your convinced of the solution- draw it. And apply it- did it work? If I give him/her

			a problem that could have many different solutions and I encourage them to try all the solutions - did they work? (Teacher 3).
	Questioning: Open versus Closed-ended	An activity that promotes divergent thinking leads students to generate multiple and varied solutions and approaches to finding solutions thereby enhancing creative problem-solving (Hardiman, 2012).	"In every theme, I add a problem or a problem of the week. This problem allows students to develop their thinking. Not just a closed question with a yes or no response. I encourage the student to search, draw, think, and apply to answer the questions. I give him opportunities to answer the question. I give him more opportunities to think differently. Before, I didn't give attention to problem solving or embed it in my lessons. Now I use it every week and I make them explore and it excites the students to explore, talk and draw their answers" (Teacher 3).

To provide background about participants' content knowledge in the BTT pedagogical framework as it relates to the CEYPD, note that the four participants (100%) had no prior experience with Hardiman's (2012) BTT model prior to this intervention. The codes that emerged from changes in perception of knowledge included, perceived knowledge of the BTT pedagogy framework and perceived knowledge on how to foster PSSD. Within the theme of perceived knowledge of the BTT pedagogy framework, codes included the importance of the

socio-emotional climate, physical environment and the BTT as an interconnected model. Within

the theme of perceived knowledge on how to foster PSSD, codes included, the basic problem-

solving process and questioning.

Perceived knowledge of the BTT pedagogy framework

When teachers were asked about the BTT pedagogical framework and how it supported

their instructional design, EEYTs reported a perceived understanding on the importance of the

socio-emotional climate and physical environment to learning as well as the BTT pedagogical

framework as an interconnected model.

Importance of the socio-emotional climate and physical environment. Although

teachers highlighted the importance of an interconnected model, the main focus of application to

their teaching was in understanding the importance of the socio-emotional climate and physical

environment in learning. Hardiman (2012) explains how one major role of the BTT model is in

understanding how emotion is connected to learning. Teacher 3 reveals her understanding of the

importance of emotion to learning as she said,

> I was excited to be able to use these targets to deepen my instruction, especially the
>
> importance of social emotional understanding and its impact on the climate [student]… A
>
> lesson is just not academic, but I learned from the targets how to interconnect my lesson.

Also, elements of the physical environment can influence students' attention in learning tasks.

Teacher 4 explains her understanding of the importance of the physical environment as she

shared,

> I pay more attention to the socio-emotional climate. For example, I change the
>
> environment in my classroom and add things from nature because it supports learning.
>
> Even with distance learning, I made sure my lessons had background pictures of plants. I

116

even encouraged students to take their lesson outdoors. Some students went outside to learn or even a corner at home that was more natural. I also used songs that made students feel happy- that relate to hope and happiness.

Teachers who foster a child-centered environment would implement strategies that are stimulating and engaging for the learner in that environment. Teachers' data shows that teachers have gained knowledge with regards to the importance of the socio-emotional climate and physical environment to learning. With that, teachers may implement instructional practices that lead to students' engagement in learning, which represents core subscales of the definition of CCP.

The BTT, an interrelated pedagogical model. The BTT model highlights the importance of the socio-emotional climate and mastery of content as central to the model, however, it also explains that fundamental to the teaching approach is a student's ability to apply the learning in "creative problem solving" or in other words, 21st century skills. This approach is achieved through understanding that, "although each of the targets is presented as a separate component, all six are interrelated" (Hardiman, 2012, p. 26). Teachers were able to show their understanding of this approach to instruction. For example, when Teacher 2 was asked, how have your beliefs about your ability to use BTT instructional practices to develop early years learners' problem-solving skills changed as a result of this professional develop? She said,

 I learned that the six targets are interrelated. For example, the target of emotional well-being is interrelated to the physical environment is connected to problem solving and evaluation. So, when we ask the student any question, like, how do you feel today and how you think you will you feel tomorrow. These questions are asking about feelings and make the students think as it probes predictions and comparison. For example, how were your

117

feelings yesterday and how do you feel today? So, we can use all the targets to solve problems.

When Teacher 1 was asked how she changed as a teacher after the intervention, she replied, "From now forward, I will make sure to prepare all my lessons making sure I include all six targets…. now I am aware of what the students need".

The participants' discussions around their perceived knowledge in the BTT pedagogical aligns with Hardiman's explanation of the BTT model, "The model should not be viewed as linear, but as an organic system that guides and informs an approach to instruction both at the level of the classroom and as a unifying school-based system" (p. 26). Teachers' data shows that teachers have gained knowledge about the BTT pedagogical model as an interrelated model, and with that, teachers may implement instructional practices that lead to students' application of learning needed for PSSD.

There was consistency between participant's responses, both written and verbal about their perceptions of knowledge regarding the BTT as an integrated model that leads to instructional strategies needed for PSSD. For example, in the written reflection, Teacher 1 said, "Through studying the six targets and its connection to the brain - the ways the teacher can use the six targets can help a student become innovative". She also verbally indicated her intention to integrate all six targets in her lessons. There were also similar alignments noted in the other three participants verbal and written qualitative reflections and notes. This knowledge gain from the BTT as an integrated model facilitated understanding of instructional strategies that may lead to application of learning intended for higher-order thinking.

Knowledge on how to foster problem-solving skills development

According to the NCTM, problem solving is defined as a process of engaging in a new task where the solution is unknown (2000). The teachers in this study began to display an understanding of how to foster PSSD in early years learners by carefully organizing steps for students to follow as well as by asking open-ended questions that have multiple answers.

The basic problem-solving process. Polya (1957) defined the basic four steps of problem solving as follows: 1) understanding the problem, 2) plan for the problem, 3) carry out the plan, and 4) check your solution. Teacher 4 in this study showed a shared understanding of how she fosters the basic problem-solving process as follows: "First, we must select the problem, then brainstorm, be creative with solutions and choose a solution to implement. The students and I look at the steps together and I help build their skills of problem solving". In addition to Teacher 4, Teacher 2 adds,

> I help my students solve problems through helping them understand the steps. We begin with brainstorming, we draw, we search for the materials we need to solve the problem, and we create the solution and try it out…. It is clearer to me how students think and what level of problem solving and critical thinking they can achieve. Before the study, awareness wasn't there, but now there is more awareness for me. I have a deeper understanding about problem solving and critical thinking.

As the examples above provide, Teacher 2 is beginning to expose early years learners to environments or situations that revolve around exposure to a problem. Teacher 2 is fostering PSSD through modeling for the students how to approach solving a problem. The teacher highlights the steps to the problem-solving process as defined by Polya (1957): (a) understanding the problem, (b) brainstorming/planning, (c) carry out or, as the teacher called it, "try it out", and (d) checking for a solution. Teacher 3 said,

119

I provide them [students] with the right environment to develop their learning. And within the steps of problem solving, we brainstorm, research, draw, select resource material to implement, try it out, and evaluate . . . First thing I do is select the problem at hand and make it clear. I make sure the student answers with a step-by-step process, so he/she understands the problem clearly. I make sure to imply that this problem may have more than one answer. I encourage the students to have a wider scope to viewing the problem from research. I tell them if your convinced of the solution- draw it. And apply it- did it work? If I give him/her a problem that could have many different solutions and I encourage them to try all the solutions - did they [the solutions] work?"

From the teachers' comments, one may conclude that the teachers' have perceived knowledge on how to implement the simple steps of the problem-solving process.

Open-ended questions. Teachers also expressed their understanding of how to ask questions to challenge students' thinking. Hardiman defines open-ended questions that promote divergent thinking as questions that lead students to generate multiple and varied solutions and approaches to finding solutions, thereby enhancing creative problem-solving (Hardiman, 2012). Teacher 2 discussed how she transitioned from asking closed-ended questions to open-ended questions. She said,

After the professional development with my first planning [peer-coaching], I started with questions that were closed then I moved on to questions that were open-ended. I started by asking questions that were easy and slowly advanced to more complicated questions that required students to predict, compare, and empathize.

Teacher 1 said, "I also ask questions that are closed and open. Questions that are deep and requires the child to think and search for the answers".

120

Teacher 3 said,

> In every theme, I add a problem or a problem of the week. This problem allows students to
> develop their thinking. Not just a closed question with a yes or no response. I encourage
> the student to search, draw, think, and apply to answer the questions. I give him
> opportunities to answer the question. I give him more opportunities to think differently.
> Before, I didn't give attention to problem solving or embed it in my lessons. Now I use it
> every week and I make them explore and it excites the students to explore, talk and draw
> their answers.

As discussed by current research in the learning sciences, quality teaching involves child-centered instruction that fosters creative, divergent thinking through student-generated products and answers (Hardiman, 2012). Participants in this study have begun to shift their understanding of how to ask questions by slowly changing their strategy design towards incorporating more open-ended questions. This instructional strategy offers an opportunity for students to think divergently, supporting them to develop their higher-order thinking skills.

For this research question, the overall qualitative analyses in this section indicated that after participation in the CEYPD intervention study, the participants (EEYTs) of this study learned about BTT principles and applied some of the aspects of the model.

Research Question 3: Role of Collaboration

In this section, the researcher investigated the third research question: what were the EEYT's experiences with collaboration during the CEYPD when using the BTT model? As explained in the previous chapter, participants were interviewed and asked to respond to a questionnaire about collaboration experiences during the CEYPD program. Qualitative data in the form of written responses to questionnaires were analyzed to provide insight into

participants' experiences. Themes that emerged from teachers' responses included: (a)

clarification understanding of the BTT model, (b) an emergence of new ideas, (c) experiences of

positivity with collaboration, and (d) teacher perceptions of change in beliefs through social

persuasion and vicarious experiences. Table 5.3 highlights the themes.

Table 5.3

Emirati Early Years Teachers' Collaboration Themes

Themes	Codes	Description	Example
Clarification of Understanding of the BTT model		Schwandt (1999) defines understanding as being able to comprehend the meaning of something (without confusion).	"We are collaborating in an excellent way. This has impacted us in that we understand the target accurately and our discussions helped us to clarify the target more [Concept Maps]" (Teacher 3).
			"Great collaboration between the group [teachers] and the discussion between the team deepened and the topic [Arts Integration] was clarified more" (Teacher 4).
			"Cooperation was good through the exchange of ideas and clarifying ideas" (Teacher 1).
			"It explained in terms of clearly communicating the picture, clarifying the six targets, and explaining each target and how it was achieved" (Teacher 1).
			"From collaborating with my colleague, I understood how to use the concept of making questions engaging" (Teacher 2).
Emergence of New Ideas		Foster and Corby (2007) define new ideas as a new combination of old elements.	"Through thinking with my peers to exchange ideas, we created ideas that benefit the child" (Teacher 1).
			"Fruitful collaboration - building new ideas and its influence and beautiful

		experiment [experience]" (Teacher 4).
		"As a result of this study, my colleague and I created a new initiative entitled, From the Emirates, We Innovate. The theme was sustainable environment. It was introduced to our council 6.2 and included 14 students. The projects were created by the students, including students from my classroom" (Teacher 2).
Experiences of Positivity with Collaboration	(Positive feelings with) Collaborative professional learning for teachers is defined as any occasion where a teacher works with or talks to another teacher to improve their own or others' understanding of any pedagogical issue (Duncombe & Armour, 2004).	"Excellent collaboration- and we all benefitted from each other, and we discussed everyone's ideas and benefitted a lot…Our collaboration was excellent as every teacher gave an excellent example of her experience and she gave an example of how we can make our learning focused more on our students and how we can help the student master long term memory" (Teacher 3).
		"The depth is generated through dialogues and discussions that took place between me and the trainer and my research colleague" (Teacher 2).
		"Through planning and integrating it [brain targets] with special topics. I will challenge my students more with broader topic" (Teacher 4).

			"Positive collaboration in exchanging ideas with each other. This all affects us for sure with how we plan future lessons as teachers" (Teacher 1).
Efficacy Experiences	Social Persuasion	A source from which self-efficacy arises and changes: social persuasion involves when one is influenced by others' comments (Bandura, 1977)	"I will focus on the comments and feedback made to me by my colleague in the peer coaching session" (Teacher 2).
			"Through my colleague's comments to me, I will adjust my teaching to make the application of the targets to my planning correctly" (Teacher 3).
	Vicarious Experiences	A source from which self-efficacy arises and changes: vicarious experiences is observing a role model successfully complete a task and believing in one's ability to replicate the experience (Bandura, 1977).	When asked, why do you think this happened, "Through my colleague's observations and feedback to me" (Teacher 3).
			"Through observing and connecting and by going back to the six targets, I could be a coach" (Teacher 2).
			"Things have been more clarified for me through the correct and successful application of the targets by my colleague" (Teacher 3).

Clarification of understanding. Schwandt (1999) defines understanding as being able to

comprehend the meaning of something, without confusion. EEYTs reported a gain in better

understanding of concepts and materials due to collaboration. Teacher 3 said, "We are

collaborating in an excellent way. This has impacted us in that we understand the target

accurately and our discussions helped us to clarify the target more [Concept Maps]". Teacher 4

reports, "Great collaboration between the group [teachers] and the discussion between the team deepened and the topic [Arts integration] was clarified more." Teacher 2 said, "From collaborating with my colleague, I understood how to use the concept of making questions engaging". Teacher 1 shared that planning with another person allowed her to consider other perspectives or ideas and that explaining the targets to one another allowed for clarification and ultimately, mastery of the objective, which is understanding the key features of each target. "Cooperation was good through the exchange of ideas and clarifying ideas" (Teacher 1). "It explained it in terms of clearly communicating the picture, clarifying the six targets, and explaining each target and how it was achieved" (Teacher 1). Teacher 2 explains how collaborating with her colleague during the peer coaching session helped her to better understand how to engage students in learning and provides an example, "From collaborating with my colleague, I understood how to use the concept of making questions engaging". This study was able to show that through encouraging collaboration, teachers were offered the opportunity to clarify their understanding of new knowledge.

Emergence of new ideas. Foster and Corby (2007) define new ideas as a new combination of old elements. All of the participants ($N = 4$) reported the emergence of new ideas in their responses to the questionnaire. The participants' written responses to the prompt "How has collaboration with one another influenced your thinking?" were, Teacher 1, "Through thinking with my peers to exchange ideas, we created ideas that benefit the child". Here, Teacher 1 highlights the importance of focusing the goal of her planning around the child and ensuring that the level of planning is not just focused on the child but ensures the child's success. Teacher 4 emphasizes how the experience of collaboration helps build new ideas. She said, "Fruitful

126

collaboration-building new ideas and its influence and beautiful experiment [experience]".

Teacher 3 said,

> Excellent collaboration- and we all benefitted from each other, and we discussed everyone's ideas and benefitted a lot…Our collaboration was excellent as every teacher gave an excellent example of her experience and she gave an example of how we can make our learning focused more on our students and how we can help the student master [achieve] long term memory.

Teacher 2, the participant who had the highest self-efficacy pre-test score, initiated a new idea, and applied it not only at her school, but at the district level. She explained,

> As a result of this study, my colleague and I created a new initiative entitled, *From the Emirates, We Innovate*. The theme was about sustainable environments. It was introduced to our council 6.2 and included 14 students. The projects were created by the students, including students from my classroom.

> This is an example of teachers working together, forming new ideas, and collaborating at the district level. As evidenced above, participants demonstrated that they could collaborate and learn new ways to improve practice. This demonstrates that teacher collaboration can lead to emergence of new ideas as described above.

Experiences of positivity with collaboration. The participants in this study expressed the benefits of collaborating with one another. Collaborative professional learning for teachers is defined as any occasion where a teacher works with or talks to another teacher to improve their own or others' understanding of any pedagogical issue (Duncombe & Armour, 2004). Teacher 3 shared that planning with another colleague allowed her to consider new perspectives. Teacher 1 shared how this collaboration changed how they will design lessons for their future planning.

127

Teacher 3 said, "Through my colleague's comments to me, I will adjust my teaching to make the application of the targets to my planning correct. Positive collaboration in exchanging ideas with each other". "This all affects us for sure with how we plan future lessons as teachers" (Teacher 1). Teacher 2 explains how dialogue allows for an opportunity for a deeper understanding and paves the way for healthy discussions. She said, "The depth is generated through dialogues and discussions that took place between me and the trainer and my research colleague". As described above, teachers were able to show their positive experiences with collaboration that had a positive influence on their learning.

Efficacy experiences. Bandura defined self-efficacy as an individual's belief about one's own capabilities to accomplish a goal to produce a positive outcome (1977). Bandura (1977) asserts that self-efficacy beliefs arise from and are changed through sources including but not limited to: (a) vicarious experiences, and (b) social persuasion experiences. Through reflection, participants described their interactions with social persuasion and vicarious experiences.

Social persuasion. Through collaboration, CEYPD provided opportunities for teachers to experience social persuasion. Social persuasion is when one person is influenced by another's comments (Bandura, 1977). For instance, after the researcher introduced the BTT targets, the teachers were given an opportunity during their peer coaching sessions to offer feedback to their colleague on their lesson planning design. Teachers 2 and 3 discuss their willingness to accept their colleagues' feedback and how they will use this feedback as a focus to change their future planning. Teacher 2 said, "I will focus on the comments and feedback made to me by my colleague in the peer coaching session". Teacher 3 said, "Through my colleague's comments to me, I will adjust my teaching to make the application of the targets to my planning correctly". Offering feedback to one another provided the teachers with an opportunity to share a process

128

they either understood from the BTT model or an example from their own classroom that aligns to child-centered instruction. When Teacher 3 was prompted to answer, how do you think your mindset has changed and why do you think this happened, she replied, "Through my colleague's observations and feedback to me" (Teacher 3).

These descriptions show how collaboration through peer coaching can create situations in which all teachers can share information, and not necessarily that a more knowledgeable other can provide information or strategies to a less experienced teacher. Teacher peer-coaching is designed such that all teachers can share information and give opportunities to help one another through social persuasion experiences. For example, Teacher 2 describes how she will focus on the comments and feedback given to her by Teacher 1. And in the needs assessment findings, Teacher 2 had more experience with CCP training than Teacher 1. Also, Teacher 2 began this intervention with a higher pre-survey score than Teacher 1. Hence, Teacher 2 appeared accepting to Teacher's 1 knowledge and experiences, demonstrating that this social persuasion experience may have influenced Teacher 2's decisions in her planning.

Vicarious experiences. Through collaboration, the CEYPD provided opportunities for teachers to exercise vicarious experiences. Vicarious experience is observing a role model successfully complete a task and believing in one's ability to replicate the experience (Bandura, 1977). After the researcher introduced the BTT targets, the teachers were given an opportunity during their peer coaching sessions to observe (three times) their colleague plan lessons aligned to the BTT pedagogical framework. When Teacher 2 was asked to reflect on how her mindset had changed about teaching and learning, she replied, "I became more confident in my capabilities of being a coach". When asked to reflect on "Why do you think this happened?", she replied, "Through observing and connecting and by going back to the six targets, I realized that I

129

could be a coach". After observing her colleague, Teacher 2 believed in her own ability to successfully be a coach and model how to align the brain targets to a lesson plan for her colleague. Moreover, Teacher 3 replied, "Things have been more clarified for me through the correct and successful application of the targets by my colleague". Here the teacher explains how observing her colleague apply the targets to lesson planning gave her the clarification she needs to do the same.

Teachers had opportunities through teacher peer-coaching to observe and model for one another how to apply the BTT targets to their instructional design. These sessions offered invaluable opportunity for teachers to engage in social persuasion and vicarious experiences-variables that may have influenced their perceptions of knowledge and consequently their teacher self-efficacy.

Research Question 4: Role of Reflection

In this section, the researcher investigated the third research question: what were the EEYT's experiences with reflection during the CEYPD when using the BTT model? As explained in the previous chapter, participants were asked to respond to a questionnaire about their experiences with reflection during the CEYPD program. Qualitative data in the form of written responses to questionnaires were analyzed with the purpose of evaluating their current practices, thoughts, views about the BTT instructional design, and experiences with collaboration. Accordingly, the three themes that emerged included: (a) a shift towards child-centered pedagogy, (b) salient decision making, and (c) references to confidence and TSE (see Table 5.4).

Table 5.4

Emirati Early Years Teachers' Reflection Themes

Themes & Codes	Description	Example
Child-centered Pedagogy (CCP)	A child-centered learning environment is defined through three subscales: (a) child participation, (b) child as an active learner (AL), and (c) learning environment (LE) (Perren et al., 2017).	"Self-reflection is very important because it makes the child express themselves on what they see or on how they feel or on how they achieve. All of these things get stored in the long-term memory and the child will not forget it" (Teacher 2).
		"It impacted me greatly because me as a teacher I tie my lessons with drama, total physical response, and drawing. But now after this target, I will try to be encouraged to follow best practice like singing and encourage students to express themselves through self-assessments and to integrate all my subjects whether they are Islamic, Arabic, or Social Studies with the intent that all of them will have practical application rather than just didactic teaching" (Teacher 3).
Salient Decision Making	The act or process of identifying and selecting differently based on the morals of the decision maker (Harris, 1998).	"The impact [PD] was positive. I have decided to present all my lessons through practical hands-on learning so that the student can master the learning and then I give him [or her] the information and I complete a retrieval exercise after a week to see if the student remembered it [the material] or not" (Teacher 3).
		"It [PD] had a great impact on my well-being and I'm very excited to apply what I'm learning from this target on

		myself… This will have a positive effect on my well-being and my children's well-being…". "Yes, I'm going to apply conceptual maps for my children in a major way in my lessons" (Teacher 2)
		"I will focus in a great way on learning with problem solving and asking deeper questions" (Teacher 2).
References to Confidence and TSE	Teachers' confidence is defined as teachers' knowledge and abilities (Chen et al., 2014). TSE is defined as "A multitude of positive outcomes for teachers and students" (Pfitzner-Eden, 2016, p.1).	"A teacher is confident with what educational material they [the teachers] present to their students, the more motivated the teacher feels to continue to work with them [students]" (Teacher 1).
		"I became convinced in the role nature plays in changing the child's well-being and it has a very positive effect on learning. In the last professional development session she states, Now I think about how to take the next step in learning, and I'm excited to implement this in my classroom" (Teacher 2).
		"[I'm] very impacted by this and excited to try every component [strategy] in the session that was presented in my classroom environment - that's especially for me. I have the certainty that it will make a difference for me as a teacher, for my children and their parents…These sessions have had a great impact on me and I'm excited that I will practice more deeply these strategies that impact learning…This influences me in a deep way,

		especially within building the skill of engagement. I will try to apply this thoroughly with my student" (Teacher 3).

Child-centered pedagogy. Focusing on pedagogy, teachers described their shift of understanding views about child-centered pedagogical knowledge in their discussions and reflections. A child-centered learning environment is defined through three subscales: (a) child participation, (b) child as an active learner, (c) and learning environment (Perren et al., 2017). Teacher 1 described a shift in her views as she writes about what she believes drawing does for the students. She wrote, "Through teaching the lesson, we deliver the information through drawing. Drawing helps the student master the objective at hand". Teacher 1 writes about how she makes sure students master knowledge through art. In addition, Teacher 3 described a shift in her views as she said,

> It impacted me greatly because me as a teacher I tie my lessons with drama, total physical response, and drawing. But now after this target, I will try to be encouraged to follow best practice like singing and encourage students to express themselves through self-assessments and to integrate my subjects, Islamic, Arabic, or Social Studies with the intent that all of them will have practical application rather than just didactic teaching [such as the subject, Islamic Studies].

Teacher 3 emphasized the importance of practical application and changed her understanding of what teaching should look like – she realized didactic teaching was not the best way to teach. Teacher 2 describes her understanding about reflection as she said, "self-reflection is very important because it makes the child express themselves on what they see or on how they feel or on how they achieve. All of these things get stored in the long-term memory and the child

133

will not forget it". In this intervention, teachers engaged in a deeper process of active

engagement in and reflection on new learning. Teachers reflections referenced a pedagogical

shift towards child-centered instruction.

An indicator of positive TSE is in a teachers' willingness to learn and openness to try new

strategies. These teachers showed that they have grown in their knowledge of the BTT model

and beliefs as teachers to focus on instruction that aligns to a CCP. This is also supported by the

changes in overall means in the pre- and post-efficacy in student instructional strategies, as the

score increased from 6.31 to 7.78 (see Figure 5.3).

Salient decision making. The participants of this study reported that reflection is how they

make all their decisions. Harris (1998) defines decision making as the act or process of

identifying and selecting differently based on the morals of the decision maker. In the context of

this professional development, salient decision making is referred to as decisions which are

deemed to be important to teachers' child-centered pedagogy. Teacher 3 describes her decision

making as she shared,

> I have decided to present all my lessons through practical hands-on learning so that the
>
> student can master the learning and then I give him [or her] the information and I complete
>
> a retrieval exercise after a week to see if the student remembered it [the material] or not.

Teacher 3 decides to foster a child-centered environment through understanding the importance

of practical learning and retrieval practice, and from this decides to change her teaching to

incorporate hands-on learning. Teacher 3 continues by saying, "It [PD] had a great impact on my

well-being and I'm very excited to apply what I'm learning from this target on myself… This

will have a positive effect on my well-being and my children's well-being…". Teacher 4 also

said,

134

… First, I will take care of my wellbeing and avoid anxiety… and I will think about

beautiful things, hope, and positivity… after that I will teach them [teacher's children] and

study with them [teacher's children] … and I am also excited to give this lesson to my

students tomorrow that [which] I learned and benefitted from today.

Current research shows that a teachers' wellbeing is correlated to important outcomes, such

as her students' learning and wellbeing (Collie & Martin, 2020). Teacher 3 decides to better care

for herself during the COVID-19 pandemic and understands the positive effect this will have on

her students. Teacher 2 in the third PD reflection said, "Yes, I'm going to apply conceptual maps

for my children in a major way in my lessons". In the fifth PD reflection she wrote, "I will focus

in a great way on learning with problem solving and asking deeper questions".

References to confidence and TSE. Teachers' confidence is defined as teachers'

knowledge and abilities (Chen et al., 2014). The participants in this study reflected after each PD

and peer coaching session and as a result, teachers' reflections showed statements that relate to

the CEYPD influencing teacher confidence and TSE. For example, Teacher 1 discusses an

increase in her confidence as she said, when "a teacher is confident with what educational

material they [the teachers] present to their students, the more motivated the teacher feels to

continue to work with them [students]". Teacher 1 makes an important point as she connects

confidence to effort in teaching.

Teachers also described their positive feelings with self-efficacy for instructional

strategies. Teacher self-efficacy is defined as "a multitude of positive outcomes for teachers and

students" (Pfitzner-Eden, 2016, p.1). Teacher 4 said,

[I'm] very impacted by this and excited to try every component [strategy] in the session

that was presented in my classroom environment - that's especially for me. I have the

135

certainty that it will make a difference for me as a teacher, for my children, and their

parents.

She continues in her fifth reflection to say, "These sessions have had a great impact on me and I'm excited that I will practice more deeply these strategies that impact learning". Teacher 4 continues to discuss how she was influenced by these sessions as she states, "This influences me in a deep way, especially within building the skill of engagement. I will try to apply this thoroughly with my students". Teacher 2 shared in her first PD reflection,

I became convinced in the role nature plays in changing the child's well-being and it has a

very positive effect on learning…. Now I think about how to take the next step in learning,

and I'm excited to implement this in my classroom.

The reflection conducted after each PD and through the peer coaching planning time provided the participants with time to reflect and think about their experiences with the CEYPD and their current instructional practice. Teachers described that they were confident about implementing the new instructional strategies in their teaching design. Teachers also described their positive feelings with their self-efficacy for instructional design during the CEYPD program.

Overall, the results from the qualitative analyses in this section indicate that EEYT's reflections describe the teachers' shift towards CCP application, teachers exercising their ability to make salient decisions aligned to the BTT model, and references to positive feelings of confidence and TSE.

Research Question 5: Implementation and Fidelity

Overall, the implementation of the CEYPD intervention study adhered to the proposed implementation procedures. The degree to which the intervention was implemented as designed (Dusenbury et al., 2003) is discussed below.

Dose. One component of implementation fidelity examined in the implementation of this intervention is dose (Dusenbury et al., 2003). Dose is a component of implementation fidelity assessment that evaluates both the amount of intended program content delivered and the amount received by participants (Dusenbury et al., 2003). The data collection tool, which is quantitative (attendance record), was used at all six PD sessions and the one peer coaching introduction session. The researcher allotted 90 minutes for the PDs; however, each session went slightly longer due to participants' inquiries. In addition, the teacher peer-coaching sessions were originally allotted for 40 minutes each but also went slightly longer due to the participants' requests. Overall, the instructor's Microsoft Forms indicated that all six PD sessions were provided and received (see Table 5.5). All six peer-coaching sessions (100%) and weekly reports (100%) were completed (see Appendix P).

Table 5. 5

Instructor's PD Session Log Dates and Average Time Reported

PD Session	Date	Instructor's Average Time Reported
Session 1- BT One: Establishing the Emotional Climate for Learning	October 10, 2020	2 hours
Session 2- BT Two: Creating the Physical Learning Environment	October 17, 2020	2 hours 30 minutes
Session 3- BT Three: Designing the Learning Experience	October 24, 2020	1 hour 55 minutes
Session 4- BT Four: Teaching for Mastery, Skills, and Concepts	October 31, 2020	1 hour 30 minutes
Session 5- BT Five: Teaching for Extension and Application of Knowledge	November 7, 2020	2 hours 30 minutes
Session 6- BT Six: Evaluating Learning	November 14, 2020	2 hours
Session 7- Introduction to Peer Coaching: - Group 1 - Group 2	November 25, 2020 November 29, 2020	1 hour 40 minutes 1 hour 40 minutes

Note: Teachers spent time reflecting after each PD and peer coaching session. The original reflection time was projected with strong fidelity; therefore, any added reflection time did not negatively influence the fidelity of implementation.

Context. The context of a study refers to the aspect of the environment of an intervention within which the intervention functions (Baranowski & Stables, 2000). The population for this study is early years Emirati teachers (who are female), who live in the United Arab Emirates and

work in the public-school system. Their ethnic background is predominately Emirati from diverse socioeconomic statuses and the medium of instruction for the Emirati teachers was Arabic. Fitzpatrick (2012) stresses the importance of being responsive to local needs of the participants by increasing their knowledge and enhancing their control over the program. An example of such responsiveness is learning the language and values of the participants. This was measured during the post-intervention interviews. All four participants reported explicitly feeling that their language was taken into consideration during the study and that translating all material to their mother tongue was helpful in deepening their understanding of the material at hand. To carefully address the context in this study, the participants responded to "Did you feel that your language was considered when creating the materials for this intervention? Explain how?" All four participants responded, "Yes" to this question and shared that they found the translation particularly helpful. For example, Teacher 3 said, "Yes, for sure. The study was originally in English, but it was presented to me in the Arabic language. This helped me understand the material very clearly and I benefited from it and understood the specific points. I used it in my teaching. I understood it more because it was presented to me in my mother tongue, I was able to really understand it". Teacher 4 said, "Yes, my language was taken into consideration as the lesson was presented to me in my language, which is Arabic. The lessons and material were presented in Arabic. The presentations were thorough, and it was easier for me to understand because it was in my language". One can infer that familiarity with Arabic is related to the participants' engagement (100%) with the program. These responses confirm the high quality of delivery for this intervention.

Participant responsiveness. Participant responsiveness refers to the degree to which the participants were actively engaged and participating in the activities for the intervention

139

(Dusenbury et al., 2003). All four EEYTs, i.e., 100% of the participants, were actively engaged in the intervention. They were all engaged in all six PD sessions, the one peer coaching introduction session, and the six peer coaching sessions. All four participants reported feeling positive about working with one another and learning from one another. For the researcher's PD session, one of the researcher's journal notes included a reflection noting that the researcher felt teachers enjoyed their session. They were very engaged as they shared their knowledge to show that they understood and agreed with the instructor. Teacher 2 said, "Through teachers' comments and discussions, we learn more". When asked after the PD, "How has the collaboration influenced your thinking?" Teacher 3 said, "Very beautiful! We benefitted from each other, and we discussed everyone's ideas and benefitted a lot." Teacher 4 said, "Collaboration is always fruitful and great…" Teacher 2 said, "Through my colleagues' responses, their answers opened new windows for me in learning". An additional sign of participant engagement is that teachers spent more time in PD sessions than the originally projected time. This indicates that the participants viewed the sessions as pleasant and helpful. Teacher 1 stated, "I will apply this new learning to my lesson with the students' interest at the forefront that makes a student a leader who is prepared for the future". Teacher 2 stated, "As a result of this study, my colleague and I created a new initiative entitled, *From the Emirates, We Innovate*. The theme was sustainable environment. It was introduced to our council 6.2 and included 14 students. The projects were created by the students, including students from my classroom". These statements show that the participants felt inspired, engaged, involved, and plan to continue implementing these strategies in their future teaching.

Project implementation. Fidelity can be described as the ability to implement an intervention as it was intended to be implemented (Nelson, Cordray, Hulleman, Darrow, &

Sommer, 2012). The goals of the implementation included: (a) at least four out of 10 teachers participate in the PDs, (b) seven out of the seven topics be covered, and (c) all the PD sessions be delivered with high quality as determined through observation. The researcher's data sources, which align to the matrix and logic model (see Table 5.6) include: (a) qualitative PD and peer coaching reflections with implementation checklists and observation notes, (b) application or implementation artifacts (six) for each participant, (c) peer coaching created lesson plans (three) for each participant, and (d) presentation slides for each PD (see Appendix Q) and peer coaching session (see Appendix N).

Overall, the CEYPD attendance rate was 100 % for both the PDs and peer coaching sessions. One potential reason for the overall change in TSE for instructional strategies may be due to the participation rate. Two of the participants, however, did not complete the peer coaching reflection exercise. The two teachers who did not complete the peer coaching reflection exercise were Teacher 3 and Teacher 4. Teacher 3's average self-efficacy score increased from 5.5 to 6.75, and Teacher's 4 self-efficacy average score increased from 5.62 to 7.0. These two teachers were intermediate between highest and lowest, though they each demonstrated some changes in TSE. In addition, when asked to reflect upon whether the PD sessions were effective, both Teacher 3 and 4 reported 100% of the time that the sessions were effective with explanations. For example, Teacher 3 reported. "Yes, very effective. I benefitted a lot, it made me think, especially with creating relationships [analogies]. The connected relationships [analogies] is new for me". Teacher 4 reports, "Effective and very helpful. I was introduced to the important relationship between anxiety and relaxation and its reflection on the productivity of the child… and his well-being". Also, Teachers 3 and 4 responded to 100% of the weekly reports during the peer coaching process and reported not having any questions throughout the six

141

sessions (see Appendix O). Therefore, the reason for not completing the reflection sheets could have been that it was simply overlooked.

Table 5. 6

Project Implementation

Intention of Intervention	Implementation rate
Four out of 10 teachers participated in the Intervention (PDs & Peer Coaching)	100%
Seven Topics Covered: Six PD (BTT Model) & One Peer Coaching	100%
Qualitative Reflections on PDs & Peer Coaching Sessions	92%
Application/Implementation Artifacts (six) for Each Participant	100%
Peer Coaching Created Lesson Plans (three) for Each Participant	100%
Presentation Slides for Each PD & Peer Coaching Session	100%

Summary and Conclusion

To summarize, the CEYPD program accomplished its main purpose, which was to explore: (a) changes in EEYT's self-efficacy scores (for instructional strategies) after participation in the CEYPD, (b) EEYT's experiences with pedagogical content knowledge during the CEYPD, (c) EEYT's experiences with collaboration during the CEYPD when using the BTT model, and (d) EEYT's experiences with reflection during the CEYPD when using the BTT model.

Changes in Teachers' Self-Efficacy

Surveys completed by participants' (TSES, 2001) demonstrated a score change in TSE for instructional strategies after the CEYPD. Active engagement in collaboration and reflection, as well as vicarious and social persuasion experiences grounded in BTT pedagogical knowledge needed for CCP may have influenced the score change in teachers' sense of efficacy. Due to COVID-19 restrictions, teachers were exposed to little or no collaborative professional development for promoting such CCP; it can be inferred, therefore, that the influence in teachers' self-efficacy for instructional strategies was largely due to the CEYPD program, which was guided by the teacher efficacy theory, i.e., the vicarious and social persuasion experiences it provided.

Teachers' Experiences with BTT Pedagogical Content Knowledge

Participants' discussions revealed that the CYEPD program provided participants' with knowledge of the BTT model as an effective pedagogical framework for knowledge building as needed to foster a child-centered environment. Teachers' reflections and interview responses showed an understanding in teachers' knowledge about the BTT pedagogy framework, such as, the importance of the socio-emotional climate, physical environment and the BTT as an interconnected model. Teachers also experienced some understanding in knowledge of instructional strategies that foster PSSD, including, the basic problem-solving process and types of questions to ask children (open-ended versus closed-ended).

Overall, the implementation of the BTT model was effective. It provides a useful framework for presenting a fundamental teaching approach that aims to help students not only to master content knowledge but also to apply that knowledge in solving problems in a creative way and this is one of the key features of 21st century skill development (Hardiman, 2012).

Presenting the BTT framework to teachers gave them an opportunity to become familiar with effective teaching practices and to engage with each other in positive social experiences that may have contributed to their teacher efficacy beliefs, which then may have influenced their teaching instructional planning.

Teachers' Experiences with Collaboration

Participants had opportunities to engage in collaborative inquiry during the professional development sessions as well as one-on-one peer coaching sessions throughout the study where the peer coaching criteria were met. A collaborative technique, teacher peer-coaching, as described by Robbins (1991) was established during the CYEPD program. Teachers described that because of collaboration, they were able to clarify understandings of the BTT model and develop an emergence of new ideas. The peer coaching process resulted in giving teachers experiences that positively influenced their learning of the BTT model. Peer coaching also exposed teachers to opportunities to observe and model for one another, resulting in social persuasion and vicarious experiences, which may have influenced their TSE.

Teachers' Experiences with Reflection

Participants had opportunities for structured time to reflect on their current practices, thoughts, views about BTT instructional design, and experiences with collaboration. The structured times occurred after each PD session and alternately after each peer coaching session. The experiences of reflection revealed a shift in understanding of the BTT model that supported a child-centered environment, the ability to make salient decisions, and references to positive feelings of confidence and TSE. EEYTs felt confident about their deeper and expanded understanding of how to apply the BTT pedagogical framework, which is an important step, that

144

if implemented as intended, will incorporate application of learning. These feelings of success

can have the ability to influence TSE (Clarke & Hollingsworth, 2002).

Overall, the practice of reflection was effective in giving the researcher insight into the

teachers' current practices, thoughts, views about the BTT model, and experiences with

collaboration. Reflection provided ample time for teachers to become self-aware of their

feelings, which led to perceptions of change in their instructional practice, new decisions based

on their new experiences, feelings of confidence, and positive references to teacher self-efficacy.

Discussion

The following section presents connections between the present findings and current

literature surrounding teacher professional development, TSE, collaboration, and reflection.

Teacher professional development. Research has shown that many professional

development initiatives appear ineffective in supporting changes in teacher practices and

ultimately student learning (Darling-Hammond et al., 2017). Although some studies showed that

education or training can change teachers' beliefs and their educational practice, only a few

studies investigated the interplay between these factors in early childhood education (Perren et

al., 2017). In the UAE, KG teachers expressed their dissatisfaction with in-service training aimed

at supporting the NSM (Bond, 2016). In the needs assessment, the participants reported their

concern for wanting to promote PSSD in the early years and discussed the desire for professional

development that was contextual. Although the needs assessment reflected teachers' desire to be

supporters of their country's aspiration to become a knowledge-based economy, a specific

challenge faced by in-service teachers was the sociocultural element of language that hindered

the implementation of the NSM methodology. In the UAE, research shows an identified tension

between embracing English as an international language and preserving the Arabic language and

145

culture (Gallagher, 2011). The participants' response to this reaffirms the need to deeply understand the importance of language in learning (Vygotsky, 1978). In this regard, Emirati trainings for teachers across the entire KG system should consider trainings in the first language of the trainees. Not only will this allow for deeper understanding through interaction of curriculum and pedagogy, but it will also elevate social justice and equity, as described by Wink (2011). Developing the CEYPD program for these participants in their first language, Arabic, within a collaborative model interlaced with reflection and guided by the teacher efficacy theory, provided teachers with opportunities to observe, model, and reflect on BTT pedagogical content knowledge without language barriers. These experiences revealed change in TSE scores in instructional strategies after the CEYPD and shifted teachers' pedagogical knowledge towards child-centered instruction.

Teacher self-efficacy. The CEYPD program was guided by the teacher efficacy theory that was developed and validated in the research literature (Ashton & Webb, 1986; Tschannen-Moran & Hoy, 2001). Based on the analyses of the TSES pre- and post- surveys, teachers showed an increased score change in self-efficacy for instructional strategies after participation in the CEYPD intervention study. The teachers' increased score change in self-efficacy in their knowledge of instructional strategies was higher than in their change in self-efficacy of engagement. A comparison of the change in teacher self-efficacy is 0.31, a small difference that if further investigated with an expanded intervention in more schools with more teachers would yield a potential significant difference.

Teachers' reflections and interview responses revealed an increased understanding in teachers' knowledge about the BTT pedagogy framework, such as, the importance of the socio-emotional climate, physical environment and the BTT as an interconnected model. JohnBull et

al. (2013) found that both personal and general teacher efficacy can be increased with knowledge from the learning sciences, which the BTT model (Hardiman, 2012) is aligned to. Teachers have gained knowledge about the learning sciences and demonstrated their ability to apply some of the aspects of the model in their professional contexts. Therefore, it can be hypothesized that this might be related to their increased self-efficacy scores because there is some evidence in the literature that shows that knowledge gains from the learning sciences can contribute to personal and general teacher efficacy.

Furthermore, the changes in TSE are accredited to the opportunities teachers were given to engage in social persuasion and vicarious experiences around BTT instructional strategies that foster CCP as needed for PSSD. The needs assessment discussed in chapter two showed that EEYTs have low TSE in fostering PSSD. During the teacher peer-coaching sessions, teachers had opportunities to observe, model, and influence one another on instructional design that's aligned to the BTT model. Bandura (1977) called these vicarious experiences and social persuasion and identified them both as sources of efficacy change. The opportunity for teachers to engage in experiences of social persuasion and vicarious experiences (Bandura, 1977), influenced their TSE (Tschannen-Moran & Hoy, 2001). Although teachers were given three opportunities to observe their colleague align the brain targets to their lesson plan, only two teachers reported this having a direct influence on their self-efficacy beliefs. Yet this does not mean that the other two teachers' observations of their colleagues did not affect their self-efficacy, however, there is no data to show that it did.

The data revealed a score change in TSE for instructional strategies. This may be accredited to professional development in the BTT pedagogical content knowledge grounded in

the learning sciences as well as teacher peer-coaching, which offered opportunities for vicarious experiences and social persuasion.

Collaboration. The findings of this study are consistent with the research literature on the benefits of teacher collaboration. Teachers who collaborate are more likely to change behaviors and try new practices as compared to teachers who work in isolation (York-Barr et al., 2007). The results of the CEYPD revealed positive teacher experiences with collaboration, such as, clarification in understanding of the BTT model, emergence of new ideas, and enhanced self-efficacy through social persuasion and vicarious experiences.

Teachers in this study were encouraged to practice teacher peer-coaching as a strategy to encourage collaboration, which is supported by the literature to improve TSE for instructional strategies (Bruce & Ross, 2008; Kohler et al., 1999; Licklider, 1995). Teachers worked together to initiate the first virtual innovative project platform in the district for early years learners. This is an example of teachers positively collaborating to implement new ideas, which is what Joyce and Showers (2002) describe as a success of peer coaching. Teachers' self-efficacy beliefs may be positively influenced by allowing early years teachers time to collaborate about instructional strategies.

Due to the lack of research specific to collaboration in early years training in the UAE, this study is the first of its kind. The results of this study show a need for early years administrators and trainers to agree on this construct and allow for professional development to be grounded in collaboration to improve TSE, thus, influencing instructional choices. Vygotsky's sociocultural theory (1978) views human development as a social process by which people gain mastery in the course of interacting with others in their environment. This process of interaction with a more knowledgeable other occurs within an individual's zone of proximal development. And although

148

this notion is true, one needs to go further as Hogan and Tudge (1999) posit and understand that collaboration also requires more than just a more knowledgeable other. It requires an interweaving of multiple aspects of development, such as cultural-historical, the individual, and interpersonal (Hogan and Tudge, 1999). Allowing teachers an opportunity to collaborate from the same microsystem can lead to teachers' clarification of understanding of new material, influence in teacher behavior, and an emergence of new ideas which may lead to attempting new practices, such as the findings of this study revealed. Such collaborative interaction was critical to this study. In addition to working together, teachers reflecting on their personal journeys with one another is an important part of teacher growth and change (Clarke & Hollingsworth, 2002; Coleman, 2011).

Reflection. Reflection and reflective practices (Wink, 2011) have gained increasing prominence within teacher education, to the point where they are now very much integrated within teacher education programs across a wide range of international settings (Clarke & Hollingsworth, 2002; Korthagen, 2001). Reflection is a crucial variable in supporting teacher change (Clarke & Hollingsworth, 2002; Guskey, 2002). In the UAE, the sociocultural complexities present a challenge in terms of the gap in the learning experiences and processes teachers face in UAE colleges (Hourani, 2013). Richardson (2004) claimed that "reflective practice is incongruent with the values of Arab-Islamic culture and is therefore an inappropriate approach to promote teacher education in the UAE" (p. 111). However, Hourani (2013) posits that reflective tasks are integrated as part of the course-work and summative assignments in the ECAE; nonetheless, reflection is not given as a well-developed course. Another component worth noting is that the language of instruction at the ECAE was in English, and as noted in the research becomes a barrier for teachers who want to express themselves. This study includes

149

descriptions of teachers actively and deliberatively engaging in cognitive processes and encompassing sequences of interconnected ideas, which accounted for their underlying beliefs and knowledge. Through reflecting in Arabic, teachers described their current practices, thoughts, views about the BTT model, and experiences with collaboration.

Through reflections, teachers described their positive feelings of confidence and TSE. Even though the needs assessment discussed in chapter two showed that Emirati early years teachers' low confidence in their ability to promote PSSD depended on their educational training on the topic, this study showed teachers' willingness to try new strategies aligned to CCP and revealed themes of a shift towards child-centered instruction as needed for PSSD. These findings are consistent with the research that confidence effects a teacher's willingness to try new strategies within the classroom (Ross, 1995).

Furthermore, this study revealed findings of teachers' salient decision making towards a shift towards child-centered instruction. One benefit of reflection in the literature shows that it allows teachers an opportunity to engage in an active and purposeful thought process that slows teachers' decision-making process (Rodgers, 2002), identifies their intentions, actions, and draws on context-based knowledge that fosters change in their practice (Danielwich, 2012). According to Harste and colleagues (2004), teachers who can theoretically justify their actions are more successful in making change in their classrooms. Thus, change occurs when thoughts and beliefs about teaching and learning are examined closely, and changes are made to implement new beliefs to improve practice, which this program provided.

Implications for Practice

Although there were only four participants in this study, all measures from this study suggest that, if replicated by early years schools in the Emirates with the aim of providing

150

EEYTs professional development in the BTT pedagogical model and peer coaching, such an intervention may yield positive results around supporting EEYT's self-efficacy in knowledge around CCP needed for PSSD. The CEYPD program revealed positive results from the pre- to post intervention as evident in score changes in the TSE scale for all participants. Qualitative data triangulated these findings yielding themes such as, increased knowledge of the BTT pedagogy framework, increased knowledge in the basic problem-solving process, and open versus closed- ended questions. Within collaboration, findings revealed clarification of the BTT model, emergence of new ideas, experiences with positivity with collaboration, and enhanced efficacy through social persuasion and vicarious experiences. In addition, teachers' reflections showed teachers' abilities to shift instruction towards child-centered strategies, salient decision making and references to feelings of confidence and enhanced TSE. Teachers who incorporate effective teaching strategies that address knowledge around CCP have the potential to produce positive student outcomes. Hence, early years students who struggle to possess the abilities to develop their problem-solving skills need teachers who can effectively support them by fostering 21st century pedagogy, such as the BTT model, into aligned instruction. EEYTs who possess the ability to foster a CCP environment may be able to meet the needs of learners who are performing below the international average in problem-solving skills (OECD, 2014; Irtiqa, 2016). Despite the challenges for EEYTs to shift their pedagogy from traditional to child-centered, Tschannen-Moran and colleagues (1998) found that teachers with high efficacy are able to invest more effort in teaching, persist longer when faced with challenges, and implement more innovative teaching methods. Knowledge about the learning sciences combined with peer coaching (interlaced with reflection), and how it may influence TSE, which effects instruction,

will provide professional developers and policy makers an opportunity to transform the current PD practices to services that directly influence teacher instruction.

Limitations

This study faced several limitations including small sample size, absence of a comparison group and peer reviewer, constrained intervention length, inherent biases, and challenge of translation. The study population sample consisted of four early years Emirati teachers who are full time at Sunshine KG public school in the United Arab Emirates. The small sample size may affect the generalizability of the research findings. To confirm the results of the study, a larger sample should be used if replicated. A larger sample could reveal more information about the effect of the CEYPD program on EEYT's beliefs around BTT pedagogical knowledge as needed for CCP. In addition, the absence of a comparison group means that the study's results cannot be generalizable to other contexts. Shadish and colleagues (2002) posit that if outcomes could be compared to a control group in a similar context, external validity of the results would increase. In order to establish generalizability, the sample size would need to be approximately 30 participants and include a comparison group (Faul et al., 2007).

In addition, an internal validity threat includes the 13-week PD and teacher peer-coaching intervention. This is a limitation because it does not follow the Darling-Hammond et al. (2017) recommendation for effective PD designs for sustained job-embedded professional learning opportunities. Future research on this intervention should occur over a longer period of time such as an entire school year. Although the researcher may see short term influence, future research could focus on some of the long-term objectives presented in the logic model (see Figure 4.2). This could yield data on whether the intervention effects of the research design persist beyond the present study's duration. That is, if components of the intervention are re-examined after a

12-month period, will the EEYT's knowledge of the BTT model for CCP, TSE, and instructional planning have any lasting effects?

Moreover, the researcher was unable to extend the data to a peer reviewer or a peer checker to increase trustworthiness as recommended by Cho & Trent (2006). Increasing the trustworthiness also increases the credibility and reliability of a qualitative study. The peer checker is not without fault; however, if completed would have served to decrease the incidence of incorrect data and interpretation of data.

Furthermore, this research study included participants who volunteered and who may be more likely to participate in this study as some of the participants have prior experience with the researcher who was the instructor of the PD sessions. Additionally, the participants knew each other which may have influenced why they decided to participate. This may have increased the likelihood that they would be positively inclined towards the study and wanted to demonstrate its success. Nonetheless, if they gained knowledge about the learning sciences and incorporate this knowledge, they gained in their lessons, and the study can still be viewed as a success.

Challenges of translation are acknowledged from the perspective that interpretation of meaning is the core of qualitative research. As translation is also an interpretive act, meaning may get lost in the translation process.

Conclusion

This research study examined four early year Emirati teachers' experiences around a CEYPD program. Four participants received online professional development in the BTT pedagogical model (Hardiman, 2012) and peer coaching (Robbins, 1991) followed by six one-on-one online peer coaching sessions. Participants' quantitative data revealed a score change between pre- and post- intervention in their overall self-efficacy beliefs as measured by the

TSES. Qualitative data from semi-structured interviews and reflections showed that participation in the CEYPD influenced EEYT's self-efficacy and provided pedagogical content knowledge around CCP and how to foster PSSD. Allowing teachers an opportunity to collaborate through PD and a peer coaching online platform further encouraged participants to try new strategies and clarified their understanding of new material. It also raised their level of expectations of what early years learners can do.

In addition, this study showed that teachers' experiences of reflection and collaboration had a positive influence on teachers' knowledge, salient decision making, confidence and TSE of the BTT pedagogical framework. This intervention addressed some of the underlying factors associated with low TSE, such as low exposure to adequate training and low confidence in teachers' abilities to teach PSSD. The analysis in this study showed that when teachers work within a community of collaboration and reflection, confidence in accomplishing their goals emerge and begin to shift their knowledge towards child-centered instruction. Providing EEYTs with one-on-one peer coaching as a collaborative inquiry approach allowed teachers to learn from one another in a non-threatening and familiar environment that began the process of vicarious experiences and social persuasion (Bandura, 1977), and thus influenced TSE (Tschannen-Moran & Hoy, 2001). Therefore, it becomes critical that teachers work together and then reflect on their personal journeys with one another as part of teacher growth and change (Clarke & Hollingsworth, 2002; Coleman, 2011). It is recommended that more research be conducted to determine the most effective approach for providing PD and peer coaching to early years Emirati teachers in CCP. The government aspires to develop a knowledge-based economy, which requires new regulations and demand for new initiatives, leaving little time for professional growth that allows teachers an opportunity to understand how they can promote

PSSD. Traditionally, the professional learning of in-service early years teachers provided by each district has only minimally addressed curriculum strategies that can be immediately transferred or aligned to instructional strategies that are purposively relevant. And when it is provided, should always be presented in the first language of the teachers receiving the professional learning. The existing literature on in-service training emphasized the need for meaningful professional development for teachers throughout the Emirates (Bond, 2016; Blaik-Hourani & Litz, 2018), especially in early years where national teachers in a 2015 survey claimed their dissatisfaction (Bond, 2016). Therefore, as the literature and research study indicate, developing meaningful, strategic, and effective professional development opportunities where teachers can model and observe as well as give on-going feedback to each other will be helpful in building teacher self-efficacy and knowledge around CCP as needed to foster PSSD. Future research should focus on peer coaching that occurs for a sustained period of time and is job embedded so that any positive gains are long-lasting.

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A Survey Study of Early Childhood Teachers' Beliefs and Confidence about Teaching Early Math

Jie-Qi Chen · Jennifer McCray · Margaret Adams · Christine Leow

By completing this survey or questionnaire, you are consenting to be in this research study. Your participation is voluntary, and you can stop at any time.

Early Math Beliefs and Confidence Survey

Section 1: Beliefs About Early Years Students and Math

Below are some ideas we've heard from early years teachers about their students and math. On this page, please indicate what you think about these ideas.

For each of the following statements, rate your agreement by checking the appropriate box.

Most children **in my class** _____	*Strongly Disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
1. Enter preschool with little math knowledge					
2. Have the cognitive abilities to learn math					
3. Should be helped to learn math in early years					
4. Are very interested in learning math					
5. Need to learn math in early years to be ready for grade 1					
6. Learn a great deal about math through their everyday activities					
7. Need structured early years math instruction					
8. Should be helped to learn math using a published math curriculum					

Section 2: Confidence in Helping Early Years Students Learn Math

Some early years teachers have told. Us they don't feel comfortable helping their students learn math. Others feel confident; still others say they are confident in some areas of math but not in others. On this page, please indicate how you feel about helping early year learners learn math.

For each of the following statements, rate your agreement by checking the appropriate box.

I am confident in my **knowledge** of ____.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. what the children in my classroom <u>know about</u> <u>math when they enter early years</u>					
2. reasonable math <u>goals</u> for early years					
3. the <u>best practices and strategies</u> for helping early years learn math					
4. local or national math <u>standards</u> for early years					
5. the best ways to <u>assess</u> children's math knowledge and understanding throughout the year					
I am confident in my **ability** to ____.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. <u>observe</u> what early years know about math					
7. <u>incorporate</u> math learning into common preschool situations (such as art or dramatic play)					
8. <u>plan</u> activities to help early years learn math					
9. <u>further early years' math knowledge</u> when they make spontaneous math comments/ discoveries *Example: When child says "I have four blocks" asking child how many blocks he would have if you gave him one more.*					
10. <u>make sense of preschoolers' confusions</u> when they learn math *Example: Why child thinks and aren't the same shape.*					
11. <u>translate</u> assessment results into curriculum plans					

Section 3: Confidence in Your Math Abilities

Some early years teachers have told us that they just aren't good at math. Others say they love math. Still others say how they feel depends on the specific area of math.

In this section, please indicate how you feel about math and your math abilities.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Math was one of my best subjects in school.					
2. Just the word "math" can make me feel nervous.					
3. I'm not a "math person."					
4. I can easily rotate objects in my mind *Example: Figuring out how something would look from another angle.*					
5. I like coming up with creative ways to solve math problems.					
6. I can easily convert fractions into percentages and decimal numbers.					
7. I have a bad sense of direction.					
8. I'm good at looking at numeric data and finding patterns.					
9. I'm good at estimating how tall something is or the distance between two locations.					

☐ Please check here if you are interested in participating in the semi-structured interview protocol.

Thank you very much for sharing your experiences.

Appendix B

Semi-structured Interview Questions about Early Year Teachers' Self-efficacy in Implementing Problem-solving skills

Welcome! Thank you for voluntarily offering your participation in this interview. Over the next 30-45 minutes, I will be interviewing you to ask specific questions about your perceptions and experience regarding problem-solving skills development. Sometimes I will probe you to further elaborate an answer.

Your answers will be helpful to me, the researcher, to help me understand if this training affected your personal and efficacy beliefs. I am specifically interested in understanding how child-centered pedagogy theory as learned during your teacher training affected your personal and general teaching efficacy beliefs. If you need to take a break at any time, please let me know.

This research is being conducted with approval by the Institutional Review Board of the School of Education at Johns Hopkins University. If you want any additional information about this assignment, please contact Dr Christine Eccles via email and I provide you with the email. The consent document you've signed contains her contact information.

Before we begin, I want to reassure we will keep this information confidential and your name will not appear in the report we write summarizing these interviews. It would be helpful if I audio record the interview. Can we begin, or do you have any questions?
Ok, let's begin the interview.

Research Questions Set 1
1) What kind of problem-solving pedagogy training did you receive in College/ University?
2) Since completing school/university, have you had any professional development about problem solving pedagogy? If so, what did you learn?

Research Questions Set 2
3) How do you describe your role as a teacher when it comes to problem solving instruction?
4) How do you know when your students understand how to problem solve?
5) In the school setting, how you decide what to teach and what not to teach?
6) How do your students best learn problem solving?
7) How do you know when problem solving is occurring in your classroom?
8) How important is receiving problem solving pedagogy training compared to other subjects you teach?

Research Questions Set 3
9) How would you describe the best practices and strategies for helping early year learners learn problem solving?
10) How would you further preschoolers' math knowledge when they make spontaneous problem-solving discoveries?
11) How do you know when you are being creative in solving problems? Can you give an example?

Appendix C

Theory of Treatment Figure

**Support Section/
Key Components**

**Short term
Outcomes**

Intermediate

Final Outcome

Intervention:

6 weekly- 120-minute PD content-based seminars/ followed by 1 PD on Peer-coaching techniques/ followed by 6 weeks of Peer-coaching.

PD: (3) BTT Targets 1-3 & its applicability to early years
PD: (3) BTT Targets 4-6 & its Alignment to Child-centered pedagogy skills and its impact on fostering problem-solving skills

PD: (1) Peer-coaching Techniques: Collaboration/ Reflection and its benefits for teachers

Teacher Peer-Coaching: Over the duration of the week 7-12, the teachers will engage in peer coaching. Teachers will meet with peer after each peer-coaching session for 40 minutes to reflect and support the collaborative process/ debrief and co-plan next session.

Increase teacher knowledge of effective early years pedagogical content

Improved teacher self-efficacy for child-centered learning and strategies

Teachers increase their use of child-centered pedagogy strategies in the classroom

Change in teachers' pedagogical practices and associated beliefs

Target Population
Ministry of Education (MOE)- In-service Early years Emirati teachers teaching in Al Ain, United Arab Emirates (UAE).

193

Appendix D

Attendance Log

This section will provide the attendance log for my POP intervention. Since the intervention study was delivered remotely, the template was converted to a Microsoft Form for a contactless experience due to the COVID-19 pandemic.

Attendance Template

Professional Development Attendance Log

Date:_____   Session #_____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Teacher's Name _____ ERP # _____

Instructor signature: _____

Teachers' Sense of Efficacy Scale

Teachers' Beliefs

Developed by Megan Tschannen-Moran and Anita Woolfolk Hoy

This survey is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about the statements below by selecting the right box. Your answers are confidential.

Directions: Please indicate your opinion about each of the questions below by marking any One of the nine responses in the columns on the right side, ranging from (1) "None at All" to (9) "A Great Deal" as each represents a degree on the continuum.

Please respond to each of the questions by considering the combination of your current ability, resources, and opportunity to do each of the following in your present position.

Questions	Not at All		Very Little		Some Degree		Quite a Bit		A Great Deal
1. How much can you do to get through to the most difficult students?	1	2	3	4	5	6	7	8	9
2. How much can you do to help your students think critically?	1	2	3	4	5	6	7	8	9
3. How much can you do to motivate students who show low interest in school work?	1	2	3	4	5	6	7	8	9
4. How much can you do to get students to believe they can do well in school work?	1	2	3	4	5	6	7	8	9
5. How well can you respond to difficult questions from your students?	1	2	3	4	5	6	7	8	9
6. How much can you do to help your students value learning?	1	2	3	4	5	6	7	8	9
7. How much can you do to gauge student comprehension of what you have taught?	1	2	3	4	5	6	7	8	9
8. To what extent can you craft good questions for your students?	1	2	3	4	5	6	7	8	9
9. How much can you do to foster student creativity?	1	2	3	4	5	6	7	8	9
10. How much can you do to improve the understanding of a student who is failing?	1	2	3	4	5	6	7	8	9

Questions	Not at All		Very Little		Some Degree		Quite a Bit		A Great Deal
11. How much can you do to adjust your lessons to the proper level for individual students?	1	2	3	4	5	6	7	8	9
12. How much can you use a variety of assessment strategies?	1	2	3	4	5	6	7	8	9
13. To what extent can you provide an alternative explanation or example when students are confused?	1	2	3	4	5	6	7	8	9
14. How much can you assist families in helping their children do well in school?	1	2	3	4	5	6	7	8	9
15. How well can you implement alternative strategies in your classroom?	1	2	3	4	5	6	7	8	9
16. How well can you provide appropriate challenges for very capable students?	1	2	3	4	5	6	7	8	9

Please respond to each of the questions by considering the combination of your current ability, resources, and opportunity to implement growth mindset instructional practices in your present position when responding to the items.

Questions	Not at All		Very Little		Some Degree		Quite a Bit		A Great Deal
17. How well can you respond to difficult questions from your students?	1	2	3	4	5	6	7	8	9
18. How much can you gauge student comprehension of what you have taught?	1	2	3	4	5	6	7	8	9
19. To what extent can you craft good questions for your students?	1	2	3	4	5	6	7	8	9
20. How much can you do to adjust your lessons to the proper level for individual students?	1	2	3	4	5	6	7	8	9
21. How much can you use a variety of assessment strategies?	1	2	3	4	5	6	7	8	9
22. To what extent can you provide an alternative explanation or example when students are confused?	1	2	3	4	5	6	7	8	9
23. How well can you implement alternative strategies in your classroom?	1	2	3	4	5	6	7	8	9
24. How well can you provide appropriate challenges for very capable students?	1	2	3	4	5	6	7	8	9

Appendix F

Post-Intervention One- on- One Interview

After the professional development sessions, the researcher will conduct one-on-one interviews with each participant. These meetings will provide space to delve deeper into each participants' perspective and experience regarding the BTT as needed for PSSD. The researcher is specifically interested in understanding how the BTT as learned during their teacher training affected their personal and general teaching efficacy beliefs for instructional strategies (Gibson & Dembo, 1984; Tschannen-Moran et al., 1998). Also, a process of evaluation question related to context will be addressed.

Q. 1) What were your expectations regarding problem-solving skill development when you first entered the classroom/ prepared lesson plans after training?

Q. 2) Did your observations of the children match your expectations?

Q. 3) How were your observations different/similar to your expectations?

Q. 4) In what ways are you facilitating early years learners' problem-solving skill development?

Q. 5) Through your observations of the children, have you discerned an overall process that they go through as they problem solve?

Q.6) How have your beliefs about your ability to use BTT instructional practices to develop early years learners' problem-solving skills changed as a result of this professional develop session?

Q.7) Did you feel that your language was considered when creating the materials for intervention? Explain how?

***Participants may be asked follow up questions, such as can you provide examples, or the researcher may ask for an explanation.

Teacher Weekly Report

Section 1 Adapted from "*A model for increasing reform implementation and teacher efficacy: teacher peer-coaching in grade 3 and 6 mathematics*" by Bruce, C. D., & Ross, J. A. (2008).

Section 2 Adapted from "Are We Really Co-teaching" by Villa, R., Thousand, J., & Nevin, A, 2004, *A guide to co-teaching: Practical tips for facilitating student learning*. Copyright 2004 by Corwin Press.

Co-planning and Peer coaching

Section 1

1. How much time did you spend co-planning this week?
2. Did you observe your partner teaching in alignment with the BTT model?
3. Did you talk to your partner about what you saw?
4. Did you get feedback from your partner about she saw?
5. Did you help your partner in setting her BTT goals?
6. Did you set a date for your follow up observation?
7. What challenges or successes would you like to share?
8. Do you have any questions? If so, please record below
Section 2
Directions: Check "yes" or "no" for each of the following statements.
1. We decide which BTT targets we are going to use in a lesson based on the benefits to the students.
2. We share ideas, information and material.
3. We identify the resources and talents of the peer coaching.
4. We are aware of what our peer-teacher(s) is doing even when we are not directly in one another's presence.
5. We share responsibility for deciding what to teach.
6. We agree on the curriculum standards that will be addressed in a lesson.
7. We share responsibility for deciding how to teach.
8. We share responsibility for deciding who teacher which part of a lesson.
9. We are flexible and make changes as needed during a lesson.
10. We identify student strengths and needs.
11. We share responsibility for differentiating instruction.

Appendix H

Reflection Sheet for PD

Adapted from "Co-Teaching English Language Learners with Disabilities: The Relationship Among Self-Efficacy, Collaboration, and Reflection" by Jennifer Gonzalez, 2017, Doctoral Dissertation, p. 155.

1. Was the professional development session effective? Why or why not?

2. Do you feel like this PD session connected to what you are doing in the classroom? Please explain your answer.

3. How has the reflection completed during this session influenced your thinking? Is there anything you plan to try or not sure about?

4. How has your collaboration with one another (in discussing this topic or lesson plan creation) influenced your thinking?

5. Please tell me what I could change in the professional development sessions that would help you implement instructional practices to develop early years' learners problem-solving skills?

Appendix I

Reflection Structure for Peer Coaching

After the peer coaching sessions, the researcher will ask participants to complete this reflection

questionnaire. These questions will help the researcher probe into each participants' perspectives

and experience regarding the BTT model and CCP as needed for PSSD. The researcher is

specifically interested in understanding how the BTT model as learned during their teacher

training affected their teacher self-efficacy for instructional strategies (Gibson & Dembo, 1984;

Tschannen-Moran et al., 1998).

Researcher: We are now going to take some time to reflect.

Over the past week…

- How do you think your mindset has changed about teaching and learning?

    o Why do you think this happened?

    o How will this change your role in the classroom?

    o What do you think you will change or keep the same?

Connection to Future Teaching

- How do you think you will apply what you discussed today?

Appendix J

BTT Slide Presentation

Adapted from Hardiman, M. (2012). *Brain-Targeted Teaching for 21st century schools.* Thousand Oaks, CA: Corwin Press. Retrieved from http://braintargetedteaching.org/Media/BTT_Planning_Template%20(1).pdf

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:
- ☑ **Predictability/routines**
- ☑ **Personal connection between teacher and student**
- ☑ **Personal connection between content and student**
- ☑ **Trust and acceptance**
- ☑ **Warm and supportive environment**
- ☑ **Control and choice**
- ☑ **Humor**
- ☑ **Music, visual art, dance, drama, creative writing**
- ☑ **Celebration**
- ☑ **Family and community connections**

- How does a positive climate encourage a sense of industry and competence?
- What are some factors that create a negative climate in the classroom and what are the consequences of that climate?
- How can teachers create a positive emotional climate?
- What routines in the classroom offer a sense of security and order?
- How can teachers use behavior-specific praise of effort throughout the unit?

BT #1 ACTIVITIES

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

Features:
- ☑ **Novelty: Change displays often**
- ☑ **Aesthetics: Visually appealing classroom, color and design**
- ☑ **Sensory: Sound, lighting, scents**
- ☑ **Order: Establish class routines**
- ☑ **Movement: Facilitate organized movement**
- ☑ **Inviting Surroundings: Bulletin boards, lamp light, plants, furniture, multicultural themes, master art work, photography**
- ☑ **Display students' work attractively**

- How can the environment help learning?
- What sensory conditions in a classroom can foster attention or inattention?
- How can the teacher balance novelty and consistency in the classroom?
- What elements of the physical environment can block learning?

BT #2 ACTIVITIES

Features:

☑ **Use of Common Core State Standards and curriculum scope and sequences**

☑ **Articulation of key learning goals and objectives**

☑ **Assessment of prior knowledge**

☑ **Design of concept map through graphic organizer that demonstrates overarching content and concepts; employs tenets of mind mapping, non-linguistic structures, and curriculum mapping**

☑ **Demonstration of connections among concepts**

☑ **Design of "big-picture" activities**

☑ **Promotion of students' personalized learning goals**

☑ **Activities that align with summative assessments**

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

- What Common Core State Standards are to be taught during the learning unit?
- What learning goals can develop from the content standards?
- What main concepts can derive from the learning goals?
- How can concept mapping promote a global understanding of the main concepts?
- How can mapping help the teacher determine the students' prior knowledge of those concepts?
- How can mapping give a preview of what is to come in the instruction?
- How can mapping use familiar concepts/terms to relate to new concepts/terms?
- How can mapping give concepts in general terms before presenting the specifics?

BT #3 Concepts Maps and Learning Goals

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:
- ☑ **Emotional connection to content**
- ☑ **"Big Picture "concepts**
- ☑ **Repeated rehearsals**
- ☑ **Elaboration through arts integration: Visual arts, Music, Theater, Dance, Creative writing**
- ☑ **Spacing time for consolidation of learning**
- ☑ **Varied and novel learning activities**
- ☑ **"Chunk" and space learning tasks**
- ☑ **Mnemonics**
- ☑ **Summarize/ rephrase**
- ☑ **Student choice in activities**
- ☑ **Meaningful movement integration**
- ☑ **Technology integration**

- Based on content standards, learning goals and main concepts, what **content, skills and concepts** must students **master** in this learning unit?
- What **instructional objectives** will facilitate mastery of the content, skills and concepts?
- What **activities** will facilitate learning?
- What **variety** of activities will allow for repeated rehearsal and allow for elaboration of learning objectives?

BT #4 Objectives and Activities

1. OBJECTIVE:
   -ACTIVITIES

2. OBJECTIVE:
   -ACTIVITIES

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:
- ☑ **Comparisons**
- ☑ **Classifications**
- ☑ **Divergent thinking tasks**
- ☑ **Creative application of content**
- ☑ **Analysis and synthesis**
- ☑ **Metaphors and analogies**
- ☑ **Cause and effect**
- ☑ **Investigations**
- ☑ **Experiments**
- ☑ **Problem-solving using real-world contexts**

LEARNING GOALS *The students will* <u>apply</u> *their knowledge of …by…*

BT #5
1. OBJECTIVE:
    -ACTIVITIES

2. OBJECTIVE:
    -ACTIVITIES

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#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Immediate, frequent, relevant feedback**
- ☑ **Feedback that verifies correct responses**
- ☑ **Feedback that requires students to extend thinking**
- ☑ **Authentic performance assessment**
- ☑ **Anchor papers; models of exemplary response**
- ☑ **Rubrics, scoring tools**
- ☑ **Self-reflection and journals**
- ☑ **Task revisions**
- ☑ **Formative and summative assessments**

Base your evaluation on the numbered objectives in Target #4 and #5

BT #6 ACTIVITIES
1. OBJECTIVE:
    -ACTIVITIES

2. OBJECTIVE:
    -ACTIVITIES

208

Appendix K

BTT Pedagogical Framework Application

This section will provide a short description of what the EEYTs presented as their application

activities for each target. The researcher makes brief connections to child-centered pedagogy as

needed for fostering PSSD as well connections to current research. All target applications were

presented to the students through an online platform, Microsoft Teams, throughout the

intervention study.

Table 1

EEYT's Brain Target-One Application Artifact Description

BTT Model	Brain Target-One
Teacher 1	Teacher 1 (through a voice note) applied target one through enriching dialogue with the students. She allowed students autonomy/choice by asking what animal they want to learn about next week. The recording shows a student (male) engaging in the conversation about what animal he wants to learn about. Child as active learner- describes to the extent to which the teacher allows the child to explore and interact with the environment. Teacher will be seen as allowing autonomy in decision making.
Teacher 2	Teacher 2 presents a video of a girl responding as the teacher kindly asks her about her current emotional state. There seems to be an understood establishment of trust and connection in the relationship. The student shares her experiences and explains how she feels happy because she was able to visit her grandma amidst the COVID pandemic. In fostering PSSD this subscale and target emphasize the importance of emotional relationships to child development.
Teacher 3	Teacher 3 focuses on effort – Teacher 3 displayed a video of whales swimming through in the ocean and asked students to write the first sound they hear when they say the word whale. Student were praised on effort. Teacher 3 encouraged independent writing and focused on effort rather than the output or outcome. She explained that making mistakes is okay- we focus on effort to reach success. Hardiman (2012) explains that praising students based on intelligence appears to reduce confidence when they encounter a difficult task, whereas praising effort enhances perseverance and engagement (p. 42). Engagement is linked to

Teacher 4	Teacher 4 emphasized the importance of building a healthy relationship with her students as she begins the day with singing with total physical response connected to their emotions (systems and routines). She emphasized the importance of movement to cognition.

Table 2

EEYT's Brain Target-Two Application Artifact Description

BTT Model	Brain Target-Two
Teacher 1	Teacher 1 encouraged students to take their virtual lesson to outside areas filled with fresh air and natural sunlight. Multiple pictures of students being outdoor during online class time show the application of this target.
Teacher 2	Teacher 2 gave students an option to go outside and connect to Microsoft Teams during their online class session. A mother video tapes her child choosing to sit outside as comments that he "enjoys learning in nature". The mother sends a picture of the student studying both inside and outside and shows how the child seems happier learning outside. Hardiman (2012) posits, "Learning is optimized when children are in environments that are free from clutter and are aesthetically pleasing. "Teachers should deliberately plan the physical environment as they establish the goals and objectives for each new learning unit (p, 69-71).
Teacher 3	Teacher 3 implemented this target by applying it to her personal life. She sent me a video of how natural light comes in the house and the effect it has on her mood. She showed a video of her garden and began taking early morning walks outside because of the effect she understood the sun had on someone's mood. She explained how stress interferes in daily life and how sometimes teachers need space and nature's calm to rejuvenate. Current research supports Teacher 3 as the well-being of teachers is just as important as the well-being of students.
Teacher 4	Due to the covid pandemic, it was difficult for teachers to impact the child's physical environment. However, Teacher 4 encouraged students to take their lessons outside or near a window for natural sunlight and greenery.

Table 3

EEYT's Brain Target-Three Application Artifact Description

BTT Model	Brain Target-Three
Teacher 1	For this target, Teacher 1 applied the mapping a concept map process. Students make simple concept maps, such as a home and the arms coming out were people who live in their home. Students applied a concept map to many other topics, such as, what lives outside, and what does a plant need to grow.
Teacher 2	For this target, Teacher 2 included a fishbone activity for the students. She displayed a problem, "Why do you think Hamad's plant died?" Students had to complete the fishbone with different causes that may have impacted this outcome.
Teacher 3	To highlight the importance of concept maps, Teacher 3 presented the students with a concept map of living things. Posner and Rothbart, 2007 posit that "When we guide learning by providing students with broader view or "big picture," we promote an understanding of the connections between prior knowledge and new learning and also demonstrate the relationships among learning goals. This is consistent with the brain's propensity to look for patterns and associations between information at the forefront of thought and information stored in memory" (p. 205).
Teacher 4	Teacher 4 also encouraged students to complete concept maps. Students had to complete a concept map on what does a plant need to grow?

Table 4

EEYT's Brain Target-Four Application Artifact Description

BTT Model	Brain Target-Four
Teacher 1	Teacher 1 showed the application of this target through students sending videos of their art work integrated in writing. The project was a picture book.

Teacher 2	Arts Integration, Teacher 2 sent me a video of a student integrating drawing in her assignment. She also pretended to be a teacher and explained her answer. The student took the lesson further to show a real tree in the environment and watered it.
Teacher 3	Teacher 3 showed how she applied Arts integration to help students master the different parts of a flower. Some students created the flower through a large arts display, while others created the parts of a flower through using vegetable parts like carrots and cucumbers. The long cucumber was the stem, and the petals were the round carrots slices. The roots were slices of dry toast. Rinne, Gregory, Yarmolinskaya, and Hardiman (2011) argue that arts integration, the use of the arts as a pedagogical method for enhancing and reinforcing learning goals, represents a powerful strategy for helping to make sure that information "sticks" in children's memories.
Teacher 4	Teacher 4 had students complete an Arts integration project to mastery what a plant needs to grow. Students found resources around their home that replicated different parts of the plant. Students were encouraged to use glue, scissors, and different mediums of colors.

Table 5

EEYT's Brain Target-Five Application Artifact Description

BTT Model	Brain Target-Five
Teacher 1	She presented more challenging questions by applying Bloom's taxonomy (questions) to the lesson. I love cucumbers and what do you like? Who remembers the steps of planting? Imagine if there weren't any vegetables, what would happen? Teacher 1 encourages a student who just learned about how to plant some seeds in a garden and water it. Teacher 1's Brain Target-Six application artifact description explained the process of what the plant needs to grow.
Teacher 2	In this target, Teacher 2 show a student a video with the intent to engage and get the student's attention. Teacher 2 posed a problem about the carrot and asked how she would be able to solve the problem and remove the carrot from the ground? The teacher asked the student to physically show her how she would remove the carrot from the ground. Teacher 2 was also inspired by this professional development and felt she has the confidence to embark on an initiative to involve students in an innovative project called, From the Emirates, I innovate. 14 students participated in this district initiative and her student won first place for sustainable environment.

| Teacher 3 | Teacher 3 presented a problem to her students explaining that one student does not like to eat healthy food and the mother is concerned with her son's eating habits. She needs help from the KG 2 students. She called on students to ask them for help. How can we help Khalid to begin to like fruits and vegetables? One student responded, we can decorate the food to help him want it. He opened his camera and displayed a fruit salad as an example. This type of instruction allows students to see how instructional goals relate to their own lives in real-world problem-solving; this connection helps make the learning experience more meaningful and fun (Hardiman, 2012). |
| Teacher 4 | Teacher 4 began presenting the problem of the week for students to develop their problem-solving skills. The problem presented included: Hamad does not like to eat fruits and vegetables, but we know how good they are for one's health. What can we do to help Hamad to start eating fruits and vegetables? It seemed that Teacher 3 and Teacher 4 for were partners in the peer-coaching process selected the same problem. |

Table 6

EEYT's Brain Target-Six Application Artifact Description

BTT Model	Brain Target-Six
Teacher 1	Teacher 1 evaluated the students through rubrics on how they understood the lesson. The students were given a template and asked to complete the question, "What are my rights as a child?" Students were encouraged to color a picture after their response.
Teacher 2	Teacher 2 included a student made video to show how the student memorized the rubric and self-assessed her own work. Allowing students an opportunity to self-assess is a reflective activity good for supporting self-regulation skills.
Teacher 3	Teacher 3 presented the students with a rubric for a task to help them achieve success. Each part of the task that was required was carefully outlined in the rubric. The students had to self-assess at the end of the activity. Students practicing self-assessment is a reflective activity that will support their self-regulation skills. Teacher 3 supported the rubric with a video of a student self-assessing her work.
Teacher 4	Teacher 4 had a video of a student explaining the rubric for how to read. She explains the steps and how she applies it.

Appendix L

Online Platforms Used During the Professional Development

This section will provide a short description and the use of the online platforms applied during

this intervention. The online platforms included, Mentimeter, Padlet, Whiteboard.fi and Nearpod.

Table 1

Platforms Used During the Professional Development

Platform	Description and Use
Mentimeter	Mentimeter is an interactive presentation platform used to engage students through smart devices using 13 question types including live polls (to collect opinions), word clouds, multiple-choice questions, etc. https://mentimeter.com
Padlet	Padlet, private or public, is a collaborative digital notice board that enables features like images, links, videos, and documents to be easily accessible from any web browser-capable device. One can create a single or multiple walls that are able to house all the posts one wants to share. https://padlet.com
Whiteboard.fi	Whiteboard.fi is an instant online formative assessment tool that provides the teacher with a live overview of student work. This virtual classroom allows students to see their work, whereas the teacher can see all students' works simultaneously. https://whiteboard.fi
Nearpod	Nearpod is a simple online interactive presentation tool. It is mainly used as a substitute for other presentation tools. The feature of Nearpod used for this intervention was "Draw It" which is built into the presentation. Teachers work on their own devices while enabling the instructor to simultaneously share teacher's good work and model good progress. https://nearpod.com

Note: All of these platforms were interactive online tools that were used with the purpose of engaging participants and building a connected culture.

Appendix M

BTT One – Sample Application Template

In the first PD session, EEYTs were given a sample of how to apply what they learned from target one and apply it practically in the classroom. This template shows how teachers may help students unpack their emotions by asking students how they feel. This simple strategy is presented to students to help them reflect on their emotions and for teachers to get an understanding of how their students are feeling that day. This activity is intended to help students release their emotions, which may be what was holding them from reaching optimal learning for that day (Hardiman, 2012).
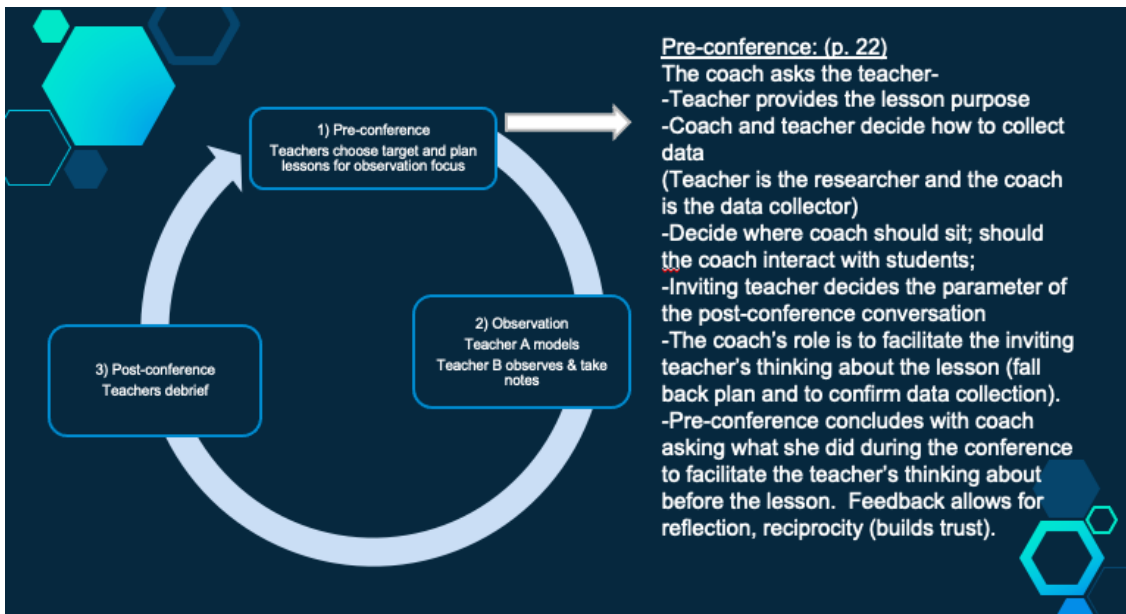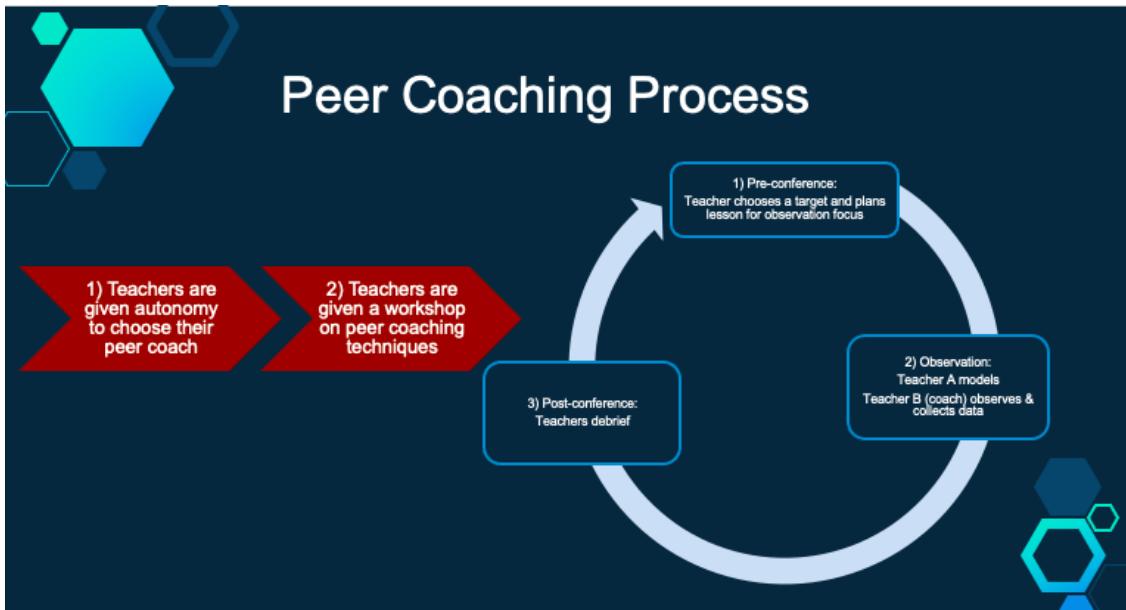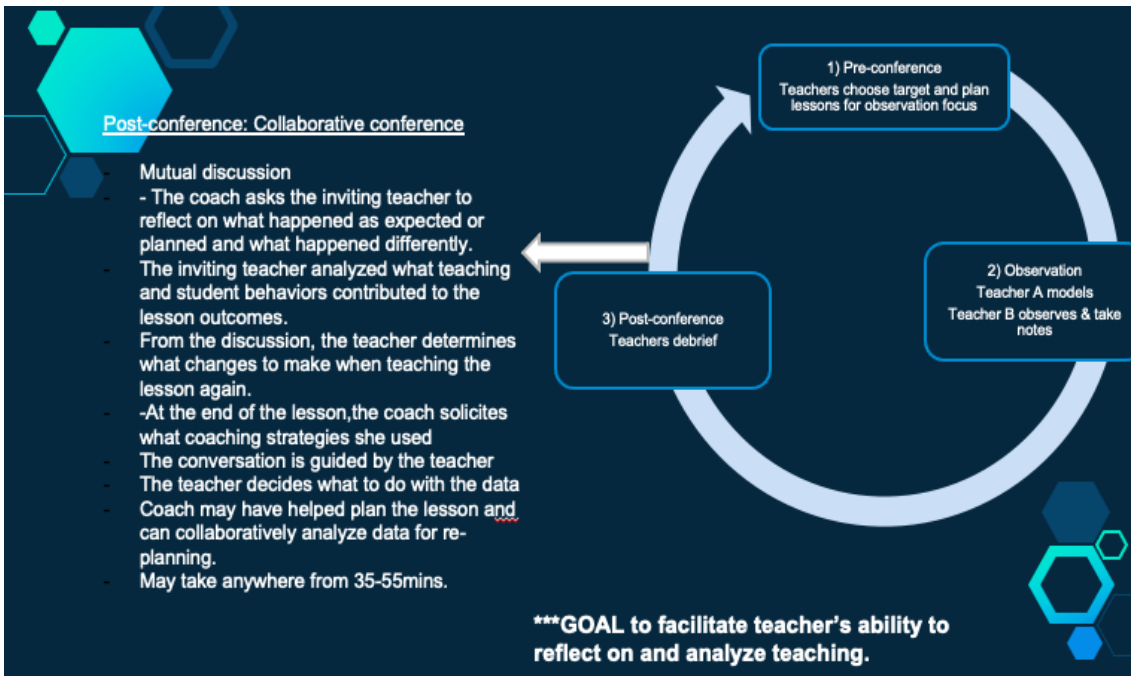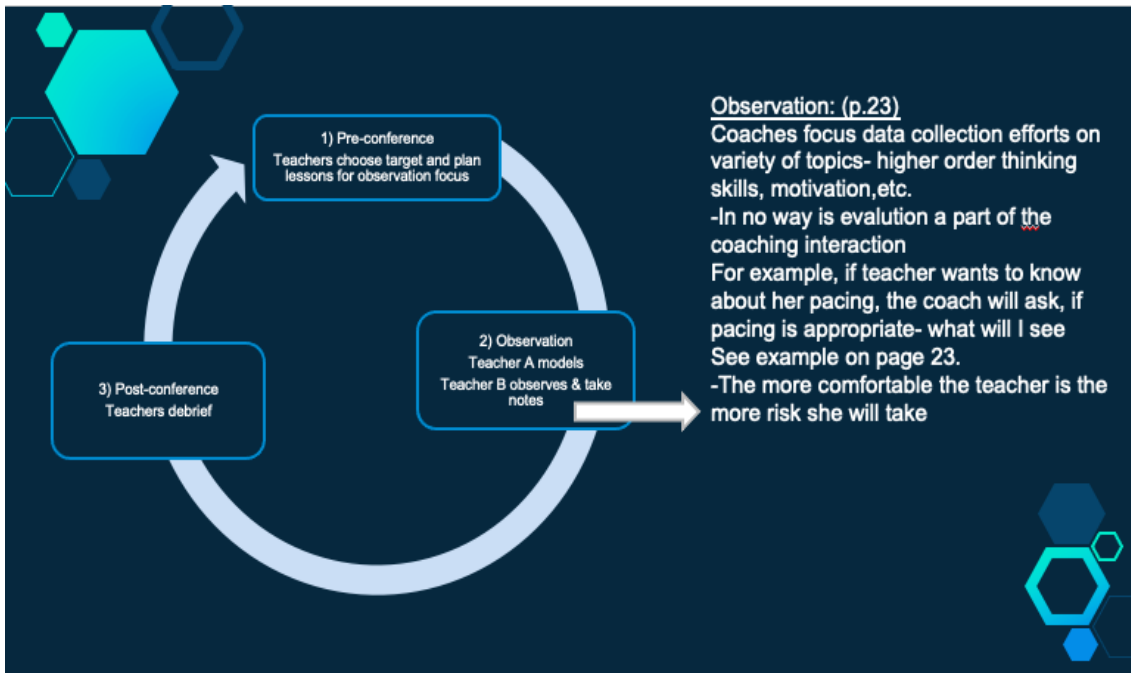

Note. The sample reads, how do I feel today, circle one? Write how you feel right now. Draw how you feel right now.

Appendix N

Teacher Peer-Coaching Slide Presentation

Adapted from Robbins, P. (1991). H*ow to implement a peer coaching program*. Alexandria, VA: ASCD.

Observation: (p.23)
Coaches focus data collection efforts on variety of topics- higher order thinking skills, motivation,etc.
-In no way is evalution a part of the coaching interaction
For example, if teacher wants to know about her pacing, the coach will ask, if pacing is appropriate- what will I see
See example on page 23.
-The more comfortable the teacher is the more risk she will take

1) Pre-conference
Teachers choose target and plan lessons for observation focus

2) Observation
Teacher A models
Teacher B observes & take notes

3) Post-conference
Teachers debrief

Post-conference: Collaborative conference

Mutual discussion
- The coach asks the inviting teacher to reflect on what happened as expected or planned and what happened differently.
- The inviting teacher analyzed what teaching and student behaviors contributed to the lesson outcomes.
- From the discussion, the teacher determines what changes to make when teaching the lesson again.
- -At the end of the lesson,the coach solicites what coaching strategies she used
- The conversation is guided by the teacher
- The teacher decides what to do with the data
- Coach may have helped plan the lesson and can collaboratively analyze data for re-planning.
- May take anywhere from 35-55mins.

1) Pre-conference
Teachers choose target and plan lessons for observation focus

2) Observation
Teacher A models
Teacher B observes & take notes

3) Post-conference
Teachers debrief

***GOAL to facilitate teacher's ability to reflect on and analyze teaching.

Early Years Emirati Teachers' (EEYT) Demographic Characteristics

This section will provide the demographic characteristics of the EEYTs.

Table 1

EEYT's Demographic Characteristics Template

	Education level	Years of experience-teaching	Years of experience teaching- early years
Teacher 1	Bachelor's in Education	24	24
Teacher 2	Bachelor's in Education	18	18
Teacher 3	Bachelor's in Education	20	20
Teacher 4	Bachelor's in Education	20	20

Appendix P

Peer Coaching Weekly Report

This section will provide the peer coaching weekly report completed by the participants after

each peer coaching session. Appendix G includes all questions.

Table 1- Section 1

EEYT's Peer Coaching Weekly Reports

| Teacher	Date of Peer-Coaching Session	Q. 1 How much time did you spend co-	Q. 2 Did you observe your partner teaching in alignment	Q.3 Did you talk to your partner about	Q.4 Did you get feedback from	Q.5 Did you help your partner in	Q.6 Did you set a date for your follow up	Q.7 What challenges or successes would you like to share?	Q.8 Do you have any
T4	12/5/20	1 hour	Yes	Yes	Yes	Yes	Yes	Evaluation rubrics and problem solving	No
T2	12/16/20	1 hour	Yes	Yes	Yes	Yes	Yes	We need to be trained more about how to be trainers	Yes
T3	12/19/20	1 hour	Yes	Yes	Yes	Yes	Yes	I liked the evaluation rubrics my friend used, and God-willing I will apply it the same way.	No
T3	1/1/21	1 hour	Yes	Yes	Yes	Yes	Yes	The challenges in implementing in Islamic Studies classes.	No
T1	1/11/21	1 hour	Yes	Yes	No	Yes	Yes	Good planning by the teacher shows on the child's levels and the engagement of the students on the lesson presented.	No
T2	1/13/21	90min	Yes	Yes	Yes	Yes	Yes	The planning has become deeper because of the brain targets.	No
T4	1/17/21	1 hour	Yes	Yes	Yes	Yes	Yes	Using the big picture in the third target with the children to achieve and challenge the children	No
T1	1/19/21	30 mins	Yes	Yes	Yes	Yes	Yes	The exchanging experiencing and using a variety of lesson plans, which benefits the child.	No
T2	1/20/21	1 hour	Yes	Yes	Yes	Yes	Yes	Now, I became a trainer and became more detailed in more than one area and I became deeper in details.	No
T1	1/23/21	1 hour	Yes	Yes	Yes	Yes	Yes	The plans that are given by the teacher need to cover every aspect and need that concerns the child and measures and presents the child from every angle.	No
T3	2/1/21	90min	Yes	Yes	Yes	Yes	Yes	Thinking and problem solving.	No
T4	2/1/21	1 hour	Yes	Yes	Yes	Yes	Yes	Challenges are the evaluation rubrics. The successes are giving students greater challenges.	No

Table 1- Section 2

EEYT's Peer Coaching Weekly Reports

Teacher	Date	Q.1 We decide which BTT targets we are going to use in a lesson based on the benefits to the students.	Q.2 We share ideas, information, and material.	Q.3 We identify the resources and talents of the peer coaching.	Q.4 We are aware of what our peer-teacher(s) is doing even when we are not directly in one another's presence.	Q.5 We share responsibility for deciding what to teach.	Q.6 We agree on the curriculum standards that will be addressed in a lesson.	Q.7 We share responsibility for deciding how to teach.	Q.8 We share responsibility for deciding who teacher which part of a lesson.	Q.9 We are flexible and make changes as needed during a lesson.	Q.10 We identify student strengths and needs.	Q.11 We share responsibility for differentiating instruction.
T4	12/5/20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T2	12/16/20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T3	12/19/20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T3	1/1/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T1	1/11/21	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T2	1/13/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T4	1/17/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T1	1/19/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T2	1/20/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T1	1/23/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T3	2/1/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T4	2/1/21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix Q

BTT & Peer Coaching Slide Presentations

Adapted from Hardiman, M. (2012). *Brain-Targeted Teaching for 21st century schools.* Thousand Oaks, CA: Corwin Press.
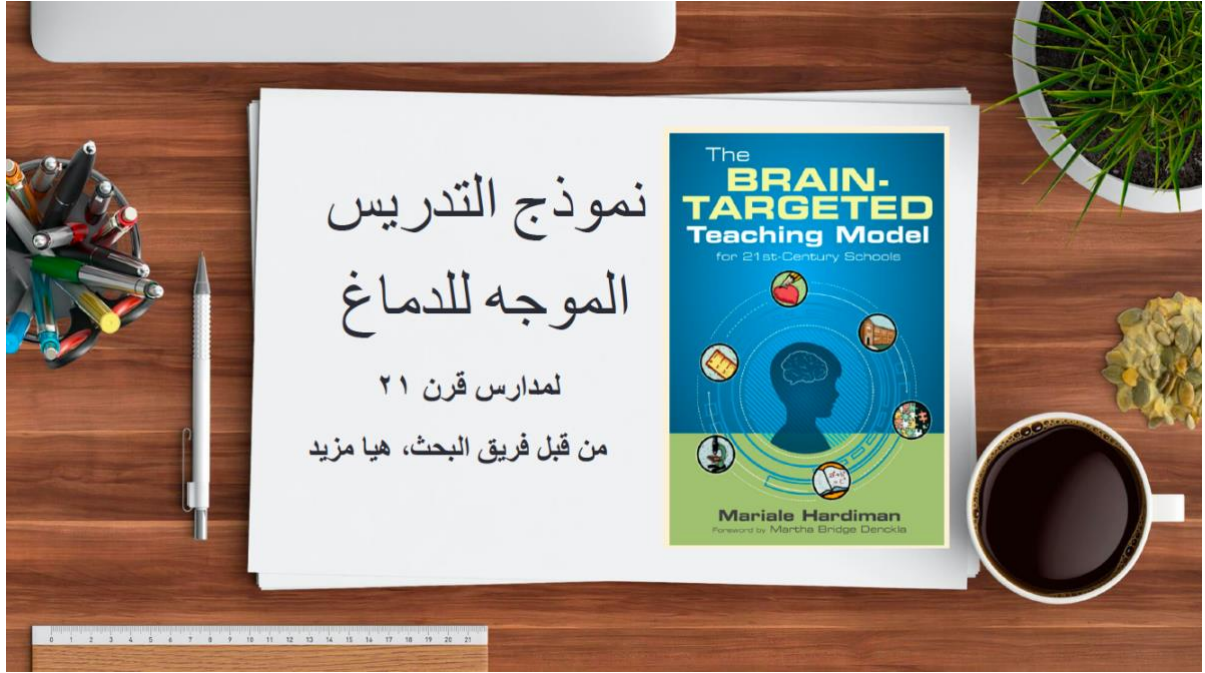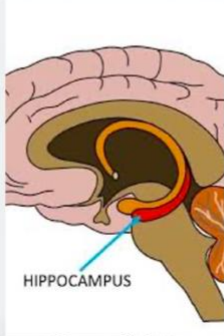
ضغط عصبي و التعلم

ضغوط طويلة الأمد على التعلم

قد يؤدي الضغط العصبي المطول إلى تلف الحُصين والقشرة الأمامية ، مما يؤدي إلى فقدان الذاكرة وفهم المعلومات
.

هرت الدراسات انكماشًا في قرن آمون ، وهو مركز للذاكرة ، بعد التعرض لضغط طويل الأمد

HIPPOCAMPUS

13

قدم علاقة جديدة لتوليد العناصر التي ، عند الارتباط ، تمثل تلك العلاق

https://whiteboard.fi/v5c4x

● تشبيهات مفتوحة

. يمكن للطلاب إنشاء ارتباطات فريدة من نوعها من المفاهيم التي تشارك تلك العلاقة المستهدفة.

مثل ماذا؟

التأمل الذاتي للمعلم / Reflection Sheet for PD

https://cutt.ly/mguG1WP

> Go to www.menti.com and use the code 67 10 17 4
>   2 57 57 77

اذهب إلي الرابط www.menti.com و استخدم الكود

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