2016

Building an executive functioning toolbox: an interactive online course for school-based occupational therapy practitioners

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http://hdl.handle.net/2144/19557
Boston University
BUILDING AN EXECUTIVE FUNCTIONING TOOLBOX:
AN INTERACTIVE ONLINE COURSE FOR SCHOOL-BASED
OCCUPATIONAL THERAPY PRACTITIONERS

by

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Submitted in partial fulfillment of the
requirements for the degree of
Doctor of Occupational Therapy
2016
Dedication

To my parents, Armando and Anita Laygo, who have been my biggest cheerleaders throughout my life. Thank for your abundance of love, support, and faith in me. I dedicate this accomplishment to you. I love you both forever.
Acknowledgements

I extend my sincere gratitude to the following people who have supported and enriched my journey throughout this program.

I am thankful for Nancy Doyle, my academic mentor, for her patience, guidance, valuable advice, thoughtful comments, and positive encouragement. Her support and mentorship has inspired my capstone project. Thank you for helping me design a program that I will continue to develop to fulfill my intended goals.

I am thankful for Karen Jacobs, my academic advisor, for empowering my occupational therapy career. Ever since I emailed her regarding the program application process, she has made herself available for guidance or just a listening ear. She inspires me with her example of advocacy within and beyond the occupational therapy profession.

I am thankful for Wendy Coster and Linda Niemeyer, for their guidance during course topics that have enhanced my perspective of meaningful health and wellness.

I am thankful for my peer mentors, Hyun Jeong Lim and Kathryn Wise, for their friendship, encouraging words, and comedic relief throughout the program.

I am thankful for my classmates, Leah Baumann, Kevin Berner, Flora Cole, Leanna Katz, Manisha Sheth, and Michal Tsipris, for their innovative projects, ideas, and professional insight. Thank you for enriching my occupational therapy practice and life.

I am thankful for my partner, Sonny Enriquez, for his patience, love, and constant belief in me throughout this program.

I am thankful for my parents, brother, and sister for supporting my professional and academic journey and inspiring me with their example of helping others in their personal
careers. I am thankful for all my family and friends for the kind and uplifting words during this program.
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ABSTRACT

School-based occupational therapy practitioners actively support students’ functional participation in school-related activities. Underlying these daily school activities are executive functioning skills. Although addressing executive functioning (EF) skills is within occupational therapy’s scope of practice, school-based practitioners typically do not support the development of these skills in students. Identified factors that contribute to this gap in practice are limited (1) EF knowledge, (2) availability and access to EF resources, and (3) time to complete job demands. To address this clinical gap, an interactive online course for school-based occupational therapy practitioners was developed which presents current EF research, knowledge, and resources. The course utilizes interactive features to support practitioners in applying course information in the school setting. This includes practicing EF assessments, designing EF interventions, and preparing advocacy resources and dissemination tools to share with school administrators and school staff about the importance of addressing executive functioning skills in school-age students. The objective of the online course is to develop a community of
occupational therapy practitioners committed to improving EF skills in students through contributions in research, assessment, interventions, and school collaborations.
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Chapter 1- Introduction

Occupational therapy practitioners are empowered by their world and national organizations to positively contribute to the well-being and health of individuals (AOTA, 2013; WFOT, 2014). The profession’s national organization in the United States, the American Occupational Therapy Association (AOTA), has identified Children and Youth to be a practice area that requires occupational therapy practitioners to promote participation in children, from birth to early adulthood, throughout their daily activities. Currently, pediatric occupational therapy practitioners are found in a wide variety of practice settings, which include schools, clinics, hospitals, and homes. Within each of these settings, occupational therapy practitioners collaborate with parents, caregivers, and team members to support children’s participation in daily and desired activities (AOTA, 2011). This chapter describes the role of occupational therapy practitioners in the school setting, identifies a clinical gap specific to school-based practice, validates occupational therapy’s role in addressing the clinical gap, and provides an overview of the developed solution to the clinical gap.

Background

Occupational therapy practitioners are an integral part of the public education system for children with disabilities (AOTA, 2014a; Case-Smith, 2002). Practitioners collaborate with caregivers, educators, and other school staff to support children’s ability to engage in academic related tasks (Case-Smith, 2002; Schultz-Krohn & Polatajko, 2013). Currently, occupational therapists commonly receive referrals from the school team due to academic concerns related to a child’s fine motor, visual motor, or sensory
processing skills (AOTA, 2014a; Schultz-Krohn & Polatajko, 2013). Delays in these skills may affect a child’s handwriting legibility, task completion, visual attention, and self-regulation behaviors in the classroom (AOTA, 2014a; Case-Smith, 2002; Schultz-Krohn & Polatajko, 2013).

Research studies suggest that executive function (EF) skills also directly affect a child’s ability to effectively participate in the same school related tasks (Cameron et al., 2012; Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013a; Dawson & Guare, 2010). Executive functioning enables an individual to appropriately adapt to the new situations frequently occurring in daily life (Baum & Katz, 2011; Wolf, Barbee, & White, 2011; Wolf & Baum 2011). Specifically, EF is responsible for an individual’s ability to effectively plan, manage, and organize behavior to complete desired novel activities (Baum, Foster, & Wolf, 2009; Cramm, Terry, Krupa, Missiuna, Lysaght & Parker, 2013b; Wolf & Baum, 2011). In the school system, children are actively exercising their EF skills as they engage in academic and social activities throughout their day (AOTA, 2014a; Schultz-Krohn & Polatajko, 2013). Students are expected to manage various aspects of their school schedule, such as following class routines, remembering academic curriculum, engaging with peers appropriately, participating in several school transitions, and maintaining attention and focus in the classroom (AOTA, 2014a).

Executive functions are inherent skills that children continue to develop well into adulthood (Center on the Developing Child at Harvard University, 2011; Cramm et al., 2013a; Schultz-Krohn & Polatajko, 2013). As a child progresses in his or her education, research suggests that EF skills are developed and nourished by the child’s daily
experiences (Cramm et. al, 2013a; Schultz-Krohn & Polatajko, 2013). Specifically, research findings suggest that caregivers as well as educators play a role in modeling appropriate strategies that contribute to overall EF development (Connor & Maeir, 2011; Dawson & Guare, 2010; Kaufman, 2010; Magalhaes, 2014). For example, classroom teachers who establish a consistent daily routine and structure foster a student’s ability to plan, organize, and sequence for an upcoming task, all of which are EF components. However, recent literature reports that everyday experiences may not always be sufficient for early EF skill development (Schultz-Krohn & Polatajko, 2013). For school-age children who demonstrate difficulties with EF skill development, incorporating EF knowledge into the occupational therapy evaluation and intervention process will ensure a holistic response in supporting the needs of students in the school setting, ultimately increasing overall occupational performance of school age children (Schultz-Krohn & Polatajko, 2013).

**Identified Problem**

Occupational therapy practitioners work closely with children on fundamental skills that affect academic success, many of which are components of EF. Evidence-based research demonstrates that EF impacts school readiness, however, there is limited research in the application of EF considerations in the occupational therapy evaluation and intervention process (Cramm et al., 2013a; Dawson & Guare, 2010; Schultz-Krohn & Polatajko, 2013). This clinical gap prevents a comprehensive portrayal of a student’s academic and occupational needs and limits successful participation in meaningful school activities. The proposed causes for the problem are:
● Occupational therapy practitioners’ lack of understanding about EF: what it is, where it falls within occupational therapy’s domain of practice, and how a child’s occupational performance in the school setting is affected by EF impairments. This problem is occurring because there is limited information explaining how school-based occupational therapy practitioners should implement EF in the evaluation and intervention process. The lack of information is present not only in the occupational therapy literature but also in the occupational therapy graduate programs (Cramm et al., 2013a).

● Occupational therapy practitioners in the school setting are still trying to educate the IEP team members regarding occupational therapy’s scope of practice. This contributes to the clinical gap, as occupational therapy practitioners are unable to further educate the team regarding EF if practitioners are not comfortable with addressing this area of need (Cramm et al., 2013a).

● Assessments of executive functioning in children are limited and challenging to develop. There are only a few assessments for EF in the school and clinical based settings that evaluate EF abilities in children. These assessments are not comprehensive and are only able to determine a component of the EF process (Wolf & Baum, 2011). Furthermore, it is difficult to develop EF assessments that do not reduce the novelty of a situation or environment (Dawson & Guare, 2010). Assessments that evaluate cognition incorporate testing structure protocol, which decreases the occurrence of assessing an individual’s participation in a new task (Dawson & Guare, 2010; Schultz-Krohn & Polatajko, 2013).
Occupational therapists working in the school setting typically are juggling more than one school and are expected to manage large caseloads. The demanding workload may contribute to a practitioner’s ability to keep up to date with current literature or new assessments and may limit time for practitioners to advocate for the relevance of EF as children participate in school related tasks (Cahill, Egan, Wallingford, Huber-Lee, & Dess-McGuire, 2015).

Occupational therapy practitioners are required to consider reimbursement and resources, which plays a role in practitioners’ choices in the school setting. This issue relates to the clinical gap, as practitioners may feel they have limited resources that could help them include EF into the school-based evaluation and intervention process (Cramm et al., 2013; Daunhauer, Fidler, & Will, 2014).

**Domain of Occupational Therapy**

Occupational therapy practitioners are becoming increasingly aware of EF delays in children and discovering that they are not currently prepared to meet these clients’ EF needs (Cramm et al., 2013a; Schultz-Krohn & Polatajko, 2013). As a result, researchers are beginning to demonstrate how to effectively conduct EF assessments and implement appropriate intervention plans to address a child’s EF needs (Cramm et al., 2013b; Rocke, Hays, Edwards, & Berg, 2008; Weiner, Williamson, & Berg, 2012). Additionally, research studies suggest that allowing children with EF impairments to continue their academic experience with no opportunity for EF development may increase the likelihood of secondary mental health problems, decrease job opportunities, increase risk for academic failure, lead to a higher likelihood for criminal punishment, and increase...
dependence on government income support programs (Schultz, 2003). Furthermore, neglecting to include an EF perspective into how a school-based occupational therapist views a child may limit true client centered practice (Cramm et al., 2013a; Josman & Rosenblum, 2011).

Research studies suggest that EF is a relevant area in occupational therapy and a critical component in cognition (Connor & Maeir, 2011; Foster & Hershey, 2011; Schultz-Krohn & Polatajko, 2013; Wolf & Baum, 2011), which is part of the profession’s domain of practice (AOTA, 2014b). Occupational therapy practitioners are trained in observing and analyzing how an individual performs a task; cognitive performance is a consistent factor considered in such task analysis (AOTA, 2014b). Practitioners engage an individual in occupations, or meaningful activities specific to each client, in order to accurately evaluate performance difficulties and needs (AOTA, 2014b). EF skill components become apparent as they are being actively utilized during occupational performance (Connor & Maeir, 2011). Occupational therapy practitioners need to continue exploring the effect of EF on novel participation of tasks specifically in the pediatric population (Wolf & Baum, 2011). Determining more efficient ways to assess and evaluate EF in children will address an occupational performance need that the profession has an obligation to support (Cramm et al., 2013b; Schultz-Krohn & Polatajko, 2013).

**Project Overview**

The purpose of my doctoral project is to educate school-based occupational therapists and occupational therapy assistants on current executive functioning resources
and provide strategies for incorporating an EF perspective into the occupational therapy evaluation and intervention processes. The outcome of the doctoral project is to create an interactive online course that will equip practitioners with the necessary knowledge and resources to beginning addressing EF delays experienced by students. Specifically, it will provide school-based occupational therapy practitioners with the most recent research on EF development in the brain, guidelines for incorporating assessment of EF skills in the school system, and intervention ideas. Additionally, the online course will support occupational therapy practitioners in preparing templates that present a student’s baseline executive functioning skills in required documentation for an individualized education program (IEP). Finally, this course will provide course learners an opportunity to develop advocacy resources such as a presentation and handout to begin educating school staff regarding the importance of developing EF skills in school age children. The goal of the online course is to empower occupational therapy practitioners to help create a more comprehensive picture of a student’s strengths and needs to encourage overall student success.
Chapter 2 - Theoretical Evidence Base to Support the Project

This chapter provides a description of two main topics, an overview of the identified problem and a review of current approaches and methods used to address the identified problem. The overview of the problem includes the theory utilized to understand the problem and the evidence that further explains that problem’s occurrence. The review of current methods and approaches includes a synthesis of the evidence and the conclusions drawn from the evidence, both which were utilized to guide the development and design of an executive function online course for school-based occupational therapy practitioners.

Theoretical Base to Support the Project

The diffusion of innovations theory describes how a new idea is spread. The theory is comprised of four main constructs: innovation, time, communication channels, and social systems (Oldenburg & Glanz, 2008; Rogers, 2004; Sharma & Romas, 2012). This doctoral project focuses on the clinical gap involving occupational therapy practitioners’ limited use of executive functioning based assessments and interventions in the school setting. The theory’s four guiding constructs shape my understanding of why the clinical gap continues to exist in school-based occupational therapy practice.

According to the diffusion of innovations (DOI) theory, an innovation is composed of the following attributes: perceived relative advantage, compatibility, complexity, demonstrability, clarity of results, cost, reversibility, pervasiveness and reinvention (Rogers, 2004). This doctoral project will focus on the attributes of complexity, compatibility, and reinvention as each contributes to the current
understanding of the clinical problem. Complexity refers to the perceived difficulty of understanding and applying a new innovation: in this case, how to utilize executive function-based assessments in the school setting (Oldenburg & Glanz, 2008; Sharma & Romas, 2012). Implementation of EF resources in the school setting is complex for three main reasons. First, research on executive function knowledge in pediatrics is constantly being developed as new findings are discovered (Center on the Developing Child at Harvard University, 2011). EF development in children is still being investigated by researchers. The continuous research focused on the development of EF in children demonstrates an innovation with a high level of complexity, which strongly influences innovation adoption (Center on the Developing Child at Harvard University, 2011; Rogers, 2004; Sharma & Romas, 2012). Second, the need for EF skills to be assessed in a natural environment contributes to the challenges regarding creating EF assessments. The level of presented complexity for the innovation impacts OT practitioners’ access to EF resources, impact EF’s translation into practice, and prevents the development of consistent information available regarding EF (Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013a; Sharma & Romas, 2012; Oldenburg & Glanz, 2008; Wolf & Baum, 2011).

Compatibility refers to whether incorporating EF considerations into school-based practice is consistent with the ideals of occupational therapists. EF is within occupational therapy’s domain of research and practice (American Occupational Therapy Association, 2014b), however many OT practitioners are not confident with their knowledge of EF and its potential application with the school-age population (Cramm et al. 2013a; Cramm, Terry, Krupa, Missiuna, Lysaght, & Parker, 2013b). This demonstrates an inconsistency
with the compatibility characteristic of the innovation. Consistency with OT ideals can begin to occur as OT practitioners begin to gain knowledge of EF, implement EF based strategies, and share information about the benefits of EF with school staff (Cramm et al., 2013a; Sharma & Romas, 2012; Wolf, Barbee, & White, 2011).

Reinvention refers to the degree that a potential adopter can adapt an innovation to meet specific needs (Rogers, 2004; Sharma & Romas, 2012). Although guidelines have not been set for evaluating EF skills in the school system, the available EF assessments and intervention resources for the school setting can be graded and modified (Rocke, Hays, Edwards, & Berg, 2008; Schultz-Krohn & Polatajko, 2013; Weiner, Williamson, & Berg, 2012). The innovation’s flexibility for reinvention is consistent with OT ideals as the innovation can be graded and adapted to specific client needs (American Occupational Therapy Association, 2014b; Schultz-Krohn & Polatajko, 2013). The attribute of reinvention is critical for innovation adoption as adaptability of resources is important in achieving student-centered practice (American Occupational Therapy Association, 2014a; Magalhaes, 2014). OT practitioners are skilled in the modifying and grading activities to provide the just right challenge to individuals. The innovation’s flexibility to change should be highlighted in order to increase the likelihood of OT practitioners’ implementation of EF considerations in the school setting (Cramm et al., 2013a; Rogers, 2004; Sharma & Romas, 2012; Wolf & Baum, 2011).

The Diffusion of Innovations theory utilizes the construct of time to refer to the time period between becoming aware of an idea and adopting the idea (Sharma & Romas, 2012). For school-based OT practitioners, the decision to implement EF assessments and
Interventions is largely impeded by OT practitioners’ limited knowledge of the innovation (Cramm et al., 2013a; Rogers, 2004). The limited knowledge regarding EF use in the school system is impacted by three components. First, in the OT professional community, published research offers limited strategies to begin implementing EF tasks in the school system (Cramm et al., 2013a; Daunhauer, Fidler, & Will, 2014). Furthermore, among the published works regarding EF assessment protocols, the follow up research is extremely limited (Daunhauer et al., 2014; Dawson & Guare, 2010; Stern & Maeir, 2014; Weiner et al., 2012). Finally, school-based OTs are expected to manage high caseloads as well as collaborations with school staff impacting their ability to participate in professional related activities such as continuing education (American Occupational Therapy Association, 2014a). OT practitioners that are knowledgeable of EF or begin to develop their EF knowledge have an opportunity to play a critical role in sharing the information with colleagues, which will contribute to innovation adoption (Rogers, 2004; Sharma & Romas, 2012). The introduction of EF resources that can quickly be accessed by OT practitioners may help to decrease the time period between awareness and adoption of an EF lens in OT practice and thereby increase the implementation of EF applications in the school settings (Cramm et al., 2013a; Rogers, 2004; Sharma & Romas, 2012).

Communication channels, an additional construct of the DOI theory, refer to how the innovation has been communicated to others and through what avenue (e.g., mass media, face-to-face, or Internet; Rogers, 2004). The current communication channels being used to share information with school-based OT practitioners regarding the
utilization of EF considerations in the school system include mass media, face-to-face, and social media (American Occupational Therapy Association, 2014a; Schultz-Krohn & Polatajko, 2013; Sharma & Romas, 2012). OT professionals that have expertise in using EF in the school system have communicated their knowledge in mass media forums such as OT professional journals and in resources published by AOTA (Schultz-Krohn & Polatajko, 2013; Rocke et al. 2008; Weiner et al., 2012). However, the use of this communication channel has not yet proven to be effective, as OT practitioners report feeling ill equipped with EF knowledge and uncertain with EF application in the school system (Cramm et al., 2013a; Hahn et al., 014). Face-to-face communication between OT practitioners in the school system may vary with each district and it is unknown whether many address the use of EF in the school system. Social media in the use of Internet forums is another communication channel that serves to inform OT practitioners of EF considerations in the school system. These social forums are utilized frequently to seek advice, ideas, or different perspectives from fellow OT professionals (Jacobs, 2012). Social media threads have been created to share information on utilizing EF in the school system. Occupational therapy practitioners’ use of the Internet to gain information on desired topics has been an effective means to exchange information (Jacobs, 2012). Professional forums in social media are inundated with daily posts from OT practitioners either seeking or providing advice. Resources, equipment, and supplies are shared or available for purchase. The OT professional forum accessibility is observed to efficiently share relevant information between OT practitioners. However, it is currently unknown whether the shared EF strategies and ideas are effective or implemented in school-based
practice. Nevertheless, the inquiries observed and presented in social forums suggest an increasing interest about EF and how to apply this knowledge in school-based occupational therapy practice.

The social systems construct of the diffusion of innovations theory also helps explain the barriers that inhibit implementation of EF considerations in school-based occupational therapy assessment and intervention. A social system is defined as individuals in a group or society that is linked together by a common interest (Rogers, 2004). Currently, it is unknown whether school-based OT practitioners share similar beliefs regarding the use of EF in the school system. Furthermore, research is lacking about what OT practitioners’ social systems may be able and available to support the diffusion of EF innovation in the school setting. In order for EF to be utilized in the school setting, OT practitioners need to develop increased communication and rapport with fellow OT practitioners in the school district and nationwide (Stoffel, 2014). Developing a formidable social system among school-based OT practitioners will increase awareness and identification of student needs for successful school participation (Jacobs, 2012; Schultz-Krohn & Polatajko, 2013).

**Summary of Theory Base**

The diffusion of innovations theory guided the understanding of school-based occupational therapists’ limited use of EF in school-based practice. Specific theory constructs identified inconsistencies in OT practitioners’ EF knowledge, availability of EF resources, practice demands, and a common network to support the incorporation of EF strategies in the school setting. Occupational therapy practitioners need to address
these inconsistencies by increasing clinical knowledge and advocating for the use of EF-based assessments and interventions in school-based practice. Supporting EF development in practice will further support students in successful and functional participation within their academic environment.

Proposed Explanatory Model of Identified Problem

Occupational therapy practitioners demonstrate limited utilization of executive functioning (EF) considerations in school-based practice. Research reports that EF difficulties impact diagnoses such as autism, specific learning disabilities, or intellectual disabilities (Daunhauer, Fidler, & Will, 2014; Hahn-Markowitz, Manor, & Maeir, 2011; Kentworthy et al., 2014; Piek, Dawson, Smith, & Gasson, 2008). The lack of EF-related considerations applied by occupational therapists in the school setting leaves students with EF-related delays having limited support as they participate in their educational curriculum. Therefore, the IEP team, which includes the occupational therapist, is not comprehensively addressing student’s needs. This will ultimately inhibit a student’s successful participation in their specific school program.

The proposed explanatory model (See Appendix A) depicts two pathways that contribute to the limited application of EF in the school setting. The first pathway indicates that the EF assessments and intervention resources are not commonly available to school-based practitioners (Main factor 1). The second pathway illustrates OT practitioners’ sentiments of having minimal knowledge and experience applying EF applications (Main Factor 2). These two pathways are negatively influenced by two moderating factors, (1) lack of EF resources provided by a school district and (2)
comprehensive task demands required of school-based practitioners. As long as these two pathways continue to be affected by these moderating factors, the portrayal of student academic and occupational needs will be incomplete. This incomplete portrayal, in turn, will limit students’ successful participation in meaningful school activities.

**Evidence for Proposed Explanatory Model of Identified Problem**

A literature review was conducted to determine the accuracy of the proposed explanatory model previously described in this chapter. The following five questions were utilized to guide the literature search on executive functioning resources available in the school setting.

- Is there evidence that limited availability of EF assessments in the OT literature is related to limited application of EF considerations in the OT evaluation process?

- Is there evidence that limited intervention resources targeting EF in the OT literature is related to the limited application of EF considerations in OT treatment sessions?

- Is there evidence that OT practitioners’ knowledge of EF in the school setting is related to the likelihood of applying EF knowledge in the school setting?

- Is there evidence that school-based OT practitioners’ job demands decrease opportunities for school-based OT practitioners to advocate for use of EF to school staff?

- Is there evidence that school-based OT practitioners’ task demands decrease the time available to participate in continuing education?

The research evidence was evaluated to determine how well it supports the proposed explanatory model. The literature criteria used for analyzing Main factor 1 included a thorough search of the American Journal of Occupational Therapy, OT seeker,
PubMed, and the CINAHL database. Keywords utilized to guide the literature search were: executive function, executive function assessment, executive function evaluation, executive dysfunction, executive control, cognitive assessment, and occupational therapy. Search results were examined for relevance to the proposed research question. Related research articles were selected and reviewed.

**Is there evidence that limited availability of EF assessments in the OT literature is related to limited application of EF considerations in the OT evaluation process?**

Main factor 1 (See Appendix A) proposes that there is limited availability of EF assessment and intervention resources. The literature search yielded 21 research articles that indicate support for main factor 1’s impact on the clinical problem. Thirteen articles discussed EF-specific assessments and eight articles discussed EF-related intervention. Thirteen articles discuss four assessments that evaluate EF skills: the Behavior Rating Inventory of Executive Function (BRIEF), the Executive Function Performance Test (EFPT), Do-Eat, and the Weekly Calendar Planning Activity (WCPA) (Baum et al., 2008; Daunhauer, Fidler, & Will, 2014; Hahn et al, 2014; Hahn-Markowitz, Manor, & Maeir, 2011; Hilton et al., 2014; Josman, Goffer, & Rosenblum, 2010; Maeir, Fisher, Bar-Ilan, Boas, Berger, & Landau, 2014; Pfeiffer, Henry, Miller, & Witherell, 2008; Rosenberg, Maeir, Yochman, Dahan, & Hirsch, 2015; Stern & Maeir, 2014; Toglia & Berg, 2013; Weiner, Toglia, & Berg, 2012; Well, Chasnoff, Schmidt, Telford, & Schwartz, 2012). Eight of these articles report on the assessment validity of the BRIEF in the adult and pediatric populations (Daunhauer et al., 2014; Hahn-Markowitz et al., 2011;
Hilton et al., 2014; Pfeiffer et al., 2008; Rosenberg et al., 2015; Stern & Maeir, 2014; Well et al., 2012; Tal-Saban, Ornoy, & Parushm, 2014). All eight research teams recommend the BRIEF as a rating scale for school-based occupational therapy. In addition to the BRIEF, there are 2 of 13 articles that focus on investigating the validity of the Executive Function Performance Test (EFPT) in adults (Baum et al., 2008; Hahn et al, 2014). The Do-Eat assessment is discussed in 1 of 13 articles. This instrument is reported to be a reliable tool for determining whether a child is at risk for DCD, a motor impairment that impacts child’s daily performance and academic achievement (Josman et al., 2010). The WCPA is presented in 2 of 13 articles focusing on EF assessment resources. This assessment was reported to be a valid tool for understanding EF skills in adolescent age students (Toglia & Berg, 2013; Weiner et al., 2012). Although the EFPT, Do-Eat, and WCPA are accessible evaluation tools for OT practitioners, there is limited evidence of their use in school-based practice setting.

Is there evidence that limited intervention resources targeting EF in the OT literature is related to the limited application of EF considerations in OT treatment sessions?

Similarly, the literature also illustrates a limited availability of evidence-based EF interventions to use with children. From the literature selection criteria previously mentioned, 8 of the 21 articles discuss potential EF interventions. These 8 articles discuss novel and innovative interventions that can be utilized to target EF skills in the adult and pediatric populations. Rosenberg, Maeir, Yochman, Dahan, and Hirsch (2015) conducted a pilot study investigating the impact of a Cognitive-Function (Cog-Fun)
intervention when implemented with preschoolers with attention deficit hypersensitivity disorder. These researchers included the BRIEF as measurement for their study and determined that students with identified delays in EF skills demonstrated improvement after the Cog-Fun intervention. Two articles reported on the Cog-Fun program and demonstrated the program’s ability to address EF delays. These studies suggest that the Cog-Fun program may serve as an appropriate resource for developing future EF interventions (Hahn-Markowitz et al., 2011; Maeir et al., 2014). Similarly, 2 articles demonstrated the effectiveness of EF programs, Tools of the Mind and Unstuck and On Target (UOT). Tools of the Mind is geared for the early childhood setting and was reported to decrease disciplinary-related behaviors (Bodrova, Leong, & Akhutina, 2011). The UOT is an EF program aligned to the classroom setting. This program was reported to decrease inflexibility behaviors in students with autism spectrum disorders (Bodrova et al., 2011; Kenworthy et al., 2014). One of research articles on interventions reported the use of a speed-based interactive game to address EF skills and recommended the game to serve as a supplemental activity to occupational therapy interventions (Hilton et al., 2014). Additional research evidence demonstrated parent support, parent modeling, and classroom tools were each reported to target components of EF skills including attention and self-regulation (Bibok, Carpendale, & Müller., 2009; Bodrova et al., 2011; Pfeifler et al., 2008). Overall, the literature demonstrates an emerging development of EF based interventions. However, all interventions still need to be investigated further to determine effectiveness when implemented in school-based practice (Bibok et al., 2009; Bodrova et al., 2011; Hahn-Markowitz et al., 2011; Hilton et al., 2014; Kenworthy et al.,
Overall then, the published research on EF-focused assessments and interventions in school-based settings is in the emerging stages for occupational therapy and school-based practice. Therefore, main factor 1 is an accurate component of pathway contributing to the clinical problem. The minimal availability of assessments and intervention resources specifically targeting EF continues to significantly impact school-based occupational therapy practice.

Is there evidence that OT practitioners’ knowledge of EF in the school setting is related to the likelihood of applying EF knowledge in the school setting?

Using the search method previously mentioned, the following keywords were utilized to examine main factor 2: Executive function (EF), EF intervention, executive dysfunction, executive control, cognitive training, school-based occupational therapy, school, related services, and special education. Only one article recognized main factor 2 as a relevant contributor to the clinical problem. Cramm, Krupa, Missiuna, Lysaght, and Parker (2013) used qualitative methods, through in-depth interviews and inductive content analysis, to portray occupational therapy practitioner’s perspectives regarding their current knowledge of executive function. The interview data revealed OT practitioner sentiments including the belief that EF is beyond OT’s scope of practice, the uncertainty with how to gain more information regarding EF, and the reports that EF strategies with children were not taught in OT school curriculum (Cramm et al., 2013). Although only one article demonstrated the impact of main factor 2, there is a consensus in the research evidence that EF is an emerging field that requires further investigation.
and future implementation in the school-based setting. (Aarnoudse-Moens et al., 2011; Anderson, 2002; Bodrova et al, 2011; Cramm et al., 2013; Daunhauer et al., 2014; Hahn et al., 2011; Hilton et al., 2014; Kentworthy et al., 2014; Maeir et al, 2014; Toglia et al., 2013; Weiner et al., 2012). Overall, the current research suggests that occupational therapy practitioner knowledge regarding EF in the school setting is related to their application of EF resources with school-age students.

**Is there evidence that school-based OT practitioners’ job demands decrease opportunities for school-based OT practitioners to advocate for use of EF to school staff?**

The impact of the moderator 1 between the pathway of main factor 1 and the clinical problem is not directly discussed in the research. Instead, there were professionally focused articles that provided a perspective of the available resources and professional boundaries occupational therapists experienced in the school setting. The following keywords were used to investigate moderator 1: Executive function (EF), EF intervention, EF training, school-based occupational therapy, classroom, related service, and RTI. Four articles were determined to provide current information regarding OT’s role in the school setting and to understand current professional boundaries impacting OT practitioners (Clark & Holahan, 2015; Kardos & White, 2005; In school setting, 2010; Wehrmann, Chiu, Reid, & Sinclair, 2006). Clark and Holahan (2015) reported that OT practitioners use specific knowledge and expertise to support students’ participation in their academic and non-academic curriculum. More specifically, the school-based OT practitioners assist with student outcomes related to social skills, math, reading, written communication, behavior regulation, recess, self-help skills and much more (In school
setting, 2010). In the current literature, 21 of the articles reported on EF assessment and potential intervention strategies. Each of these articles reported in their discussions that EF is an area that should be addressed in the school setting (Baum et al., 2008; Bibok et al., 2009; Bodrova, et al., 2011; Clark & Holahan, 2015; Daunhauer, Fidler, & Will, 2014; Hahn et al., 2014; Hahn-Markowitz et al., 2011; Hilton et al., 2014; In school setting, 2010; Josman et al., 2010; Kardos & White, 2005; Kenworthy et al., 2011; Maeir et al., 2014; Pfeiffer et al., 2008; Rosenberg et al., 2015; Stern & Maeir, 2014; Toglia, & Berg, 2012; Toglia & Berg, 2013; Wehrmann, et al., 2006; Weiner et al., 2012; Well et al., 2012). This suggests that OT practitioners have an emerging role in supporting EF in students. Additionally, there are dynamics occurring within the school setting that directly impact occupational therapy practitioner’s job expectations. School administrations are at times restricted by district guidelines. For example, Kardos and White (2005) reported that school-based OT practitioners held the perception that OT services were traditionally not recommended during transitional services due to financial reasons. Additionally, Wehrmann et al. (2006) demonstrated that OT service delivery in the school setting was impacted by inadequate communication from school administration and funding constraints in the healthcare systems. Furthermore, school-based occupational therapy practitioner job demands are not recently reflected in the research literature, however, it is an emerging concern that needs to be addressed by school-based OT practitioners (Workload Approach, 2014). The American Occupational Therapy Association (AOTA) encourages OT practitioners to identify their workload and communicate with school administration how OT can best meet student needs. The
communicated evidence demonstrates how overseeing administration may impact OT practitioners and therefore their clinical choices such as providing EF-related assessment and intervention services. Such findings support the continued relevance of moderator 1 as impacting proposed pathway one.

**Is there evidence that school-based OT practitioners’ task demands decrease the time available to participate in continuing education?**

Moderator 2’s impact on the clinical pathway between main factor 2 and the clinical problem was addressed in 2 articles. These articles focused on whether the task demands of school-based OT practitioners impacted professional learning opportunities. Using databases previously mentioned, the selection criteria used the following keywords: executive function, job demands, caseload, workload, advocacy, school-based occupational therapy, classroom, related service, and special education. Qualitative analysis from Cramm et al. (2013) reported that some school-based OT practitioners feel constrained by the program expectations of their school district. Another study found that OT practitioners’ participation in a new intervention, specifically Response to Intervention (RtI), was inhibited by limited resources such as time, finances, and appropriate staffing (Cahill, Egan, Wallingford, Huber-Lee, & Dess-McGuire, 2015). Additionally, it was identified that school district administration provided limited guidelines and support regarding how OT practitioners should engage in specific policies associated with RtI (Cahill et al., 2014). These findings demonstrate accurate challenges faced by OT practitioners resulting from the introduction of new intervention. By extrapolation, incorporating EF considerations in the school system may face similar
challenges. In summary, this body of evidence indicates that Moderator 2 does contribute to the pathway between main factor 2 and the clinical problem.

**Summary of Evidence for Explanatory Model**

All parts of the visual model proposed continue to contribute to the current understanding of the clinical problem. However, after analyzing the evidence, the pathways originally presented are no longer an accurate visual representation of the clinical gap. An improved visual model (See Appendix A) merges the two pathways, presenting a linear track towards the clinical problem. As demonstrated by the evidence, main factor 1 serves as the key component that drives the gap in occupational therapy school-based practice. Sub-factor 1 (formerly Main Factor 2) in the linear pathway is a result of main factor 1 as limited EF resources significantly impact an OT’s access to EF material, ultimately affecting professional knowledge. Furthermore, moderator 1 (school administration guidelines) and moderator 2 (OT task demands) maintain their role in the pathway as each negatively influences the pathway between the factors and the clinical problem. The improved visual model more accurately represents the current dynamic between available research evidence and clinical practice in occupational therapy. Furthermore, the visual model illustrates the critical components that have led to the current clinical problem.

**Review of Current Approaches and Methods**

**Introduction**

School-age children need executive functioning skills to effectively participate in their academic curriculum (AOTA, 2014; Cramm, Krupa, Missiuna, Lysaght, & Parker,
2013; Dawson & Guare, 2010). In current school-based occupational therapy practice, evaluation and intervention services are not focusing on student-related EF needs. There are at least 3 underlying factors that impact this clinical problem. Professional literature and research articles indicate that the limited number of effective EF assessments and intervention strategies impede occupational therapists from accessing current EF resources (AOTA, 2014; Cramm et al., 2013; Schultz-Krohn & Polatajko, 2013). There is emerging research suggesting that school-based occupational therapists do not feel knowledgeable applying EF resources to the school-age population (Cramm et al., 2013). Additionally, professional literature and forums suggest that administrative-enforced boundaries and workload expectations may be contributing factors to occupational therapists’ current limited use of EF strategies in the school setting (AOTA, 2014; Cramm et al., 2013; Schultz-Krohn & Polatajko, 2013). To further evaluate the underlying factors that contribute to the clinical problem, the research evidence was synthesized to understand current research about the developing brain, EF assessments, EF interventions, and specific school-age populations that benefit from EF support in school-based occupational therapy practice.

**Review of Current Approaches and Methods**

*Is there evidence that features new EF development research in the developing child’s brain?*

Researchers currently are working to understand which key areas of the brain facilitate EF development (Center on the Developing Child at Harvard University, 2011). Research evidence has identified the involvement of the prefrontal cortex, the anterior
cingulate, parietal cortex, and hippocampus. Additionally, brain circuits and systems, which involve each of these brain areas, support the gradual acquisition of EF skills from infancy. As these brain areas develop, the involved circuits and systems begin to mature and build connections that further refine EF skills during adolescence and into early adulthood (Center on the Developing Child at Harvard University, 2011).

There are three core executive functioning skills that work together specifically when an individual is learning a new concept or solving a problem (Center on the Developing Child at Harvard University, 2011). These skills are working memory, mental flexibility, and inhibitory control. Working memory is an individual’s ability to hold and utilize specific information for a short time period. Mental flexibility is an individual’s ability to maintain or shift attention according to different demands of a situation. Inhibitory control is an individual’s ability to stop oneself from engaging in actions or responses. Developing these EF skills as early as infancy will yield lifelong benefits, especially in learning and development (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016).

Research evidence reports that within the first five years of life the basic functions in language and cognition develop (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016). As early as the first three years of age, cognitive and emotional control systems are emerging; these will continue to develop into adulthood. Executive functioning skills develop alongside a child’s language, cognition, and emotional regulation skills. Research evidence has determined that children do not develop EF skills solely on their own (Center on the Developing Child at Harvard
Instead, the research suggests benefits from facilitated experiences in the home and school environment (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016). Typically, as children start school, EF skills continue to be refined and play a role in overall school participation. However, if a child is not developing EF skills as expected, providing early intervention for EF skills is critical to improving daily participation in all of the child’s natural settings (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016; Maeir et al., 2014). A child with EF delays should have access to early intervention to decrease risks for future disabilities (Maeir et al., 2014). To improve adult support for children, more accurate assessments and effective interventions are needed to gain a comprehensive understanding of the child’s developmental level (Center on the Developing Child at Harvard University, 2011).

As students enter secondary school, there are changes in the environment, academic demands, EF demands, and motivation levels. One study reported that underachievement in school is due to limited support for EF skills, specifically attention, inhibition, and self-regulation (Boyer et al., 2015). Research evidence shared that developmentally there is a dramatic change in cognitive maturity that impacts students. Complex behaviors such as forming an identity, choosing peer circles, and various opportunities to shift between decisions and activities demonstrate the actions the brain must execute in the progression towards adulthood (Toglia & Berg, 2013). Research evidence determined that supporting adolescence in inhibition, increased concentration,
self-control, and less distractibility would increase an adolescent's navigation through the various expected task demands (Toglia & Berg, 2013).

Executive functioning skills continue to develop while navigating through the additional environmental demands that occur in the school setting (Boyer et al., 2015). Occupational therapy practitioners must be mindful of the additional executive functioning load that adolescents experience enter secondary school and beyond (Boyer et al., 2015; Toglia & Berg, 2013). Occupational therapy practitioners can play a contributing role with the adolescent population through collaboration with school staff on effective strategies to use in the classroom, parent education to encourage executive functioning development in the home and community setting, and bringing awareness to adolescent students regarding executive functioning skills that need development to support success into adulthood (Boyer et al., 2015; Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016).

The research of EF development in the brain demonstrates sufficient information to begin initiating the application as well as the creation of EF assessments, EF interventions, and EF based programs. From the research, there are identified strengths in the current research content specifically 1) identification of specific brain areas where EF skills develop, 2) awareness of core EF skills that support learning and problem solving, and 3) recommendations for children’s EF skills to be supported through adult-facilitated experiences. Furthermore, the research has determined that developing EF skills should begin in infancy and should continue through adolescence. Research limitations are apparent in the need for follow up studies regarding EF skill acquisition, the impact of EF
skill development on vulnerable populations (i.e. socioeconomic, age, disabilities), and
detailed protocols on how adults can best support EF development in children. Overall,
the brain research focusing on EF development in children requires further evidence to
determine the specific types of EF supports that students need to gain benefit (Toglia &
Berg, 2013).

*Is there evidence that existing EF assessments in the school setting are effective evaluation tools?*

In the school setting, there are two types of evidence-based executive functioning
assessments: rating scales and performance based assessments. Currently, there are nine
EF assessments that are available for use with school-age children. The table below (see
Table 1) outlines the EF assessments, assessment type, EF construct being measured, and
assessment age population.
<table>
<thead>
<tr>
<th>EF assessment name</th>
<th>Assessment type</th>
<th>EF construct measured</th>
<th>Age of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior rating inventory of executive function (BRIEF)</td>
<td>Rating Scale</td>
<td>Measures behavior manifestations related to EF</td>
<td>School age</td>
</tr>
<tr>
<td>Childhood Executive functioning inventory (CHEXI)</td>
<td>Rating Scale</td>
<td>Working Memory, inhibition</td>
<td>School age</td>
</tr>
<tr>
<td>Here’s How I Write (HHIW)</td>
<td>Rating Scale</td>
<td>Goal setting</td>
<td>School age</td>
</tr>
<tr>
<td>Early Years Toolbox (EYT)</td>
<td>Performance based</td>
<td>Inhibition, working memory</td>
<td>3–6 years</td>
</tr>
<tr>
<td>Children’s Kitchen Task Assessment (CKTA)</td>
<td>Performance based</td>
<td>Planning, organization, initiation</td>
<td>8–12 years</td>
</tr>
<tr>
<td>School version of the Assessment of Motor and Processing Skills (School AMPS)</td>
<td>Performance based</td>
<td>Evaluates student schoolwork task performance in their classroom setting</td>
<td>3–13 years</td>
</tr>
<tr>
<td>Do-Eat Assessment</td>
<td>Performance based</td>
<td>Organization, goal setting, planning</td>
<td>5–8 years</td>
</tr>
<tr>
<td>Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-Ch)</td>
<td>Performance based</td>
<td>Cognitive performance: orientation, spatial perception, praxis, visuomotor, organization, and thinking operation</td>
<td>6–12 years</td>
</tr>
<tr>
<td>Weekly Planning Calendar Assessment</td>
<td>Performance based</td>
<td>Planning, organization</td>
<td>Adolescent age</td>
</tr>
</tbody>
</table>
The Behavior Rating Inventory of Executive Function (BRIEF) and the Childhood Executive Functioning Inventory (CHEXI), are rating scales provided to parents and teachers (Reddy, Hale, & Brodzinsky, 2011; Thorell & Nyberg, 2008). These two assessment tools are typically used to gain an initial understanding of a student’s EF skills in the school and home environment. The BRIEF and CHEXI compliment additional assessments administered to a student to obtain a comprehensive picture of a student strengths and areas for growth. Here’s How I Write (HHIW), is also a rating instrument that focuses on a student’s self-assessment of their handwriting and encourages the goal setting process (Cermak & Bissell, 2014). The existing evidence for this assessment is limited to content and construct validity and evaluating the effectiveness of the self-assessment portion. Research has not yet examined the goal-setting component, which is an EF construct. Of the three rating scales presented, the BRIEF is widely used to measures EF in children in the school and non-school settings. The BRIEF’s validity and reliability has been researched in various studies and support the BRIEF’s ability to accurately measure EF skills in children (Reddy et al., 2011). The CHEXI and the HHIW have not been used in follow up studies within the school setting and have limited evidence of their successful administration in the school setting (Cermak & Bissell, 2014; Thorell & Nyberg, 2008). From the presented research, school-based occupational therapists would benefit from administering the BRIEF to determine EF delays impacting school participation (Reddy et al., 2011; Toglia & Berg, 2013). The results from this assessment can direct occupational therapists to decide which performance-based assessments are needed to determine specific EF weaknesses (Reddy
The performance-based assessments cover a wide range of the school-age population and measure several EF constructs (Berg, Edwards, & King, 2012; Howard & Melhuish, 2016; Josman, Goffer, & Rosenblum, 2010; Katz, Golstand, Traub Bar-Ilan, & Parush, 2007; Munkholm, Berg, Löfgren, & Fisher, 2010; Toglia & Berg, 2013; Traub Bar-Ilan, & Parush, 2007). Each of these assessments has demonstrated initial evidence of their contribution to the occupational therapy evaluation process in the school setting, specifically measuring EF constructs. The presented assessments require the school-based occupational therapist to observe a student process, plan, and perform a novel task in either a natural or structured setting. This is important as EF skills are more accurately measured when a student is performing a task. A strength among the developed assessments is the ability for the evaluator to administer more than one of the assessments to obtain a comprehensive picture of a student’s baseline EF skills (Berg et al., 2012; Katz et al., 2007; Toglia & Berg, 2013). However, current limitations to these EF-based performance assessments are the duration of testing and the limited suitability for re-evaluation due to the activities’ diminished task novelty (Berg et al., 2012; Josman et al., 2010; Munkholm et al., 2010).

There are four EF assessments that best fit the current school-based practice model. These assessments demonstrate feasibility to be administered in the school setting, determine EF skills specific to academic and classroom need, and contribute to generating a comprehensive picture of student EF skills. The four assessments are the Early Years Toolbox (EYT), School Version of the Assessment of Motor and Processing
Skills (School AMPs), Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-Ch), and Weekly Planning Calendar Assessment (WPCA). The EYT is a quick and engaging way to determine EF skills of inhibition, working memory, shifting (ability to control and redirect attention). It is an iPad-based assessment for students 3–6 years of age who are able to understand simple directions (Howard & Melhuish, 2016). For elementary age children, the School AMPs is an appropriate tool to evaluate a student’s performance in the classroom, specifically noting the quality of work, as well as motor processing skills. However, occupational therapists must participate in a 5-day training and a rater calibration process to ensure the accurate administration of the School AMPS. The DOTCA-Ch is another helpful tool for elementary age children; it assesses cognitive functioning, specifically cognitive strengths, that can be utilized to facilitate intervention strategies. Both of these assessments can support intervention plans, goal development, and indicate goal progress. For adolescents in junior high and high school within the general education setting, the WPCA can be administered to determine planning, organization, and working memory. Students must be able to sustain attention for at least 20 minutes, understand verbal instructions and be able to read as well as understand the presented paragraph. WCPA has three testing protocols that can be administered depending on what is most appropriate for the student (Toglia & Berg, 2013).

*Is there evidence that existing EF interventions in the school setting are effective in improving EF-related delays?*

There are five executive functioning interventions that have demonstrated initial
evidence of their effectiveness in the school setting (Bowers, Lemberger, Jones, & Rogers, 2015; Boyer, Geurts, & Prins, 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda, Presentacion, Siegenthaler, & Jara, 2011). They are described in Table 2 below.

Table 2. Executive Function Interventions

<table>
<thead>
<tr>
<th>EF Intervention</th>
<th>EF construct addressed</th>
<th>Use of cognitive based therapy?</th>
<th>Used in the school setting?</th>
<th>Use family and teacher involvement?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstuck and On Target (UOT)</td>
<td>Flexibility</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cog-Fun Approach</td>
<td>Metacognitive learning, self-efficacy, planning, and controlling behavior</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Student Success Skills Program (SSS)</td>
<td>Behavior regulation, metacognition</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Psychosocial intervention</td>
<td>Inhibitory control, problem solving</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Cognitive Based Therapy</td>
<td>Organization, planning</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

The administration of these interventions varies with class-wide, group, and one-on-one sessions. The interventions also vary in duration from weekly sessions to a complete school year. Two of the interventions involved an occupational therapy perspective: Unstuck and On Target (UOT) and Cog Fun (Kentworthy et al., 2014; Maeir
et al., 2014). An occupational therapist was one of the authors that collaborated to develop the UOT curriculum. The Cog Fun approach is based on occupational therapy theories and a client- and family-centered approach. All interventions share common limitations: the need to establish further reliability and validity, to determine evidence of longitudinal gain, to incorporate the student’s perspective, and to find ways for the interventions to be incorporated in the school setting. The strengths of the interventions include a multi-modal approach, involvement of parent and teachers, and overall student engagement in the intervention sessions (Bowers et al., 2015; Boyer et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda et al., 2011).

The UOT curriculum is an appropriate curriculum for students having difficulty with flexibility in the classroom. The curriculum is hands-on and provides verbal scripts that can be provided to school staff to reinforce lessons. The Cog-Fun approach is an occupation-based EF focused intervention for children and adolescents with ADHD. It incorporates and educates parents to be active participants in the intervention process. Currently, the School of Occupational Therapy in Jerusalem, Israel is training and certifying occupational therapists to implement the Cog-Fun Intervention. From the evidence available, it is unclear which interventions are most appropriate to use as there has not yet been follow up evidence regarding the interventions’ effectiveness in the school setting. However, researchers’ recommend the need for increased family and teacher collaboration, consistent use of EF related strategies, and opportunities for students to practice EF skills in their natural setting, either in the home or school
environment (Bowers et al., 2015; Boyer et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda et al., 2011).

**Is there evidence regarding which school age population benefits (primary vs. secondary school?) most from EF intervention?**

With executive function interventions and assessments emerging, a wide range of ages may be evaluated for their progress in EF skills. The evidence supports EF intervention in early childhood, school age, and adolescence, essentially from age 3 to 19 years of age (Bowers et al., 2015; Boyer et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda et al., 2011; Toglia & Berg, 2013). Additionally, research evidence identified specific disorders traditionally impacted by EF delays. Up to 10% of school-age children may be impacted by neurodevelopmental disorders that involve deficits in EF skills (Maeir et al., 2014). For example, students with ADHD experience compromised EF skills, specifically initiation, attention, emotional regulation, working memory, and continued task engagement (Maeir et al., 2014). Additional studies have found similar EF delays in school-age children with autism spectrum disorder, developmental coordination disorder, and at-risk youth from disadvantaged backgrounds (Josman et al., 2010; Kentworthy et al., 2014; Toglia & Berg, 2013). The evidence is in agreement that addressing these EF delays with OT intervention will improve access and participation in all aspects of the school setting (Bowers et al., 2015; Boyer et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda et al., 2011).
Summary of Evidence

Current brain research suggests that EF development begins at infancy and continues to early adulthood (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016). The research identified the first five years of life to be a critical time for EF development (Howard & Melhuish, 2016). A solid foundation with EF skills has been directly linked to school readiness and effective learning (AOTA, 2014; Dawson & Guare, 2010). School-age children (i.e., ages 3–21 years) require natural and scaffolded opportunities in the home and school setting to develop executive functioning skills (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016; Katz et al., 2007). Children with ADHD, ASD, and DCD, as well as children from at-risk backgrounds often demonstrate delays in EF, specifically with regards to initiation, attention, emotional regulation, working memory, and continued task engagement (Bowers et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014).

Researchers agree that school-based occupational therapy practitioners can play a contributing role in addressing a student’s EF related needs (Kentworthy et al., 2014; Maeir et al., 2014). The research suggests that in addition to clinical observations and teacher interviews, occupational therapy practitioners can utilize a combination of rating scales (BRIEF, CHEXI, and HHIW) and performance-based assessments (WPCA, CKTA, AMPS, Do-Eat, EYT, & DOTCA-Ch) to obtain an understanding of a student’s EF skills (Cermak & Bissell, 2014; Katz et al., 2007; Miranda et al., 2011). The research does not specifically report the preferred interventions to address EF in school age children. Based on a review of the available research literature, the current best strategies
for addressing EF skills in occupational therapy practice are: school-based curriculums such as Unstuck and On Target, collaboration with the health professionals regarding cognitive-based therapies, educating school staff regarding typical school age children EF development, and utilization of assessments that can be used to address EF constructs (Bowers et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014).

Overall, the available research on executive functioning is emerging yet currently limited regarding EF-related brain development, assessments, intervention, and populations that would gain the most benefit from occupational therapy intervention, particularly in the school setting. Nevertheless, school-based occupational therapists need guidelines for (1) which assessment and intervention tools are most reliable and valid for addressing student needs in the school environment, and (2) how to best present assessment results and develop EF-related goals. Addressing these professional needs will help occupational therapists to provide services that address a student’s EF-related needs and skills and thereby enhance their overall school participation and academic performance.

Conclusion

This chapter demonstrates the theory and evidence base utilized to understand the clinical problem and support the development of the online course educating school-based occupational therapy practitioners on executive functioning. The author applied the diffusion of innovations theory’s constructs to guide the understanding of the identified problem. An explanatory model was developed and revised to align with the evidence gathered from professional literature. Lastly, the author provided best-practice
recommendations based on the synthesis of the research literature, which were ultimately incorporated into designing the executive functioning online course.
Chapter 3- Description of the Project

Introduction and Background

Occupational therapy practitioners are an integral part of the public education system for children with disabilities (Case-Smith, 2002; Clark & Polichino, 2008). In collaboration with the school team, occupational therapy practitioners are typically consulted to support academic concerns related to a student’s fine motor, visual motor, and sensory processing skills (Clark & Polichino, 2008; Schultz-Krohn & Polatajko, 2013). In order for students to successfully participate in classroom related tasks, research has determined that in addition to the aforementioned skills, executive functioning skills are directly linked to student school-readiness (Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013; Josman & Rosenblum, 2011; Schultz-Krohn & Polatajko, 2013). In the school setting, weaknesses in these skills are apparent in handwriting legibility, task initiation, task completion, visual attention, and self-regulation behaviors. By addressing EF deficits and delays, occupational therapy practitioners can do more to facilitate the academic participation of students in the classroom (Cramm et al. 2013; Dawson & Guare, 2010).

This doctoral project focuses on the clinical problem that school-based occupational therapy practitioners generally are not 1) formally evaluating EF skills in students, 2) providing interventions to address EF related delays, and 3) advocating for student EF skills to be included in the occupational therapy assessment and intervention process. The Diffusion of Innovations (DOI) theory was used to analyze the clinical problem and gain a deeper understanding as to why this problem persists in school-based
occupational therapy practice. The DOI theory posits that when new ideas are simple to understand, they are more easily implemented and shared with others. However, understanding executive functioning skills and their development is a complex problem that inhibits EF’s incorporation in school-based occupational therapy practice (Rocke, Hays, Edwards, & Berg, 2008; Schultz-Krohn & Polatajko, 2013; Weiner, Williamson, & Berg, 2012). Through the DOI’s construct of compatibility, ideas that are aligned with a group values and beliefs are easier to diffuse. Occupational therapy practitioners self-report feelings of limited knowledge regarding how to apply EF in the school setting; this demonstrates a misalignment in addressing EF development within the profession (Cramm et al., 2013a; Daunhauer, Fidler, & Will, 2014). Lastly, communication channels is a construct of the theory that explains how new ideas need to be shared in various avenues in order to increase adoption of a new idea. Currently, occupational therapy practitioners have access to journals, face-to-face interactions, and social media forums. However, it is unknown whether these avenues create a network of communication that facilitates the implementation of EF in the school setting (American Occupational Therapy Association, 2014a; Schultz-Krohn & Polatajko, 2013; Sharma & Romas, 2012).

The literature also was reviewed to determine EF assessment availability, EF intervention access, EF information as it pertains to the developing brain, and expected EF development for certain age populations or disabilities (Bowers et al., 2015; Boyer et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda et al., 2011; Toglia & Berg, 2013). The research was then synthesized for occupational therapy practitioners to demonstrate current methods and resources available specifically for the school setting.
The research demonstrates that EF assessments and interventions are available for school-based occupational therapists to use in the school setting. However, available resources require further development through follow up studies. Furthermore, continued EF research is required to improve occupational therapy practitioners’ ability to utilize current EF resources in the school-based practice setting (Bowers et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014). EF research focusing on brain development has provided foundational knowledge for occupational therapy practitioners to begin applying EF-related strategies in the school system (Boyer et al., 2015; Toglia & Berg, 2013). However, further information is needed specifically regarding EF skills acquisition, EF development in student with disabilities, and a clear protocol on how adults can support EF development within the school setting and beyond.

The doctoral project was designed to address the previously mentioned factors impeding school-based occupational therapy practitioners’ application of EF considerations in the classroom. An online course for school-based occupational therapy practitioners was developed to 1) improve the clinical knowledge of EF development in school age children, 2) provide best practice recommendations on EF assessment and EF interventions for school-age children, 3) develop a collaborative social network of occupational therapy practitioners committed to increasing the ways EF skills are addressed in the school setting, 4) prepare occupational therapy practitioners to educate their respective school districts about EF-related concerns and OT’s role in this work, and 5) serve as advocates for school-age children with EF-related needs.

An interactive online course was chosen to provide course learners 1) the
flexibility to complete the course in any location, nationally and internationally, 2) the opportunity to communicate with fellow practitioners, and 3) the experience of being part of an online community, potentially expanding to the international level, focused on providing EF-related support in the school setting. The online course described aligns with the development of an online community of practice (CoP), which initiates collaborative learning among professionals (Baran & Cagiltay, 2010; Boulton & Hramiak, 2012; Hou, 2015). A CoP is defined as a collection of professionals with common interests engaging in learning activities that serve to promote and expand their profession (Baran & Cagiltay, 2010; Hou, 2015). Research has determined from online course participants of CoPs that this type of learning platform provides structured activities that can be translated into practical applications (Hou, 2015). Furthermore, research has demonstrated that online courses involving critical discussion components enhance the learning experiences as it enables the learner to self-reflect, think critically, and develop a personal perspective of the learning material (Boulton & Hramiak, 2012; Hou, 2015; Lee & Brett, 2014). Utilizing an online course format with a forum component facilitates the development of an occupational therapy community committed to increasing executive functioning support for school-age children.

The purpose of this chapter is to describe all the features and elements of the project titled, *Building an Executive Functioning Toolbox: An Interactive Online Course for School-Based Occupational Therapy Practitioners*. The development of the online course utilized the principles of three theories: cognitive theory of multimedia learning, social constructive theory, and diffusion of innovations. Additionally, a description of
intended course participants, goals and objectives, and an implementation plan are provided. Lastly, the course content for the first two weeks will be provided along with a table that provides an overview of the 7-week course.

**Program Participants**

The online course is designed for occupational therapy practitioners interested in supporting school-aged children in enhancing their executive functioning skills in the school environment. The course guides occupational therapy practitioners to educate school personnel on the importance of EF development in children, specifically school-age students. Course participants have access to a course instructor and professional colleagues to gain feedback on EF intervention ideas, EF assessment administration, guidance on non-typical student cases, as well as EF specific templates that are ready to embed into evaluation reports and official school documents. The interaction described will be maintained and managed using a forum-based website. Course participants will have unlimited access to the forum website during and after the course.

Occupational therapy practitioners will be invited to participate in the course through networking in occupational therapy national and local conferences. Similarly, the author will serve as a guest lecturer to local occupational therapy programs to spread awareness regarding EF development in children and the role occupational therapy practitioners have in supporting children in their daily settings. Additionally, brochures with course details will be distributed to local school districts as well as advertised in professional publications.
Goals and Objectives

The online course with a forum component serves to address the demonstrated need for executive functioning applications in the school setting. The course is designed to equip occupational therapy practitioners with current research-based knowledge regarding EF in the developing brain, available EF assessments, and adaptable EF interventions that can be applied to the school-based settings. After completion of the course, occupational therapy practitioners will:

- Feel confident to initiate EF strategies with school age students.
- Collaborate with school staff on setting up EF based supports in the classroom.
- Utilize a forum to share new EF related ideas and troubleshoot concerns.
- Develop advocacy resources to educate school teams on supporting EF development in students.

Course learners will be reminded that the course content is developed from current EF research evidence that is still emerging at this time. The course instructor is hopeful that occupational therapy course participants will be encouraged to contribute to research efforts through creation of EF-related programs, development of EF assessments, or EF interventions. Unlimited access to the forum website will continue during and after the online course in order to nurture the development of a community of practice for occupational therapy practitioners seeking to or currently utilizing EF-based strategies in school-based practice.
Guiding Theories

Cognitive Theory of Multimedia Learning

The online course will utilize multimedia tools to provide information to learners. These multimedia tools include the use of words, pictures, and videos to facilitate course learners’ understanding and interpretation of provided information. The cognitive theory of multimedia learning guides the development of the online course through the theory principles that 1) learners are equipped with two channels, auditory and visual, 2) the auditory and visual channels of a learner are equipped with a certain capacity, and 3) learners undergo an active process when taking in information (Mayer, 1997; Mayer & Moreno, 2003). The cognitive theory of multimedia learning principles has been previously used in live and online course to support college students, medical education, and students with learning disabilities (Greer, Crutchfield, & Wood, 2013; Yue, Kim, Ogawa, Stark, & Kim, 2013). Utilizing these principles, the online course was developed considering the different ways students learn. The use of images, evidence-based information, and videos from topic experts will access each learner’s auditory and visual channels as they progress through each module.

Social Constructive Theory

The online course format with a forum component encourages a social learning environment that is supported by the social constructive theory. This theory applies the following principles 1) learning should occur in a social and collaborative process, 2) individuals benefit from using their past experiences during the learning process, 3) solving problems is a critical activity in the learning environment, and 4) the instructor
facilitates and guides interaction between learners (Ractham & Kaewkitipong, 2012; Thomas, Menon, Boruff, Rodriguez, & Ahmed, 2014).

Research evidence reports that technology allows access to tools that facilitate the goals of social constructivism theory. More specifically, learners are able to utilize communication tools such as internet, email, and forum chats in order to nurture a meaningful interaction among course learners (Ractham & Kaewkitipong, 2012; Sthapornnanon, Sakulbumrungsil, Theeraroungchaisri, & Watcharadamrongkun, 2009). Additionally, through this theory, students are encouraged to take more responsibility for their overall learning process by collaborating with peers and participating in critical thinking. The social constructivist theory has previously been applied in online courses focused on management information systems, pharmacy professionals, health promotion, teacher education, and nursing courses. Research outcomes were in consensus that the social learning environment guided by the social constructivist learning theory promotes an effective learning process for students (Ractham & Kaewkitipong, 2012; Sthapornnanon et al., 2009; Thomas et al., 2014).

The principles of social constructivism guided the development of the online course. Specifically, course participants are encouraged to take an active role in their learning through the support of technology (Sthapornnanon et al., 2009; Thomas et al., 2014). Course participants will be able to learn from interactive modules, which include embedded videos that further explain topics and videos of EF experts providing additional insight to current course content. Each weekly module is paired with interactive assignments where course participants are guided to share their personal ideas.
on addressing EF in the school setting. The unlimited access to the forum website naturally creates a collaborative environment, as course participants are able to provide feedback, guidance, and support for each other’s thoughts, ideas, and concerns. The dialogue facilitated by course features has the potential to strengthen the collaboration and quality of discussion between peers and course instructor. Furthermore, research evidence suggests that the social learning environment guided by the social constructivist theory facilitates course learners ability to translated new knowledge into the practice setting (Thomas et al., 2014).

**Diffusion of Innovations**

The diffusion of innovations theory is utilized to provide a framework for the online course with a forum component. The diffusion of innovations (DOI) theory describes how a new idea is spread. The theory is comprised of four main constructs: innovation, time, communication channels, and social systems (Oldenburg & Glanz, 2008; Rogers, 2004; Sharma & Romas, 2012). The construct of social systems is utilized to demonstrate the development of the online course features. Through the accessibility of technology, the theory provides guidance on how the online course will facilitate the importance of developing a social system that will encourage dissemination, specifically based on the theory stages of adoption, implementation, and maintenance (Dingfelder & Mandell, 2010).

The online course will be a catalyst that increases occupational therapy practitioners’ application of EF strategies in the school setting. The adoption stage occurs when course learners choose to participate in the online course, gaining benefit from the
course content and assignments. As information is gained from the online course, occupational therapy practitioners have the opportunity to practice applying the concepts and strategies with immediate feedback from peers and course instructor. This process initiates the beginning of the implementation stage (Cramm et al., 2013; Daunhauer, Fidler, & Will, 2014). As occupational therapy practitioners continue to apply the EF knowledge throughout the online course, the implementation stage initiates the formation of opinions regarding the accuracy and efficiency of the current EF resources (Dingfelder & Mandell, 2010; Sharma & Romas, 2012). Finally, the maintenance stage is initiated in the online course as participants develop a presentation and handout that will educate school administration and staff regarding the importance of EF development during childhood. Developing these advocacy resources allows occupational therapy practitioners to apply EF resources in the school system and simultaneously educate school administration and staff regarding the importance of supporting EF development.

**Program Design**

The proposed program will be a 7-week online course for occupational therapy practitioners interested in/or currently practicing in a school-based setting. The proposed program provides an opportunity for occupational therapy practitioners to enhance their current knowledge regarding utilizing EF in the school setting. The online course will include 1) multimedia course modules guided by a course instructor, 2) interactive assignments that draws from practitioners’ past experiences and incorporates new information, and 3) development of advocacy resources to support dissemination of executive functioning information in the school setting. The course is designed to support
school-based occupational therapy practitioners’ application of research-based EF considerations in the school setting.

Course participants will engage in 7 multimedia modules that includes course content, relevant topic videos from EF-based resources or from an EF topic expert, and supplementary research articles and resources that will enable learners to further gain information on specific EF topics of interest. EF assessment and EF intervention authors will be invited to generate a brief video regarding EF expertise (i.e., assessment, intervention, brain research). The informative videos will be utilized within the multimedia modules to further supplement the course content. These EF topic expert videos may highlight current research findings, discuss proposed research plans, and share the most effective EF strategies utilized with school-age children. The incorporation of multimedia into the course modules is based on the principles of the cognitive theory of multimedia learning, where learners benefit from receiving information visually and auditorily. The course modules paired with videos of EF topic experts will enable course learners to strengthen their clinical knowledge and enhance their critical thinking regarding how to best address EF skills based on student need. Previously prepared discussion questions will be provided to facilitate discussion between course learners.

Within each content module, course learners are presented with “interact assignments” that encourage interaction with colleagues utilizing the forum website. This component of the course is critical; research has suggested that occupational therapy practitioners are not confident of their knowledge of EF applications, specifically in the
school setting (Cramm et al. 2013a; Cramm, Terry, Krupa, Missiuna, Lysaght, & Parker, 2013b). Course learners will engage in dynamic assignments specific to course topics. The assignments will require course learners to upload pictures, videos, or other media onto the forum for feedback and discussion from course peers as well as the course instructor. Specific examples of these assignments are provided in Appendix 1 and Appendix 2. These interact assignments complement the content for week 1 and week 2 of the online course. These interactive assignments draw from occupational therapy practitioners’ experiences with children. This aligns with the Social Constructivism Theory principle of learning as facilitated through the use of social and collaborative process. It is important to note that assignments that ask for media use such as video recording will be limited to recording the course learner only, or a consenting adult if necessary.

The course instructor also will guide course learners through an in-depth and hands-on tutorial regarding specific school-based tasks expected of occupational therapy practitioners. The tutorial will prepare course learners on developing evaluation reports, goals, intervention planning, recommended accommodations in the classroom, and report presentation during an Individualized Education Plan (IEP) meeting. Course learners will collaborate with peers regarding how to best present EF knowledge specific to occupational therapy’s role in respective school sites. Course learners will be equipped to have a clear discussion regarding the impact of EF development on students’ academic participation and success. After the course is completed, occupational therapy practitioners will feel prepared to begin addressing EF needs in school age children.
Current EF assessments and interventions can be utilized with students as appropriate and in alignment with their specific IEPs.

**Course Implementation**

Course implementation will require the support of personnel, specifically a technology specialist and a forum moderator. The technology specialist must be available for instances that need troubleshooting during class sessions and course maintenance to ensure the online tools are available to course learners. The forum moderator will ensure social interaction is appropriate between course peers within the online forum. The course instructor will collaborate with topic experts to record brief videos about specific topics within multimedia modules. Topic experts will develop brief presentations using a provided video recording software. The online instructor will create a contract of consent with topic experts for course learners to have access to videos for future reference.

The course will offer continuing education units for school-based occupational therapy practitioners. Full continuing education units will be earned with complete participation in discussion and interactive assignments. In the instance that a course learner is unable to complete certain discussions or assignments within the seven-week duration of the course, the course learner will be given two additional weeks to complete all assignments. Uncompleted assignments after the extended two weeks will result in a deduction from the total continuing education units.

After completing the first implementation of the course, the course instructor will gather feedback from course participants and make revisions to the course as needed. Evaluation and data management plans can be reviewed in the evaluation plan presented
later in this project proposal (Chapter 4). For the second annual implementation of the course, the online instructor, technical support, and forum moderator will continue to moderate and manage the online course. Topic experts will be invited to share a revised video. If a topic expert is unable to return for the second implementation, videos from past courses will be shared with course learners and the online instructor will facilitate interactive assignments and feedback. Collaboration and feedback will continue to be accessible through the website.
## Course Lessons

<table>
<thead>
<tr>
<th>Week</th>
<th>Webinar topic</th>
<th>Content Reviewed</th>
<th>Interact Assignments</th>
</tr>
</thead>
</table>
| 1    | EF Development| EF in Children, EF development in the brain, core EF skills                      | 1: Introduction to colleagues  
2: Reflect on clinical experience and provide example where EF core skills were used  
3: Share an intervention via video or other media of a familiar intervention and how and EF perspective can be utilized.                                                                                                          |
| 2–3  | EF assessment | Test administration, score interpretation, reliability and validity, EF construct being measured, challenges, follow up plans | For each assessment:  
Upload a video clip of you practicing to administer a portion of the provided assessment (course learner on video only).  
Provide feedback to peers.                                                                                                                                                                                            |
| 4    | Intervention  | Therapy approach, preferred age population, EF constructs being measured, strengths and challenges providing intervention | For each intervention introduced:  
Upload a video of you performing the intervention (course participant or adults only)  
Provide feedback to peers.                                                                                                                                                                                            |
| 5 | IEP and Accommodations in the School Setting | EF specific report template for present levels, EF-based accommodations, clinical observations for EF | 1: Discusses challenges and barriers in implementing EF into your evaluation report and school official documents.  
2: Develop a template for discussing EF in an OT evaluation report and share with peers.  
3: Develop 2 EF goals that can be used to support participation in the school setting and share with peers. |
| 6 | Advocacy: Content Development | Gather information regarding the following: defining EF, EF development in children, research evidence on EF skills related to school performance, research recommendations for utilizing EF in the school setting. | Create a handout that can be provided to educate the school team on EF. Share this handout on the forum.  
Review 2 handouts and provide feedback on content, structure, and images used. |
| 7 | Advocacy: Presentation | Presentation of live or narrated PowerPoint to course learners. Presenters will identify their selected audience. | Course participants will present their presentation to peers in a live classroom format.  
Peer feedback: Considering the target audience of the presentations, review 2 peers’ presentations. Post one question in each presentation that might be asked by target audience member.  
Presenter: Answer 3 of the posted questions. |
The module content for Week 1 titled, Executive Functioning in the School Setting is available in Appendix B. The module content for Week 2 titled, Executive Functioning Assessment for the School Setting: Early Years Toolbox and Weekly Calendar Planning Activity is available in Appendix C.

**Potential barriers and challenges for Implementation**

In the development of this online executive functioning course, there are potential barriers that may impede the course’s immediate implementation and availability. The potential barriers include 1) time allotted for course participants to complete the course and development of webinars, 2) availability of topic experts to share insight, 3) scheduling of course participants, 4) and content setup for the website platform. Time is a factor that will impact various components of the course development and implementation process. The time allocated for the entire course content may present a challenge for course participants. For example, course participants may want more or less time to discuss a topic; however, the previously set course pace may require the course learner to bring focus to another topic. Ensuring that a topic expert will be available to provide a brief presentation to supplement the multimedia course is not guaranteed. In the case that a topic expert is unavailable to provide insight, the course instructor will ensure the module comprehensively reviews current and evidence-based literature and resources. Additionally, the consistent participation of course learners is not guaranteed, due to unforeseeable life commitments, course participant learning style, or comfort level with the interactive components of the course. Lastly, technology-based challenges are possible, especially during the transferring of course content into the
chosen online platform. The online course display and organization is limited to this author’s current knowledge and research.

Conclusion

Building an Executive Functioning Toolbox: An Interactive Online Course for School-Based Occupational Therapy Practitioners was developed to provide practitioners an educational option that specifically addresses the clinical gap previously identified in the doctoral project. The course provides resources that will serve to jump start an occupational therapy practitioner’s initiation of EF applications in the school setting. Additionally, the incorporation of a multimedia presentation throughout the course facilitates practitioners’ application of EF resources in the school setting. The next chapter will describe the proposed evaluation plan that reviews how school-based occupational practitioners will play a role in further development of the online course.
Chapter 4 - Evaluation Plan

This chapter will review the components that will be utilized to support course goals and evaluate course features. This evaluation plan will provide 1) an overview of course components that are explained using an attached logic model and described further in this chapter, and 2) a description of evaluation methods that will be implemented during and after the course is implemented.

For the course evaluation, school-based occupational therapists will serve as the program’s main evaluators. With school-based OT practitioners leading the program evaluation effort, there will be an increased understanding of their role in supporting EF development and inspiring continued collaboration with school staff to generate new EF strategies to help students. The use of formative evaluation, specifically implementation evaluation, will be utilized to understand how the program activities are impacting student performance (Bryson & Patton, 2010).

Logic Model – Please see Appendix D.

A comprehensive overview of the online course components is visually represented in a logic model (See Appendix D). The logic model identifies 1) input resources, 2) activity outputs, 3) outcomes, and 4) impact. First, the input resources include course clients and resources. For this online course, the focus is on providing occupational therapy practitioners evidence-based and current EF resources to support student performance in the school setting. Course resources include the main instructor, brief videos from EF topic experts, current information on EF resources for school-age children, and interactive assignments using an online forum. Second, the activity outputs
describe the activities that occur with the provided resources and the outputs are the products of the program activities. The online activities will include weekly participation in multimedia modules, course learner collaboration with peers, course learner development of EF interventions, and development of advocacy resources. The outputs of the course include: (1) school-based occupational therapy practitioners who are equipped to educate school staff on the EF development of students and (2) school-based occupational therapy practitioners enrolling to participate in the online course. Third, the outcomes are the distinct changes in course participants’ knowledge, behavior, and skills. The outcomes are presented in three levels, short-term, intermediate, and long-term outcomes.

*The short-term outcomes are:*

- Occupational therapy practitioners increase participation in continuing education courses regarding EF application in the school setting.
- Occupational therapy practitioners begin to incorporate EF knowledge in school-based practice.
- Occupational therapy practitioners advocate for tools and resources to initiate implementation of EF strategies to school staff and students in the school setting.

*Intermediate outcomes are:*

- Occupational therapy practitioners initiate education of school staff on EF strategies.
- Occupational therapy practitioners collaborate with OT colleagues on improving EF application with students.
Long-Term Outcomes:

- Development of a community of practice made of occupational therapy practitioners and school staff committed to serving EF needs of students in the school setting.

Lastly, the impact is the intended or unintended change that occurs in systems, organizations or communities after program implementations. The online course is intended to impact change in the school-based occupational therapy community and school district student evaluation protocol. In the school-based occupational therapy community, the impact from the online course includes:

- Advocating for the development of EF skills in students throughout their school experiences
- Contributing to the research efforts to improve and enhance current EF resources

Similarly, in school districts, the impact of the online course involves school-wide implementation of EF support in the classroom to support student performance.

Evaluability Assessment Plan

1. School-based occupational therapists (Intended Users) will comprehensively review online course content specifically regarding their perceived ability to support school programs.

2. Course design will be confirmed through course evaluations completed by intended users, review of provided perspectives, consideration of contextual factors, and outlining the course activities to be implemented.

3. Short-term, intermediate, and long-term outcomes will be identified and reviewed.
4. Evaluation of the EF online course will occur in order to determine the dissemination and application of course content.

5. Estimations of the likelihood that the EF content will meet intended outcomes for school-based OT practitioners will serve as a basis to confirm course design.

6. School-based OT practitioners will be encouraged to provide honest feedback regarding online course strengths and areas for growth (Newcomer, Hatry, & Wholey, 2010).

**Core Purposes**

The online course evaluation will focus on a formative evaluation approach, especially since the course is still in the developmental stage. The end goal of the course evaluation will be to fine-tune the course such that it will inspire and educate school-based OT practitioners regarding utilization of an EF perspective when working with school age children. School-based occupational therapists will be significantly involved in the course design process, which will serve as a starting point for generating EF-based assessments, interventions, and other related resources that can be applied in the school setting. By encouraging school-based OT practitioners to collaborate, there will be an increase in professional research, conversations, and education. This will ultimately lead to EF development becoming part of the discussion when supporting students’ success in school.

A combination of descriptive and relational research design and data analysis approaches will be used to guide the course evaluation. Specifically, for the descriptive purpose of the course evaluation, there will be focus on determining the number of
school-based occupational therapy practitioners participating in the online course, which EF resource was most beneficial and which was least beneficial, and frequency in utilization of EF resources (Haertl, Behrens, Houtujec, Rue, & Haken, 2009).

For the relational component of the purpose, there will be focus on determining if there is a relationship between:

- Course learners’ (occupational therapy practitioners) EF knowledge before course and course learners’ knowledge after the online course
- Previous course learners and their frequency of applying EF resources in school setting
- Previous course learners and their frequency of educating school staff regarding EF development and EF strategies.

**Scope of the Evaluation**

*For current course participants.* The online course will take place over a span of 7 weeks. The forum platform will be utilized to turn in assignments, provide feedback to peers, and to have access online surveys that will be provided at the mid-point of the course and end of the course. The survey will use open-ended question to obtain perspectives from course participants.

*For past course participants.* After completion of the online course, past course participants will have access to forum platform to share new EF ideas, strategies, and resources. The forum will also be available for course learners to discuss concerns, seek advice, and troubleshoot ideas with past course participants. The forum platform will be utilized to announce a survey 6 months after the course and 1 year after the course. An
invitation to participate in the surveys will be emailed to past course participants. The
surveys will be available through a link on the forum platform. The survey will use open-
ended questions to obtain perspectives from course participants.

The setting for the EF online course will occur in the main instructor’s home
office or additional professional setting. Course participants will have the freedom to
participate in the online course in a location of their preference. The main course
instructor will manage the data collection that will occur during and after the online
course. The inclusion criteria for the online course include occupational therapy
practitioners and occupational therapy students who have completed their pediatric
school-based fieldwork. The exclusion criteria will be any non-occupational therapy
professionals as the online course is focused on expanding school-based practice in the
occupational therapy profession.

**Evaluation questions for occupational therapy practitioners:**

- After participation in the EF online course, is the course content sufficient to
  begin using EF resources to evaluate EF skills in students?
- After participation in the EF online course, is the course content sufficient to
  begin using EF intervention resources to address EF skills in students?
- After participation in the EF online course, is the course content sufficient to
  begin educating school staff about the importance of EF development in school-
age children?
After participation in the EF online course, is the course content sufficient to advocate to school administrators the need for EF resources to support EF needs in school age students?

**Research Design and Implementation Method**

The online course evaluation will focus on collecting qualitative data. This data will be obtained, as it will be important to get detailed perspectives and feedback from course learners who are currently participating and have participated in the online course. From the evaluation questions developed, there will be an analysis of course learner feedback. The analysis will focus on identifying themes, consistent concerns, and consistent strengths gained during and after participating in the online course. This will lead to a clear understanding of the EF courses strengths and needed areas of growth.

**Data management plan**

For the obtained qualitative information, tables and spreadsheets will be created by course instructor to record feedback from course participants. The responses from evaluation questions collected from course learners would be submitted through electronic means. Online course evaluators would gather the collected data to be transcribed, coded, and distributed into categories for analysis. This will help determine common themes among the responses received.

**Summary**

The course titled, *Building an Executive Functioning Toolbox: An Interactive Online Course for School-based Occupational Therapy Practitioners*, will focus on gaining feedback from course participants using their personal perspectives during and
after course participation. Qualitative methods, specifically through the use of open-ended questions will be provided to course learners during, at the end, and after the course to guide the main instructor’s plan to enhancing course content and features. The evaluation methods will facilitate necessary course changes and further implementation plans to ensure the proposed course goals are met.
Chapter 5 - Funding Plan

Program Description

School-age children need to naturally access their executive functioning (EF) skills to effectively participate in their academic curriculum (AOTA, 2014; Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013; Dawson & Guare, 2010). In current school-based occupational therapy practice, evaluation and intervention services are not focusing on student-related EF needs. After synthesizing the current research, emerging evidence was identified specifically regarding brain development, EF assessments, EF intervention, and populations that would gain the most benefit from EF-related occupational therapy intervention in the school setting. The proposed program is a 7-week online course with unlimited access to an interactive website. The course serves to provide occupational therapy practitioners with: 1) foundational and current knowledge on the executive functioning development in the brain, 2) current information on EF assessments and intervention from authors and EF experts, 3) frequent opportunities to collaborate and brainstorm EF strategies, and 4) comprehensive guidance on how to begin implementing EF analysis into evaluation reports, goals, as well as classroom accommodations. Researchers are in agreement that developing EF skills in students will improve overall participation in academic as well as school related tasks (AOTA, 2014; Cramm et al., 2013; Schultz-Krohn & Polatajko, 2013). The proposed program goals are to support occupational therapy practitioners in these efforts.

The online course with interactive forum will involve cost of four elements. First, the main instructor of the course will be an occupational therapist and the guest lecturers
will be field experts for EF assessments, EF intervention, or EF development in the brain. All instructors will be compensated for their time and preparation. Second, the online course will require access to a learning portal that provides dynamic learning features to encourage productive communication between course learners. Funding will be allotted to online tools used throughout the course. Third, a technology specialist must be available on standby to support technology related issues impacting course progress. Lastly, a forum moderator for the website is available to ensure response as well as uploads are accessible to course learners. The cost related to the online course will be a monthly website fee to ensure its accessibility to learners during and after the course implementation. Additional budget resources include office supplies (paper, office items), office hardware (computer, scanner, printer), communication (mobile phone), and advertising (flyers, ads in OT Practice) that will serve to support the course implementation as well as dissemination costs (See Table 1 for outline of costs).

**Table 3. Needed Resources: Budget**

<table>
<thead>
<tr>
<th>Needed Resource</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course instructors</td>
<td>$15,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Website cost</td>
<td>$1200 (100/month)</td>
<td>$1,200</td>
</tr>
<tr>
<td>Video recording software</td>
<td>$120</td>
<td>$45</td>
</tr>
<tr>
<td>Forum moderator during course</td>
<td>$700</td>
<td>$700</td>
</tr>
<tr>
<td>Off course</td>
<td>1,700</td>
<td>1,700</td>
</tr>
<tr>
<td>Office supplies</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Office hardware</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
<tr>
<td>Communication</td>
<td>$800</td>
<td>$800</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$21,220</td>
<td>$12,145</td>
</tr>
</tbody>
</table>
### Table 4. Dissemination costs

<table>
<thead>
<tr>
<th>Description</th>
<th>AOTA</th>
<th>OTAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference fee</td>
<td>$500</td>
<td>$400</td>
</tr>
<tr>
<td>Travel (includes flight, transportation, and mileage)</td>
<td>$600</td>
<td>$100</td>
</tr>
<tr>
<td>Lodging and meals</td>
<td>$900</td>
<td>$90</td>
</tr>
<tr>
<td>Evaluation (internet survey, incentive, prize)</td>
<td>$350</td>
<td>$350</td>
</tr>
<tr>
<td>Advertising (OT practice, Flyers, in-services)</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,650</strong></td>
<td><strong>$1,240</strong></td>
</tr>
</tbody>
</table>

The dissemination costs include presentations at occupational therapy national and local conferences. The travel costs for the national conference allocates for flight and transportation. Specifically, the flight is budgeted to be $400 and transportation via public, private, and subway is $100. The cost for lodging and meals is $900, with lodging budgeted to be $600 and meals costing up to $300 for the 4-day stay. An evaluation of the projection presentation via online survey would be encouraged using incentives such as beverage (i.e. Starbucks) card for the first 20 participants and a grand prize raffle for an executive functioning assessment kit. For the local conference, travel cost will include use of personal car and gas. The cost of meal for 3 days is approximately up to $90. Lodging is not included in budget due to conference site being close proximity to living personal residence. A similar evaluation cost and process will be used with conference attendees (See Table 2 for outline of costs).
Available Local Resources

- School-based occupational therapy practitioners, school staff, and school district administration play a collaborative role in determining the occupational therapy assessment process. The school team will support and help advertise the course to educate and support school professionals specifically on incorporating EF-related strategies with students.

- School districts have access to technology specialists that will support learner access to course material and website in the school setting.

- Collaboration with executive functioning experts will enable course learners to have access to current research, have insight to follow up research plans, and can share personal ideas for EF interventions or assessments for feedback.

- Occupational therapy student volunteers, from local occupational therapy programs, demonstrating interesting in pediatrics as well as school-based settings can benefit from developing an executive functioning lens.

Potential Funding Sources

- Institute of Education Science (IES)- the Institute of Education Science offers research grant programs in the areas of special education, early intervention, professional development, and social as well as behavioral outcome to support learning (Special Education, 2016). The grant awards fund between $600,000-$3,300,000 depending on research focus of development and innovation, effectiveness, measurement, or efficacy and replication. The IES has funded
topics regarding individualized intervention in reading comprehension, classroom-based training program for attention and emotional regulation, and teaching approaches to support student development of self-regulatory skills in middle school setting (Special Education, 2016).

- Grants.gov offers grant opportunities in the area of dissemination and implementation research in health. The categories of education, environment, and health are acceptable activities for funding (Dissemination and Implementation, 2016). The grant funds are for $200,000–$675,000 for topics such as pediatric quality measurement programs and health services research on dissemination.

- William T. Grant foundation offers grants from $143,750–$350,000 for school-based interventions focusing on increasing school motivation and academic outcome of low SES adolescents, dissemination and implementation, and online journal specific for research use (Healthy Pathways, 2016).

- Autism Speaks offers grants and funding opportunities of up to $450,000 in topics such as executive functioning, cognitive rehabilitation, flexibility, and cognitive control (Meixner Translation, 2013)

- The AERA grants program offers funding opportunities for research focusing on education issues occurring in the U.S. such as achievement gaps between ethnic groups, relationship between school readiness and engagement in art activities, as well as children’s academic growth. AERA grants fund up to $20,000 for projects lasting one year and up to $35,000 for projects lasting two years (Research Grants, 2016).
● DonorsChoose.org is a crowd funding team that enables donors to provide funding to education related projects. Through the website, donors provide monetary donations and the DonorsChoose team purchases the needed supplies and delivers the item to program site. Donorschoose.org has raised $436,095,637 to date on educational related project (Connecting the public, 2016).

● JPMorgan Chase provides grants that follow guidelines such as a demonstration of clear objectives, organized information, identification of a target population in need, and research evidence supporting a problem (U.S. Domestic Grants, 2016).
Chapter 6 - Dissemination Plan

Program Description

School-age children need to naturally access their executive functioning (EF) skills to effectively participate in their academic curriculum (AOTA, 2014; Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013; Dawson & Guare, 2010). In current school-based occupational therapy practice, evaluation and intervention services are not focusing on student-related EF needs. After synthesizing the current research, emerging evidence was identified specifically regarding brain development, EF assessments, EF intervention, and populations that would gain the most benefit from EF-related occupational therapy intervention in the school setting. The proposed project is a 7-week online course with unlimited access to an interactive forum. The course serves to provide occupational therapy practitioners with: 1) foundational and current knowledge on the development of executive functioning in the brain, 2) current information on EF assessments and intervention from main course instructor and EF experts, 3) frequent opportunities to collaborate and brainstorm EF strategies, and 4) comprehensive guidance on how to begin implementing EF analysis into evaluation reports, goals, and classroom accommodations. Researchers are in agreement that developing EF skills in students will improve overall participation in academic as well as school related tasks (AOTA, 2014; Cramm et al., 2013; Schultz-Krohn & Polatajko, 2013). The program goal is to support occupational therapy practitioners working the school-based setting in initiating the use of executive functioning applications when working with students.
Dissemination goals

- Long-Term Goal: The executive functioning online course will develop a community of occupational therapy practitioners committed to improving assessments, interventions, school district education, and classroom supports regarding EF to facilitate efficient student participation in the school setting.

- Short Term Goal: Occupational therapy practitioners working with school age children will participate in the online course and collaborate with OT colleagues in initiating further development of assessments, interventions, and EF related classroom supports.

- Short Term Goal: Occupational therapy practitioners working with school age children will collaborate with EF experts to understand more information regarding EF in the developing brain.

- Short Term Goal: Occupational therapy practitioners will work with school administrators to develop an EF based program that can be implemented school wide to develop EF skills throughout a student’s academic experience.

Target Audience

- Primary Audience: Occupational Therapy Practitioners, specifically those working with school age children, are the target audience for the EF online course. Occupational therapy practitioners are experts in task performance analysis, understand the value of meaningful participation, and strive to obtain comprehensive pictures of individuals (AOTA, 2014). These are primary contributions that occupational therapy practitioners provide to a multidisciplinary
team that allows OT professionals to be advocates for clients. Currently, research has identified a need for more executive functioning applications in the school setting specifically due to the critical EF development that occurs from infancy to adulthood (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016). Occupational therapy practitioners that work closely with school age children must be knowledgeable advocates that are empowered to learn as well as develop innovative strategies to support children’s development and participation.

● Secondary Audience

○ School Administration staff (board members, principals, department supervisors) must have an awareness of EF development in school age children and collaborate with school staff to ensure that strategies and accommodations are in place to support student EF needs. School administrators must encourage the facilitation of EF development in school age children to support active participation and academic success.

○ School staff (teachers, related-service professional, and instructional support aides) lead and support foundational academic experiences that nurture student growth. School staff must have an understanding that EF skills contribute to the active participation and planning process that they witness student engage in daily. School staff must collaborate with occupational therapy practitioners to setup classroom accommodations and develop EF skill building activities.
Key Messages

To Occupational Therapy Practitioners:

Occupational therapy practitioners play a significant role in supporting school age children as they participate in their academic curriculum and other school activities (Case-Smith, 2002; Clark & Polichino, 2008). Central to school age children’s engagement in the school setting is their reliance on their EF skills to effectively participate in daily school tasks (Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013; Josman & Rosenblum, 2011; Schultz-Krohn & Polatajko, 2013). Current evidence-based research describes EF skills as linked to students’ school readiness (Schultz-Krohn & Polatajko, 2013). However, the evidence-based research in occupational therapy suggests emerging information regarding EF assessments, interventions, and EF in the developing brain specifically in the school setting. As a result, EF skills are not being addressed in the school setting leaving many students unsupported and unsure how to navigate school tasks. Research evidence suggests that occupational therapy practitioners can help decrease the clinical gap by investing time to gain more knowledge regarding EF (Cermak & Bissell, 2014; Katz et al., 2007; Miranda et al., 2011). More specifically, the author encourages occupational therapy practitioners to review current available EF assessments and begin evaluating a student's EF strengths and areas for growth. It is advised that school staff be presented with assessment results and clinical observations to ensure the student's access to necessary accommodations to facilitate meaningful participation (Berg et al., 2012; Josman et al., 2010; Munkholm et al., 2010).

Occupational therapy practitioners are empowered to collaborate with school
psychologists, teachers, and other school staff to gain a perspective on a student current EF development specifically regarding school participation. Through the acknowledgement of an EF deficit, occupational therapy practitioners can begin initiating available as well as innovative interventions to address EF in the school age children.

Occupational therapy practitioners are encouraged to keep updated on EF skills typically gained throughout child development. As more clinical practice is gained with addressing EF, occupational therapy practitioners are recommended to remain committed to updating and contributing to current research with follow up as well as new research studies. Lastly, occupational therapy practitioners are advised to collaborate with occupational therapy professionals to understand the different ways EF is being address in the school setting. Overall, occupational therapy practitioners would benefit from joining together as a community to support each other as professionals with a united goal of setting up students for success in the school setting.

To School Administrators:

Research supports the importance of addressing and facilitating student EF skill development to improve overall engagement in school tasks. Furthermore, evidence-based research suggests a significant link between EF and school readiness (Cramm et al., 2013; Dawson & Guare, 2010). Therefore, it is important for EF skills in students to be monitored and supported throughout a student’s academic experience. Providing students with the tools and resources to develop their EF skills has the potential to increase academic scores, facilitate behavior regulation, improve emotional regulation, and prepare student for life after their educational experience (Boyer et al., 2015; Center
on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016).

Occupational therapy practitioners are experts in task analysis and supporting cognitive performance through environmental setup and adaptations. Occupational therapy practitioners are equipped with the foundational knowledge to educate school teams regarding the benefits of supporting EF development in the school setting. Additionally, occupational therapy practitioners have the skill set to support student development in their EF skills ultimately facilitating their participation throughout their academic career.

In order to begin supporting student EF skills, the school staff would benefit from school administration approval for more opportunities 1) to engage in EF related continuing education courses or in-services, 2) to collaborate as a multidisciplinary team in order to analyze school related EF-related needs, and 3) to purchase evidence-based EF resources, such as assessment protocol or program guides, that can be used to support students. Overall, the collaboration of occupational therapy practitioners, school administrators and school staff to meet the EF needs in the school setting will yield positive benefits for students, the school, and the community.

To School staff:

Current evidence-based research regarding EF development in the brain has reported there are three core EF skills that work simultaneous specifically when learning a new concept or solving an existing problem. These EF skills are working memory, inhibitory control, and mental flexibility (Center on the Developing Child at Harvard University, 2011). Development of these core EF skills start from infancy and continue through adolescence. These skills support children in academic related tasks, behavior
regulation, emotional regulation, and navigating new or unfamiliar tasks (Center on the Developing Child at Harvard University, 2011; Dawson & Guare, 2010; Howard & Melhuish, 2016). Occupational therapy practitioners support students in these skills and are professional resources that the school team can access to support students in the school setting. Furthermore, research evidence has determined that children are not able to develop EF skills on their own. Instead, children benefit from adult facilitated experiences in their natural settings such as the home and school environment (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016; Maeir et al., 2014). School professionals working directly with children throughout their school day are encouraged to gain an awareness of 1) the importance of developing EF skills throughout children, 2) EF strategies to scaffold novel school activities to support children’s participation, and 3) accommodations that can be implemented in a classroom to support development of EF skills. Overall, school staff play a contributing role in supporting EF skill development in children, specifically in their daily interactions serving as adult models and setting up the school environment with embedded EF-related supports.

Sources/messengers

For Occupational Therapy Practitioners: The American Occupational Therapy Association (AOTA) continues to actively advocate for occupational therapy practitioners’ practice through science driven evidence-based research, involvement in state and federal policy affairs, and the provision of resources that serve to inform practitioners of best practices for each practice setting. With Children and Youth
identified as a key population for the 21st century, AOTA will continue to actively disseminate relevant information on a national level. Furthermore, AOTA will ensure that occupational therapy practitioners continue to serve children from infancy through adolescence in various settings.

*School Administrators and School staff:* The Center on the Developing Child at Harvard University is comprehensive resource that provides current information regarding executive function as it relates to development, academic participation, and overall health. The Center disseminates information focused on executive functioning development in children through science driven innovations, providing access to current research results, and global collaborations.

**Dissemination Activities**

**Person-to-person contact:**

- *Participation in Professional Presentations:* Information regarding the executive functioning online course will be shared at the national and local conferences by poster presentations. These presentations will be conducted face to face with individuals interested in learning more about how to utilize EF application with children in the school setting. The poster presentations will go over current research evidence, suggestions focused on what school-based occupational therapy practitioners can begin implementing, and preview EF online course content.

- *Participation as guest lecturer in occupational therapy academic programs:* The guest lecturer will share an overview of school-based practice, bring awareness to
EF skill development, share EF evidence based research related to school practice, and discuss potential EF intervention that can be applied in the school setting with occupational therapy students. Occupational therapy students will be informed of the EF online course opportunity and encouraged to participate in the course during or after their pediatric fieldwork.

- **Face to face interactions:** An overview of the EF online course will be shared with local school-based and clinic based occupational therapy practitioners in an informal meeting. The overview will share samples of course content and provide tips on how EF can be applied in the school setting. Handouts will be provided in the information session to facilitate dissemination of online course details.

**Electronic media:**

- **Social forum:** Online occupational therapy groups such OT connections via AOTA or pediatric groups via Facebook will be utilized to initiate conversation threads regarding EF applications in the school setting. The discussions generated from the conversation threads will provide opportunities to bring awareness to “Building an Executive Functioning Toolbox: An Interactive Online Course for School-based Occupational Therapy Practitioners” course details.

- **Podcasts:** Utilizing AOTA’s special interest group access, a podcast will be developed to increase awareness of EF online course. The podcast will provide an overview of course content, advertise the accessibility of EF topic experts, and provide initial suggestions for how school-based occupational therapists can get started on addressing EF in the school setting.
Budget

The dissemination activities require financial resources specifically for travel to local and national occupational therapy conferences, Occupational Therapy Association of California (OTAC) and American Occupational Therapy Association (AOTA) respectively. Lodging and meals costs will be required mainly for the national occupational therapy conference. In addition to travel and lodging costs, budget resources will include presenter registration fees, office supplies, and printing of presentation materials. Dissemination activities occurring in local occupational therapy programs and local school districts requires travel by car generating cost for gas mileage for each trip. During the national and local conferences, as well as the local occupational therapy program, there will be access to the primary audience, occupational therapy practitioners. The presentations occurring in local school districts will address the primary and secondary audiences. A detailed outline of the budget for dissemination activities is in Table 1.

**Table 5. Dissemination costs**

<table>
<thead>
<tr>
<th></th>
<th>AOTA</th>
<th>(OTAC)</th>
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</thead>
<tbody>
<tr>
<td>Conference registration fee</td>
<td>$500</td>
<td>$400</td>
</tr>
<tr>
<td>Travel (includes flight, transportation, and mileage)</td>
<td>$600</td>
<td>$100</td>
</tr>
<tr>
<td>Lodging and meals</td>
<td>$900</td>
<td>$90</td>
</tr>
<tr>
<td>Evaluation (internet survey, incentive, prize)</td>
<td>$350</td>
<td>$350</td>
</tr>
<tr>
<td>Advertising (OT practice, Flyers, in-services)</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,650</strong></td>
<td><strong>$1,240</strong></td>
</tr>
</tbody>
</table>
Evaluation

Person-to-person contact:

During professional posters presentations at the local and national level, visitors of the presentation will be tracked by accounting for number of provided handouts that will include a preview of the online course content with contact information. There will also be an opportunity for visitors to provide their contact information to the presenter to gain access to email updates. Additionally, a short pre-and post-questionnaire will be provided to poster presentation attendees. The pre- and post-questionnaire will include up to 4 questions evaluating understanding of presented content. To increase attendee motivation for post-questionnaire performance, a small incentive will be provided if all questions are answered correctly. The number of handouts provided, the number of contacts, and attendee questionnaire results will be compiled to determine success of dissemination. Networking and generating interest from the primary audience will be the outcome of the conference presentations.

As a guest lecturer at a local occupational therapy program, the number of students attending the course will be tracked with each short course provided. Students will be encouraged to share a potential executive functioning intervention that can be used in the school setting. Sharing an EF intervention will serve as an entry for a drawing where the winner will get to participate in the online EF course. Additionally, students will participate in a pre-and post-quiz to assess understanding of content. The quizzes will be up to 5 questions evaluating knowledge prior to and after the short course lecture. The number of short course attendees, number of EF intervention ideas, and the
participation in the quizzes will determine success of dissemination. Bringing early awareness of the importance of addressing EF skills in children to future occupational therapy practitioners will be the outcome of the guest lectures.

Executive functioning-based in-services provided to local school districts will track the number of primary and secondary audience members attending the session. Additionally, short pre and post in-person surveys will be distributed to gain feedback on in-service information. Returning the survey will serve as entry to a drawing for a classroom based executive functioning strategies guide. The number of attendees and the results from the short surveys will determine success of dissemination. Promoting the use of EF strategies in the classroom that encourage the collaboration of primary and secondary audiences attending the session will be the outcome of the in-service.
Chapter 7 - Conclusion

This doctoral project focused on developing an online course entitled “Building an Executive Functioning Toolbox: An Interactive Online Course for School-based Occupational Therapy Practitioners.” This online course supports school-based occupational therapy practitioners in understanding executive functioning and utilizing executive functioning (EF) assessments and interventions with school-age students. A review of the research evidence provides current information regarding the availability of EF resources that can be applied in the school environment. This chapter will review the theories used to frame the project and design the online course, the integration of research evidence in facilitating the course’s development, and the implications of implementing and disseminating the online course for occupational therapy practitioners and their clients.

Integration of Theory

The diffusion of innovations was utilized as the theory base to understanding the identified clinical gap in school-based occupational therapy practice. Using the theory’s constructs as a guide, the factors that contribute to the clinical gap were visually depicted in an explanatory model (see Appendix A). This visual model demonstrates the relationships between current EF resources in the school setting, current practitioner knowledge in EF, school administration established guidelines, and task demands within school-based practice. The literature was reviewed for each factor to (1) better understand the clinical gap and (2) determine current methods and approaches to address executive functioning in the school setting and thereby address this clinical gap.
Three theories were utilized to guide the design and development of the online course, cognitive theory of multimedia learning, social constructive theory, and diffusion of innovations. The principles of each of these theories facilitated the development of course content presentation, course topics, and course features. Using the principles of the cognitive theory of multimedia learning, course learners have access to the course content using multimedia features. The social constructive theory’s principles were utilized to foster a social learning environment that will enable course learners to learn from peers and their practice experiences. Lastly, diffusion of innovations was utilized to facilitate practitioner implementation and dissemination of EF applications in the school setting.

Integration of Evidence

Professional literature was reviewed focusing on the current methods and approaches specifically, EF development in the brain, EF assessment, EF intervention, and disorders impacted by EF delays specifically in the school setting. The research evidence regarding EF development in the brain suggests that EF development occurs starting from birth and dramatic growth in EF skills occurs in the first five year of life (Center on the Developing Child at Harvard University, 2011; Howard & Melhuish, 2016). Analysis of the research indicated that 4 EF assessments were available to evaluate specific EF skills within a certain age range that fits the current school-based practice model ((Berg et al., 2012; Katz et al., 2007; Toglia & Berg, 2013). Current EF interventions were also reviewed in the literature and the results indicate that it is unclear which interventions are most appropriate for use in the school setting (Kentworthy et al.,
Lastly, the research evidence determined that disorders such as ADHD, autism, developmental coordination disorder, and conduct disorder are impacted by EF delays.

**Implications for Occupational Therapy**

The development of the online course, “Building an Executive Functioning Toolbox: An Interactive Online Course for School-based Occupational Therapy Practitioners,” aligns with AOTA’s vision for occupational therapy practitioners to promote children’s participation in desired daily activities, specifically in the school setting (AOTA, 2013). The course content provides occupational therapy practitioners with tools to begin addressing executive functioning needs in the school setting. More specifically, these tools include current EF assessments, EF interventions, and strategies for practitioners to use an EF lens in their school-based practice. Although current executive functioning resources are an emerging area in the occupational therapy literature, the potential course outcomes aim to encourage course participants. More specifically, practitioners are empowered to contribute to the research effort supporting EF development in children, sharing new EF-related intervention ideas, and determining ways to support EF skills in the classroom environment.

Occupational therapy’s involvement in the dissemination of EF resources to support students will benefit both the special education and general education settings. The online course supports occupational therapy practitioners in preparing advocacy resources that will serve to educate the school team, parents, and local school community regarding the importance of EF development in children. This component of the online
course aligns with the Occupational Therapy Practice Framework and the Occupational Therapy Code of Ethics, both encourage practitioners to engage in the advocacy of individual and community needs (AOTA, 2014; AOTA, 2015; Stover, 2016). In conclusion, the online course contributes to the effort of decreasing a clinical gap in occupational therapy school-based practice. Furthermore, occupational therapy practitioners play a significant role in creating awareness and empowering communities to develop innovative solutions in addressing EF development needs in school age children.
Appendix A: Explanatory Model of Identified Problem

MAIN FACTOR 1
Minimal availability of assessment and intervention resources specifically targeting EF

MAIN FACTOR 2
OTs report feeling ill-equipped with EF knowledge and how it is applied in the school setting.

MODERATOR 1
Lack of resources within practice and professional setting

MODERATOR 2
Task, context, and communication demands within the school setting impact OTs' opportunities to learn

CLINICAL PROBLEM
Limited application of EF considerations in the occupational therapy evaluation and intervention process

Consequence
Prevents a comprehensive portrayal of a student's academic and occupational needs and limits successful participation in meaningful school activities

OUTCOME:
User friendly manual that will provide school based occupational therapy practitioners with the most recent research on EF development in the brain, guidelines for incorporating assessment of EF skills in the school system, specific questions to ask during interviews of parents or teachers, and appropriate language to incorporate into occupational therapy assessment results that are to be reported to the individualized education program (IEP) team.
Appendix B: Executive Functioning Course – Week 1 Content

Week 1: Introduction to Executive Functioning in the School Setting

Week 1 Objectives

After the first week’s content, course participants will be able to:
- Define executive functioning (EF)
- Verbalize to colleagues how early childhood experiences impact EF development
- Define 3/3 core EF skills
- Incorporate EF components into a familiar intervention

**Interact Assignment 1**: A significant component of this course is the dialogue, collaboration, and sharing of personal experiences that will occur within the forum. As occupational therapy professionals, it is expected that the forum is a place to share ideas, gain feedback from colleagues, and learn from each other’s experiences. I encourage you to each use this forum as a support network especially as you begin to explore the utilization of executive functioning applications in the school setting. Let us take a moment to each introduce ourselves in the forum. Please state:
- Where you are from?
- What school district do you work for? Contracted? In-district?
- What age population in the school setting do you work with?
- List any areas of expertise
- Share what has led you to work in school-based practice
- Do you currently use EF application in the school setting? If so, do you use EF during evaluation or interventions? Another capacity?
- What do you hope to learn from this course?

*Consider using the media features of this forum and upload a video of your response or an audio clip.

**Introduction to Executive functioning**

This week you will be introduced to Executive Functioning (EF). What is executive functioning? Where does EF develop in the brain? What are EF skills? How do EF skills impact students in the school setting?

Gaining an understanding of these questions will help each of you begin to strengthen your school-based practice as you start to utilize and develop EF resources that will support your students throughout their academic experience.
Visualize:
Throughout this course, there will be research articles and multimedia resource that will facilitate learning and applying EF application in the school setting. One of the main resources is the Center on the Developing Child (http://developingchild.harvard.edu/), which is an online resource that you can begin to utilize to learn more about EF and how to support students’ development of EF skills. I encourage each of you to explore the website and pull the knowledge that best helps you elevate your school-based practice.

Please watch the following 5-minute video to gain an overview of how EF works in the brain and how early childhood experiences scaffold the development of EF. It is a resource from the Center on the Developing Child.

https://youtu.be/efCq_vHUMqs

From the video you will hear that executive functioning is compared to an air traffic control center. This analogy is helpful and can be used when explaining EF to colleagues, students, and parents. As you continue to learn more about executive functioning you will begin to generate your own definition when discussing EF.

*What is Executive Functioning?*

Here is a good starting definition for Executive function:

Executive functions (EF) enable an individual to appropriately adapt to the new situations frequently occurring in daily life. Specifically, EF is responsible for an individual’s ability to effectively plan, manage, and organize behavior to complete desired novel activities.

*What are EF skills?*

Now, let’s review the core skills that promote executive functioning development. These skills work in tandem specifically when an individual is learning a new skills or when problem solving.

Core Skills
• Working Memory
  ○ The ability to hold information in the mind for a short period of time and be able to manipulate the information as needed for the task.
○ Examples:
  ■ A student engaging in multiple-step task such as math problem.
  ■ A student following multiple-step instructions provided by teacher without reminders.
  ■ A student leaving a game to get water and rejoining the game, remembering how to play.

● Mental Flexibility
  ○ The ability to adapt or adjust to changes in routine and perspectives.
  ○ Examples:
     ■ A student being able to switch classroom centers because the center has too many students participating in it.
     ■ A student learning a different way to get the same answer to a math problem.

● Inhibitory Control
  ○ The ability to resist impulsive actions, avoid distractions, and filter thoughts.
  ○ Examples:
     ■ Students waiting in line for their turn in a game while keeping their hands to themselves.
     ■ Playing “Simon Says” and “Red Light/Green Light.”
     ■ Resisting the urge to hit when another student accidently steps on one’s foot.

These core skills facilitate an individual’s participation in initiating tasks, ignoring distractions while engaging in a task, controlling inappropriate impulses, and maintaining focus to complete a task. These core skills also support an individual’s ability to set and manage goals. Specifically, these skills help an individual plan his or her approach to meeting a goal, determine progress toward goals, demonstrate flexibility to make changes as needed, and regulate emotions that occur while completing set goals.
Visualize:

![Brain Image](Center on the Developing Child, 2016)

This image of the brain provides a visual representation that EF skills work with other elements of the brain.

Take a look at the following video. You will see toddlers completing a multiple step activity that is becoming familiar to them as part of their daily routine. Working memory and inhibitory control are the EF skills being developed during this activity. The toddlers are expected to remember the instructions for the task and filter out distractions to complete the task. The adults have set up the environment, and provided non-intrusive prompts (i.e., gestural cues, participating in the activity to provide a visual reference for the students). *Link will be provided

With successfully acquired EF skills, students in school are able to:

- Initiate and complete projects with multiple steps
- Stop themselves from engaging in distracting behaviors
- Ignore or avoid distractions
- Demonstrate flexibility when there are changes in their school routine
- Engage in another plan when their first plan for a task does not work
- Develop good study habits

**Where does EF develop in the brain?**

Executive functioning develops in the brain, starting from infancy. At first, the brain is composed of simple circuits that allow humans to do simple skills (ages 0–3). This creates the foundation for the brain and enables more complex circuits to develop. The more complex circuits then facilitate performance of more advanced skills. In early
childhood, these complex circuits develop, mature, and then create more interconnections in the brain (ages 3–15). During adolescence and early adulthood, these circuits are further enhanced and become more efficient (ages 15–25).

The developing circuit systems mainly involve the prefrontal cortex as well as the anterior cingulate, parietal cortex, and hippocampus. Current research reports that EF skills gained gradually are directly linked to prefrontal brain development, one of the last areas of the brain to mature.

Hear from an EF topic Expert:
Watch the following video with a topic expert sharing information regarding how the brain develops EF skills from infancy to early adulthood.

Gather more Information:
Please refer to the follow reading for more information on EF development in the brain:


Considering this information regarding brain development, children need to develop a strong foundation of lower-level cognitive skills in order to further build high-level cognitive skills.

Research on the developing brain has identified the three age ranges where EF skills demonstrate peak EF development:

- 0–3 years: The brain is most adaptable and able to change, demonstrating need to address EF develop from immediately after birth.
- 3–5 years: Age range where EF skills can be practiced to gain proficiency
- 15–25 years: Adolescence is another period where EF skills can be further refined

The various age ranges mentioned above demonstrate the immediate development of EF skills after birth (age 0–3) and two age ranges where there is dramatic growth of EF skills, ages 3–5 and ages 15–25. Between ages 5–15, EF skills are maintained or exhibit some developmental growth. Overall, the brain demonstrates the ability to adapt and reorganize throughout life especially from infancy to young adulthood.
Review the chart for EF development for children over time when properly supported by adults


When reviewing the chart, keep in mind that skills listed for a 5 year old are in the emerging stage and still require practice facilitated by adult modeling. It is also important to note that there are skills listed by age 7 that are similar to those listed for adults. This demonstrates how skills need time, practice, and facilitated experiences from adult modeling to refine the listed skills through adolescence and into early adulthood.

Interact Assignment 2: After reviewing the chart, reflect on your clinical experiences in the school setting. Are any of the students you work with demonstrating delays in their EF core skills? Pick a scenario where the student may be demonstrating an EF delay. Determine whether the student is demonstrating a delay in a specific EF core skill or more than one EF skill. Share the scenario with your peers.

Peer Feedback: Review 1 of your peer’s scenarios. Do you agree or disagree with the suspected EF delay? Why do you agree or disagree? Do you agree or disagree with the core EF skills identified? Why? Share your feedback.

What factors disrupt EF development and lead to EF delays?

The previously shared chart presents typical development when appropriate adult support is provided. However, as we started to explore in our previous discussion, there are students demonstrating EF delays that impact their overall school participation. Research has demonstrated that when a student has experienced or is currently in a high stress environment, EF development is impacted causing delay in the EF core skills. Children’s development of EF skills relies on adult modeling and supportive environments. Lack of daily adult scaffolding and access to structured environments limits a child’s development of EF skills. Research has identified the following environmental experiences that cause stress, ultimately leading to delays:

- Children experiencing abuse or neglect
- Children exposed to chronic violence
- Children with parents or caregivers impacted by a mental illness
Exposure to these environments and limited adult support may lead to delayed development, specifically in the brain’s prefrontal cortex.

*Executive functioning and childhood disorders*

Research has found that EF impairments are also associated with different childhood disorders such as Autism, Conduct Disorders, Dyslexia, and Attention Deficit/Hyperactivity Disorder (ADHD).

Examples:

A student with Autism may demonstrate the ability to say the rules however have difficulty applying them and following them in the classroom.

A student with Conduct Disorder may exhibit behavior problems such as physical aggression towards peers or teachers.

A student with Dyslexia or ADHD may demonstrate difficulties with inhibiting their impulses thereby impacting their ability to learn.

These childhood disorders demonstrate deficits in attention, self control, working memory, and planning. All of these skills are part of the learning process and are critical EF skills that need to be developed to demonstrate optimal academic performance.

EF skills need to be practiced. Activities paired with adult support can help improve EF delays that children face.

**Visualize:**

Consider this next video, where a kindergarten class is engaged in a center time activity. Notice how the adults model the activity and provide verbal cues to prompt the student to try again instead of point out the incorrect response. Adults can facilitate the development of EF skills by establishing a classroom routine, modeling positive behaviors, and fostering a supportive environment in the classroom.
Why should school-based occupational therapy practitioners address EF development?

As school-based occupational therapy practitioners, we are aware of the importance of early intervention and how early intervention can improve areas in need of growth as a child develops. EF is a relevant area in occupational therapy as it is a critical component in cognition, which is part of the profession’s domain of practice (AOTA, 2014b). Occupational therapy practitioners are trained in observing and analyzing how an individual performs a task; cognitive performance is a consistent factor considered. Executive Function is a component of cognitive performance that occupational therapy practitioners need to evaluate, support, and monitor when working with individuals to ensure efficient participation in daily activities.

School-based occupational therapy practitioners have the opportunity to work with students throughout their educational career. Improving our knowledge as practitioners regarding the critical need to develop EF skills is the first step towards supporting students’ EF needs in the school setting.

Research has determined a link between EF skills and school readiness. More specifically, research shows that when students have a strong foundation in their EF skills, they demonstrate higher test scores in the school subjects such as math, language, and reading. Children are required to control impulses, wait for their turn, maintain attention to a presented task, as well as listen and remember directions. Children demonstrating difficulty in these tasks demonstrate deficits in EF skills. Furthermore, children demonstrating behavior problems related to attention to task, regulation of emotions, task incompletion, and verbal communication demonstrate EF-related delays. These issues require the need for adult support in addressing EF skill development rather than merely providing disciplinary action for the child. Many researchers believe that developing EF skills should take precedent when starting school as opposed to the traditional focus of letters and numbers.

Current research findings report that from infancy the developing brain thrives from early experiences supported by adult interaction. More specifically, individuals are able to develop their EF skills when surrounded by positive adult models and a stable as well as predictable environment. Therefore, enriching experiences impact EF development in the brain from infancy, adolescence, and into early adulthood.

With successfully acquired EF skills, students in school are able to:
- Initiate and complete projects with multiple steps
- Stop themselves from engaging in distracting behaviors
- Ignore or avoid distractions
- Demonstrate flexibility when there are changes in their school routine
- Engage in another plan when their first plan for a task does not work
- Develop good study habits

Please review the document that lists various activities that address EF in students by age.


For example: (provided in video format for course), I like to utilize Lego building blocks when working with my students for a hand warm up. One of the ways I use the blocks is through a game called Lego Tower.

Setup: I provide students with the Lego pieces they will need to create the tower
Instructions: I inform the student that I will be presenting them with a tower made with Legos. They have 10 seconds to look at the tower before I take it away. The student is able to touch the model tower. However, the student is not allowed to touch his or her own blocks while looking at the tower. Additionally, the student can ask to look at the model tower again, but must be sure to stop building when he or she is looking at the tower.

The EF skills being utilized are inhibition (student is not able to touch their blocks while looking at the tower), planning (student must plan how to build the tower without referencing the model), and working memory (the student has to hold a picture of the model tower in the mind in order to recreate the tower).

For elementary age students: Utilize playground games such as “Simon Says” and “Red Light/Green Light.”

Let’s break down “Simon Says”:

Instructions: It time to play the game “Simon Says.” I will lead the game first. Remember you can only copy my actions when I say “Simon Says.” Let’s practice!
Simon Says touch your head,
Simon Says touch your nose,
Simon says touch your knees,
Touch your ears. Remember, since I did not say Simon says your hands should still be on your knees.

The EF skills being utilized are inhibition (students must avoid copying an action when the phrase Simon say is not announced), working memory (students much remember the rule throughout the duration of the game), and mental flexibility (student has to switch from one action to the next along with game leader and peers).

Let’s break down “Red Light, Green Light”

Instructions: Point out the starting line and finish line. I will lead the game. When I say “Green Light,” you will move towards the finish line. When I say “Red Light” you will stop moving. Make sure to listen to me and remember the rules.

The EF skills utilized is similar to Simon Says, inhibition (student has to control body and stop when the “Red light” is called), working memory (student has to remember the rules to determine when to move or stop), and mental flexibility (student has to adapt to frequent changes in movement throughout change).

The game “Red Light and Green Light” can be adapted to further challenge EF skills. For examples, certain animal walks can be used when green light is called or a different animal picture could be held up throughout the game to let students know which animal movement to engage in once green light is called.

For students in middle and high school:

Logic games such as Rush Hour improve development of working memory and cognitive flexibility.

Can be found online for purchase: https://www.amazon.com/Think-Fun/b/ref=bl_dp_s_web_2602239011?ie=UTF8&node=2602239011&field-lbr_brands_browse-bin=Think+Fun

There is an online version you are try to get an idea of the game: http://www.thinkfun.com/play-online/rush-hour/

Setup: Rush Hour requires a student to set up car pieces following the pattern provided on the game card. The student is allowed to shift car pieces up and down, left and right,
in order to clear a path for the red car to exit. Lifting car pieces off the game track is not allowed.

The EF skills utilized are working memory (student not only has to remember rules but also keep track of past movements that did not help achieve game goal) and mental flexibility (student needs to adapt to frequent moving pieces and change plans to meet game goal).

**Interact Assignment 3**: Reflect on interventions you currently utilize with students. Pick one and demonstrate through media (video, pictures, audio) how school-based therapists can use an EF perspective when implementing this intervention.

Provide peer feedback: Pick a peer and state which EF component was targeted and whether the intervention addresses the desired EF component. Is there another way your peer can use an EF lens with his or her presented intervention? Do you have any suggestions to add another EF component to the intervention? Please pick a peer that has not been review yet.

**Week 1 Wrap Up**

This week’s content has focused on defining executive functioning, understanding where EF develops, and the core skills that facilitate EF development. As a school-based occupational therapy practitioner, you reflected on current or new interventions and determined how to utilize an executive functioning lens when working with students. The knowledge gained from this week will continue to grow as you seek more information on EF, initiate EF-focused interventions with students, and educate fellow colleagues about the impact EF skills has on learning and life.
References


Appendix C: Executive Functioning Course – Week 2 Content

Week 2: Executive Functioning Assessment for the School Setting: Early Years Toolbox and Weekly Calendar Planning Activity

Learning Objectives
After the second week’s content, course participants will be able to:

- Incorporate 2 EF assessments into their school-based practice.
- Share the description of 2 EF assessments with colleagues.

Introduction

Last week, we defined executive functioning, explored how executive functioning is developed in the brain, considered how addressing EF skills can be applied for OT practitioners, and practiced how to use an EF lens during intervention sessions with students.

This week we will explore two assessments that measure specific executive functioning related skills. Both of these assessments have been utilized in the research to investigate their effectiveness with school age children. The two assessments that will be highlighted in this week’s content are the Early Years Toolbox and the Weekly Calendar Planning Activity.

Early Years Toolbox (EYT)

Assessment Overview

The EYT is a game-like assessment that utilizes the iPad to measure young children’s (ages 3–6) EF (inhibition, working memory, and cognitive flexibility), self-regulation skills, language, and social development.

At this time, the assessment is an app that can be downloaded only from the iTunes App Store (requires iPad 2 or later version).
The recommended training for utilizing the EYT is 1–2 hours where data collectors (i.e., occupational therapy practitioners) participate in a face-to-face session discussing app use, the assessment goals, data collection, data collector’s role during the assessment, and troubleshooting of potential issues that may occur during administration. This training is free and requires a group of individuals interested in utilizing the EY, to go over the previously mentioned topics. Freely accessible training video are available in the EYT website (http://www.eytoolbox.com.au/). It is also recommended that the data collector practice administering the assessment with a neurotypical child. Additionally, the creators of the assessment developed training videos that are available for viewing.

**Visualize:**
Please take the time to watch the training videos now. You can watch all 5 training videos on the following link: [http://www.eytoolbox.com.au/using-toolbox](http://www.eytoolbox.com.au/using-toolbox)

The assessment utilizes five interactive apps on the iPad that are presented to children (ages 3–6). The interactive apps assess the following 1) visual-spatial working memory, 2) phonological working memory, 3) inhibition, 4) shifting (flexibility), and 5) executive functioning and vocabulary. The assessment includes a parent and educator questionnaire that evaluates behavioral regulation, cognitive regulation, emotional regulation, and social behavior.

Let’s take a closer look at each of the interactive apps.

<table>
<thead>
<tr>
<th>App title</th>
<th>EF skills measured</th>
<th>App Instructions</th>
<th>Duration</th>
</tr>
</thead>
</table>
| Mr. Ant   | Visual-Spatial Working Memory | -Mr. Ant is presented to students with a number of colored stickers placed on different part of Mr. Ant’s body. 
-After a set amount of time, the dots disappear.
-The student is asked to recall the location of the stickers by tapping Mr. Ant. | 5–10 minutes |
<table>
<thead>
<tr>
<th>Task</th>
<th>Executive Functioning</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Not This** | Phonological Working Memory | Students are provided with a display of colored cards with shapes and different facial expressions.  
- Students are given an auditory cue to point to a card that does not have the desired descriptive quality (i.e., Find a shape that is not blue).  
- The number of descriptors in the auditory cues increases with each card.  
- The game stops once there are 3 incorrect responses. |
| **Go/No-Go** | Inhibition | Students are presented with either a picture of a fish or shark.  
- Students are instructed to tap to “catch the fish” and “avoid the sharks.” |
| **Rabbits & Boats** | Shifting (Mental flexibility) | Students are presented with cards varying in shape and color.  
- Students are asked to sort cards following one rule (i.e., by color), then after a number of trials, students are asked to follow a different rule and sort (i.e., by shape). |
| **Expressive Vocabulary Task** | Executive functioning and vocabulary: Identify and name objects | Students are presented with cartoon pictures (45 items).  
- Students are asked to verbally name the pictures.  
- If students use another name for the image (responding with “teeth” instead of “mouth”), they are prompted with “What else might this be called?” |
**Data collection**

The EYT assessment provides 3 options for data collection:

1. A small in-app purchase allows the data collected to be sent to a preferred database (e.g., Excel).
2. Data can be sent to a specific email, where the data will be provided in a trial-by-trial format indicating accuracy, response, and response time.
3. If assessment data will be used on a more informal basis, summary statistics are available.


**Interpreting Toolbox Data**

At this time, the norms for the EYT are in the preliminary stages. These norms were established from combined data of five initial studies where the EYT was utilized. These five studies generated a large sample (N=1,764) with a wide representation of demographics (i.e. gender, SES, and maternal education) (Howard & Melhuish, 2016; Howard & Okely, 2015).

**Reliability for EYT**

Reliability was evaluated using an internal consistency analysis. Very good to excellent reliability was determined for each of the app measures. The questionnaire yielded acceptable to very good reliability on subscales measures (i.e. behavioral, cognitive, and emotional regulation).

Convergent Reliability was obtained by correlating the measures of EYT to the measures of similar and existing assessment tools. The study outcomes determined that the measures of EYT correlated well with the existing comparison measures (Howard & Melhuish, 2016; Howard & Okely, 2015).

**Hear from an EF Topic Expert:**

Watch the following video with an EF Topic expert sharing the strengths and potential challenges for administering the EYT assessments.
**Gather more information:**
The formal report of the preliminary norms, reliability, and convergent validity can be found in the following reference.


**Interact Assignment 4:**
Video Record a practice administration of one of the EYT assessments. Upload this video for peer review. Then in no more than 3 paragraphs please share: perceived strengths and challenges of administering this assessment; how therapeutic use of self was utilized when performing this assessment; and whether or not you would utilize this assessment in the school setting explaining why or why not.

Peer review: Review 1 of your peer’s videos (preferably one that has not been reviewed yet). From the media shared, what can the assessor improve in their administration of the assessment? Were the instructions for the assessment clearly provided? Are there any additional challenge you foresee that could occur during administration? From what you have observed, would you see yourself administering this assessment in the school setting? Why or why not?

**Weekly Calendar Planning Activity**

**Assessment Overview**

The Weekly Calendar Planning Activity (WCPA) was developed to observe and examine the performance of individuals (ages 16–94) as they engage in cognitive instrumental activities of daily living. The assessor is able to evaluate whether there are difficulties in executive functioning that impact the individual’s ability to participate in daily life activities that have multiple steps. The calendar task requires individuals to organize appointments into a weekly schedule while doing the following:

- Keeping track of multiple rules
- Monitoring time passed
- Recognizing schedule conflicts
- Avoiding distractions
While the individual is performing these activities, the assessor is making note of strategies, errors, and accuracy of tasks performed.

The WCPA is for individuals that have subtle cognitive symptoms as a result of any of the following:

- Central nervous system illness
- Stroke
- Acquired brain injury
- Multiple sclerosis
- Brain tumor
- Parkinson’s disease
- Mild cognitive impairment
- Other illnesses that may negatively impact EF

Participation in the calendar task is most appropriate for individuals that are oriented and able to do the following:

- Able to sustain attention for at least 20 minutes
- Read a paragraph without difficulty
- Functioning at a level 5 or more in the Functional Independence Measure (FIM) in the areas of self-care, cognition, and communication

The Calendar task was designed to support intervention planning, specifically focusing on reducing the number of cognitive errors while completing daily living tasks.

**Assessment Components**

The calendar task has 3 options for level of difficulty. The assessor determines which level to use for the client. In the case the assessor is unsure, then it is advised that the participant start with the level 2 task.
**Level of assessment difficulty**

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Simple version is where the individual is required to copy and organize the provided checklist into a weekly schedule. The assessor presents a list of fixed appointments first, then flexible appointments. The list is provided in a checklist format to cue the individual to check off each appointment from the list.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>Requires the individual to copy a list of appointments that are out of order. The individual must re-arrange the list and make sure to avoid conflicts between appointments and errands. The information presented to the individual is unformatted and not in checklist form.</td>
</tr>
<tr>
<td>Level 3</td>
<td>Complex version where the individual is presented information in paragraph format with extra information. Individuals are required to use personal strategies (i.e., create an organized list with fixed and non-fixed appointments) to complete the calendar task.</td>
</tr>
</tbody>
</table>

While examinees progressed through the task presented to them, they are expected to follow five rules, which they have access to for reference throughout the assessment. The five rules are:

1. Do not schedule appointments on Wednesday.
2. Do not answer questions from the examiner.
3. Tell the examiner when it is 7 minutes after the test begins.
4. Do not cross out appointments entered on the calendar.
5. Report to the examiner when you are finished.

These five rules enable the assessor to evaluate distraction management, memory, and ability to problem-solve.

**Data collection**

At this time, normative data is still being collected to establish normative ranges of performance. Currently, there are research studies evaluating the use of the WCPA for at-risk adolescents and college students with ADHD (Lahav, Ben-Simon, Inbar-Weiss, & Katz, 2015; Weiner, Toglia, & Berg, 2012).
The scoring guidelines require the assessor to record the error patterns that occurred during task performance. For example:

- Input an appointment in the wrong place for date or time
- Appointment is inputted twice
- Appointment name is not entered accurately

Additionally, the assessor must also analyze the use of strategies during task performance. Some example strategies include:

- Inputting fixed appointments before flexible appointments
- Using self-talk
- Reviewing or re-reading appointments before starting the task

Once the assessment is complete, the evaluator engages the examinee in an after-task interview and provides a self-rating scale to gain information regarding the examinee’s self-evaluation of his or her task performance.

Example of after-task interview questions:

- What was your general approach to the task?
- What strategies did you use?
- What strategies did you not use?

The evaluator’s goal is to gain feedback regarding why a certain strategy was used and clarify anything unclear that the examinee wrote during the assessment.

**Hear from an EF Topic Expert:**
Watch a video of an EF topic expert sharing more information regarding the strengths and potential challenges of administering the WPCA.

**Gather more information:**
The WPCA is available on the American Occupational Therapy Association website. From the information reviewed, research has recommended the assessment be utilized with at risk youth.


**Interact Assignment 5:** Take the time now to reflect on the description, goal, and intended population for the WCPA. Is there a way you can re-create the skills being assessed in the WCPA? Are there informal ways you can observe similar skills being assessed in the WCPA?

Peer Feedback: Review 1 peer’s idea (preferably one that has not been reviewed yet). Consider the EF skills they are trying to assess or improve. Can you offer feedback to strengthen their plan? Can you offer additional ideas about how to grade the activity?

For example, there are calendar games for student that can be found online where students are expected to determine what day an activity will be inputted into a calendar. We are able to observe a child during this activity and note the strategy he or she uses to complete the task.

[http://www.abcya.com/calendar_word_problems.htm](http://www.abcya.com/calendar_word_problems.htm)

**Week 2 Wrap Up**

This week’s content focused on two executive functioning assessments that can be utilized in the school setting: the Early Years Toolbox and the Weekly Calendar Planning Activity. Each assessment was reviewed to provide a foundational understanding of how the EF components were being assessed and evaluated. As a school-based occupational therapy practitioner, you were provided opportunities to practice administering components of an assessment and brainstormed ideas on how to evaluate and monitor EF skills. Additionally, this week’s content provided information that can be shared with fellow occupational therapy practitioners, school staff, and school administration to increase the awareness of addressing EF skills in students.


http://dx.doi.org/10.5014/ajot.2012.004754
Appendix D: Evaluation Plan Logic Model

<table>
<thead>
<tr>
<th>Inputs &amp; Resources</th>
<th>Problem Theory</th>
<th>Activities &amp; Outputs</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Participants</td>
<td>Nature of the Problem</td>
<td>Intervention &amp; Activities</td>
<td>Short-Term Outcomes</td>
</tr>
<tr>
<td>- School-based occupational therapy practitioners</td>
<td>School-based occupational therapists demonstrate limited application of EF assessments and intervention in the school setting. This leads to students with EF delays having challenges with classroom participation, problem solving, setting goals, social interaction, and flexibility to change.</td>
<td>- Reflect on clinical practice and discuss how EF lens can be utilized in interventions</td>
<td>- Participation in EF-related courses</td>
</tr>
<tr>
<td>- Occupational therapy students</td>
<td></td>
<td>- Video record a new or familiar intervention that address a core EF skill</td>
<td>- Incorporate EF knowledge in school-based practice</td>
</tr>
<tr>
<td></td>
<td>Program Theory</td>
<td>- Video record practice administration of and EF assessments</td>
<td>- Advocate for tools and resources to initiate the application of EF strategies to support students</td>
</tr>
<tr>
<td></td>
<td>School-based occupational therapy practitioners participate in multimedia modules, collaborate with colleagues, and expand their current knowledge in EF. The cognitive theory of multimedia learning, social constructive theory, and diffusion of innovations guides the course development.</td>
<td>- Develop advocacy resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Program Outputs</td>
<td>- Guided feedback for each assignment is provided by peers to facilitate quality discussions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Number of school professionals that will gain awareness of EF development in children.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Number of OTs participating in online course</td>
<td>Long-Term Outcomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Impact</td>
<td>Intermediate Outcomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Empowerment of the school-based occupational therapy community</td>
<td>- Initiate education of school staff on EF strategies and accommodations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Advocacy for EF skill development in students</td>
<td>- Collaborate with occupational therapy colleagues on improving EF application with students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Enhancement of school district evaluation guidelines</td>
<td>- Contribute to the research efforts to improve and enhance current EF resources</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix E: Implementation and Dissemination Budget

#### Table 1: Needed resources: Budget

<table>
<thead>
<tr>
<th>Item</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course instructors</td>
<td>$15,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Website cost</td>
<td>$1,200 (100/month)</td>
<td>$1,200</td>
</tr>
<tr>
<td>Video recording software</td>
<td>$120</td>
<td>$45</td>
</tr>
<tr>
<td>Forum moderator during course</td>
<td>$700</td>
<td>$700</td>
</tr>
<tr>
<td>Off course</td>
<td>$1,700</td>
<td>$1,700</td>
</tr>
<tr>
<td>Office supplies</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Office hardware</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
<tr>
<td>Communication</td>
<td>$800</td>
<td>$800</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$21,220</strong></td>
<td><strong>$12,145</strong></td>
</tr>
</tbody>
</table>

#### Table 2: Dissemination costs

<table>
<thead>
<tr>
<th>Item</th>
<th>AOTA</th>
<th>OTAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference fee</td>
<td>$500</td>
<td>$400</td>
</tr>
<tr>
<td>Travel (includes flight, transportation, and mileage)</td>
<td>$600</td>
<td>$100</td>
</tr>
<tr>
<td>Lodging and meals</td>
<td>$900</td>
<td>$90</td>
</tr>
<tr>
<td>Evaluation (internet survey, incentive, prize)</td>
<td>$350</td>
<td>$350</td>
</tr>
<tr>
<td>Advertising (OT practice, Flyers, in-services)</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$2,650</strong></td>
<td><strong>$1,240</strong></td>
</tr>
</tbody>
</table>
Appendix F: Executive Summary

Introduction

Occupational therapy practitioners are an integral part of the public education system for children with disabilities (Case-Smith, 2002; Clark & Polichino, 2008). In collaboration with the school team, occupational therapy practitioners are typically consulted to support academic concerns related to a student’s fine motor, visual motor, and sensory processing skills (Clark & Polichino, 2008; Schultz-Krohn & Polatajko, 2013). In the school setting, weaknesses in these skills are apparent in handwriting legibility, task initiation, task completion, visual attention, and self-regulation behaviors. In order for students to successfully participate in classroom related tasks, the evidence-based research suggests that executive functioning (EF) skills are directly linked to student school readiness (Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013; Josman & Rosenblum, 2011; Schultz-Krohn & Polatajko, 2013). Although occupational therapy practitioners work directly with students to facilitate academic participation, there is limited demonstration of addressing EF delays occurring in the classroom (Cramm et al. 2013; Dawson & Guare, 2010).

This doctoral project focuses on the clinical problem involving school-based occupational therapy practitioners that are not 1) formally evaluating EF skills in students, 2) providing interventions to address EF related delays, and 3) advocating for student EF skills to be included in the occupational therapy assessment and intervention process. To further analyze the clinical problem, the Diffusion of Innovations (DOI) theory was utilized to gain a further understanding as to why this problem continues to
Persist in school-based occupational therapy practice. It was determined that occupational therapy practitioners are impacted by the complexity of applying EF strategies, accessing EF resources (i.e. assessment protocols, intervention, continuing education support), sentiments of not feeling knowledgeable of how to provide EF related support in the school setting (Daunhauer, Fidler, & Will, 2014; Cramm et al., 2013). Additionally, time demands from job tasks as well as access to fellow occupational therapy colleagues were factors that contribute to the clinical problem (Cramm et al., 2013; Sharma & Romas, 2012).

Further synthesis of the literature regarding EF resources was reviewed. Specifically reviewed were: available EF assessments, access to EF intervention, EF information as it pertains to the developing brain, and expected EF development for certain age populations or disabilities (Bowers et al., 2015; Boyer et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014; Miranda et al., 2011; Toglia & Berg, 2013). It was determined from evidence-based that research that EF assessments and interventions are available for school-based occupational therapists to use in the school setting however, the available resources required further development through follow-up studies as well as strategies for adapting current resources to fit school-based practice setting (Bowers et al., 2015; Kentworthy et al., 2014; Maeir et al., 2014). EF research focusing on brain development starting from infancy has provided foundational knowledge for occupational therapy practitioners to begin applying EF related strategies in the school system (Boyer et al., 2015; Toglia & Berg, 2013). However, further information from the research is required regarding EF skills acquisition, EF development in student with
disabilities, and a clear protocol on how adults can support EF development all within the school setting.

**Program Overview**

The doctoral project was designed to address the previously mentioned factors impeding school-based occupational therapy practitioners’ application of EF considerations in the classroom. An online course for school-based occupational therapy practitioners was developed to: 1) improve the clinical knowledge of EF development in school age children, 2) provide best practice recommendations on assessment and interventions to utilized when working with school age children, 3) develop a collaborative social network of occupational therapy practitioners committed to increasing the ways EF skills are addressed in the school setting, and 4) prepare occupational therapy practitioners to be educators to their respective school districts and in turn serve as advocates for school age children with EF related needs.

An interactive online course was chosen to provide course learners 1) the flexibility to complete the course in their own time while following provided deadlines for assignment due dates, 2) the opportunity to communicate with course participants beyond the local level, and 3) the experience of being part of an online community specific to discussing EF in the school setting. Evidence-based research has demonstrated that online courses involving critical discussion components enhances the learning experiences as it enables the learner to self-reflect, think critically, and develop a personal perspective of the learning material (Boulton & Hramiak, 2012; Hou, 2015; Lee & Brett, 2014). Utilizing an online course format with forum component facilitate the
development of an occupational therapy community committed to increasing executive functioning support for school-age children.

The proposed program of this doctoral project will be a seven-week online course for occupational therapy practitioners interested in/or currently practicing in a school-based setting. The online course will include: 1) multimedia course modules guided by course instructor, 2) assignments for course learners utilizing a forum based website and incorporating executive functioning components into school-based OT related job tasks, 2) brief videos of EF topic experts sharing insight, and 3) development of advocacy resources to support dissemination of executive functioning development in the school setting. The course is designed to support school-based occupational therapy practitioners’ application of evidence-based research and best practices for EF considerations in the school setting.

Occupational therapy practitioners will be invited to participate in the online course through networking in national and local (California) occupational therapy conferences. Similarly, short courses presented as a guest lecturer will be offered to local occupational therapy programs to spread awareness regards EF’s development in children and the role occupational therapy practitioners have in supporting children in their everyday settings. Additionally, brochures with course details will be distributed to local school districts as well as advertised in professional publications.

**Key Recommendations**

For occupational therapy practitioners, the findings from this doctoral project have determined the benefits for supporting students’ development of EF skills in the
school setting. These benefits extend to academic related tasks, behavior regulation, and emotional regulation which each impact students’ effective participation within and beyond the school setting. School-based occupational therapy practitioners are encouraged to increase their knowledge of EF development specifically in children; to initiate the incorporation of EF assessments to determine student EF related needs; to guide students through EF related strategies to support school participations; and to collaborate with school teams on facilitating EF development throughout the school environment.

For the school team, the findings from this doctoral project has determined the need for collaboration among school staff in providing students a structured and safe environment to nurture the development of EF skills. School staff that work directly with students have the opportunity to model appropriate EF skills; to set up the school environment for the development of core EF skills; and to provide positive feedback as students navigate through their school day. School staff that oversee student programs have the opportunity to encourage their school teams' participation in relevant educational sessions and provide access to resources that serve to improve their ability to positively support students. Overall, the findings from this doctoral project demonstrate the need for a collaborated effort in addressing the development of EF skills to benefit students during and after their educational experiences.

Conclusion

Overall, the online course and the utilization of the forum component will provide school-based occupational therapy practitioners an opportunity to collect evidence-based
resources specifically for executive functioning in school age children. The information and resources provided by the online course enable occupational therapy practitioners to begin implementing EF related strategies in their respective school settings. Additionally, the online course supports occupational therapy practitioners in developing materials that facilitate the advocacy for students with EF related needs. In conclusion, the online course contributes to effort of decreasing a clinical gap in occupational therapy school-based practice. Further creating awareness and empowering occupational therapy practitioners to develop innovative solutions in addressing EF development need in school age children.
References


Appendix G: Fact Sheet

Building an Executive Functioning Toolbox: An Interactive Online Course for School-Based Occupational Therapy Practitioners

Allison Laygo, MOT, OTR/L OTD Candidate

**Definition**

Executive Function (EF) is responsible for an individual’s ability to effectively plan, manage, and organize behavior to complete desired novel activities. EF relies on the following three core skills: working memory, inhibition, and mental flexibility, to work simultaneously when an individual is learning a new skills or problem solving.

**Case example**

Prior to the young girl pouring the liquid into the measuring cylinder, she needed to remember the instructions provided by the teacher (working memory), gather needed materials (mental flexibility), and avoid distractions (inhibition) to complete task. (McCarthy, 2015)

**Clinical problem**

In current school-based occupational therapy practice, executive functioning resources are typically not utilized to support student performance. The identified factors contributing to the problem include:

- Limited number of effective school-based resources that address executive function
- Self-reports that school-based occupational therapy practitioners do not feel knowledgeable applying EF-related resources
- Previously established guidelines by school administration
- High caseload demands
Solution to the problem

An online course for school-based occupational therapy practitioners was developed to:

● Improve the clinical knowledge of EF development in school age children.
● Provide best practice recommendations on assessments and interventions to utilize when working with school-age children.
● Develop a collaborative social network of occupational therapy practitioners committed to increasing the ways EF skills are addressed in the school setting.

(Harper, 2015)

● Prepare occupational therapy practitioners to be educators at their respective school districts and in turn serve as advocates for school-age children with EF-related needs.

In order to facilitate learning, interactive assignments are presented using a forum on-line platform to encourage a dynamic social learning environment.

Executive Function and School-based Occupational Therapy Practice

School-based occupational therapy practitioners have the opportunity to work with students throughout their educational career. EF is a relevant area in occupational therapy as it is a critical component in cognition, which is part of the profession’s domain of practice. Occupational therapy practitioners are trained in observing and analyzing how an individual performs a task; cognitive performance is a consistent factor considered. EF skills need to be practiced to strengthen the foundations needed for learning and life.

Recommendations for Occupational Therapy Practitioners

● Invest time to gain more knowledge in executive functioning
● Collaborate with other occupational therapy practitioners to brainstorm and troubleshoot ways to address EF with students
● Empower school teams to initiate using an EF lens to support students
References


References


Curriculum Vitae

Certification and Licensure

Board of Occupational Therapy – State of California
Issue date: August 29, 2013
License number: 13733

Credentials

- Handwriting Without Tear Level 1 Certification
- Physical Agent Modalities Certification

Education

Boston University, Boston, Massachusetts Anticipated graduation September, 2016
Doctorate of Occupational Therapy
Capstone:

Loma Linda University, Loma Linda, California April 2013
Master of Science in Occupational Therapy

Claremont McKenna College, Claremont, California May 2007
Bachelor of Science in Cognitive Neuroscience
Senior thesis: Grade 1 concussions and the role of head rotational forces

Work Experiences

Occupational Therapist for Chino Valley Unified School District, Chino, California Aug. 2015 – Present

- Provided occupational therapy services in a push-in model, supporting students in the general education setting.
- Developed teacher and parent in-services regarding sensory tool use and home routines.
- Manage occupational therapy support tools for general education classrooms.


- Collaborates with IEP team members to develop academic strategies to be implemented by teachers.
- Advocates for students to support their educational environment and develop academic skills.
- Communicates with teachers and school staff regarding student-centered strategies, accommodations, and student progress and goal development.

Occupational Therapist for Monrovia School District – Monrovia, California August 2014 – October 2014

- Provided school-based and clinic-based interventions focused on facilitating IEP goals.
• Developed and implemented class-wide functional based activities for special education classes.

**Occupational Therapist for San Diego Unified School District** – San Diego, California  

• Implemented therapeutic intervention to students with therapy services on their Individualized Education Program.

**Occupational Therapist for Premier Physical Therapy** – El Cajon, California  

• Reviewed patients’ past medical history to identify their problems.
• Developed client centered hand therapy programs specific to each patient’s needs.
• Assessed patients’ response to therapy sessions and home exercise programs.

**Administrator in A.L. Care Center** – Riverside, California  
May 2009 – Sept. 2013

• Oversaw operation of 24-hour Residential Facility supporting adults with developmental and physical disabilities.
• Communicated with consumer service coordinator, job coaches, family members, and those involved with the care of clients.
• Arranged for the clients to attend available community programs including arranging for transportation.
• Promoted of consumers’ rights, health, safety, and social and physical integration

**Teaching Assistant to Fieldwork 1 Students** – San Bernardino, California  

• Educator at public health nurse in-service - San Bernardino, California  
November 2012

• Behavior Therapist – Ontario, California  
Sept. 2007–2008
  • Provided Applied Behavioral Analysis therapy to children with autism.
  • Facilitated development of behavior compliance, verbal communication, and completion of daily routines.

**Presentation**

**Panel speaker in Spring OTAC symposium**– Anaheim, California  
April 2012

**Volunteer Experiences**

**Haiti Interdisciplinary Mission Trip**  
June 2012

• Co-taught rehab tech class
• Participated in orphanage renovations
• Prepared and lead Haitian students in team building activities

**Special Needs Counselor for vacation bible study camp**  
July 2012

**Childcare Provider for Autism Caregiver Support Group**  
May 2012

**Academic Tutor for Community Kids Connection**  
August 2010 – April 2011

**Skills**
**Computer**: Special Education Information System, Microsoft Word, Excel, PowerPoint, Internet Explorer, Statistic Package for the Social Sciences, PubMed, Medicine and Ovid databases  
**Language**: Tagalog, Spanish (Intermediate Proficiency)

**Professional Membership**

**AOTA**

**Certifications**

- Basic Life Support, CPR, First Aid certified, Carfit technician