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Doctoral Capstone Experience- Clinical Skills and Program Development

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OTD 8494: Capstone Final Culminating Project

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Abstract

My 16-week capstone experience was completed at Bayshore Elementary School under the supervision of my mentor who is an occupational therapist. I administered assessments, provided interventions, documented sessions, and attended Individualized Education Program (IEP) meetings for a population ranging from preschool to fifth grade. The primary skills focused on during occupational therapy sessions included body awareness, motor planning, strengthening, handwriting, attention to task, play skills, and self-regulation. Three main objectives of this experience included completing the day-to-day responsibilities of a school-based occupational therapist while maintaining current knowledge on policies and procedures within the Manatee County School System, conducting a literature review to generate handwriting interventions supported by current evidence, and creating a sensory break room on school grounds while adhering to COVID-19 precautions. Achievement of these objectives helps to meet the needs of this school which include creating effective, evidence-based handwriting interventions and incorporating movement breaks for students due to decreased recess time following COVID-19.

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Introduction

My capstone experience was completed at Bayshore Elementary school in Manatee County. I saw students ranging in grade levels from preschool through fifth grade. The primary skills we worked on in occupational therapy (OT) were body awareness, motor planning, strengthening, handwriting, attention to task, play skills, and self-regulation. I did not have any telehealth students; my entire caseload was seen face-to-face. I saw all of my students except one in groups and each group had 3-4 students. They were primarily grouped by grade level. The only students who were grouped differently were the Varying Exceptionalities (VE) group and the Emotional and Behavioral Disorders (EBD) group. These students came as a group from either the VE class or the EBD class. All of the sessions are 30 minutes and I saw most kids 2 times per week. Once a week I assisted in leading the Special Olympics' Young Athletes program with the preschool students. This is a program that works on skills needed for physical education and other sports. My mentor at my site was the occupational therapist for Bayshore Elementary school. She is contracted out to the school by a local pediatric clinic, at which she has worked also.

The ACOTE focus areas for my capstone experience included clinical skills and program development. My culminating projects addressed the program development focus area. I completed a review of the literature to create a binder of evidence-based handwriting interventions. I also created videos of myself performing various movement stations that were then sent out to teachers and staff at the school to use as needed for students who may need movement breaks throughout the school day, while adhering to COVID-19 guidelines at the school.

Literature Review

Occupational therapy practitioners provide services in a number of facilities; hospitals, clinics, industry, schools, homes, and communities are all examples of these facilities (American Occupational Therapy Association, 2014). According to the American Occupational Therapy Association (AOTA) Workforce and Salary Survey (2019), 18.8% of occupational therapists work within the school setting. School-based occupational therapists are a key aspect of many students' educational team. Within this setting, occupational therapists work with children to help them functionally participate in their role as a student and engage in the daily occupations that encompasses a student's school day. School-based occupational therapists may work with children who have physical limitations, learning difficulties, speech and language problems, behavioral and emotional issues, or hearing and visual problems to name a few (Stanford Children's Health, 2021). Skills and activities targeted in school-based occupational therapy (OT) may include academics, social skills, math, reading, writing, behavior management, recess, engagement in sports, problem solving skills, prevocational training, and transportation (American Occupational Therapy Association, 2016).

Within this setting, occupational therapists often educate parents, teachers, staff, and administrators to promote better outcomes for the child. Occupational therapists may also educate and provide interventions through an individualized, a class wide, or school wide approach. When providing services one on one, the child must have an Individualized Education Program (IEP). An IEP is created by a team of individuals which may consist of parents, teachers, a school system representative, occupational therapists, physical therapists, speech therapists, and social workers (Florida Health, 2020). The IEP includes the child's specific

needs, goals, and any services or modifications that will be provided to the child in the least restrictive environment (America American Occupational Therapy Association, 2016).

Handwriting

There are many reasons as to why a child may need OT services within the school system, but one of the most common reasons for referral is due to handwriting difficulties (Schneck & Case-Smith, 2010). It is important to note that the educational mandate beginning in 2009 that has been adopted by 41 states (Common Core State Standards Initiative, 2021), the Common Core State Standards Initiative, does not include handwriting instruction within the classroom (Collette et al., 2017). It focuses on keyboarding which has decreased the time spent on handwriting instruction within the schools. A study done by Caramia et al. (2020) sought to identify the motor and technology demands of elementary schools by observing a kindergarten, second grade, and fourth grade class for two full days each. The research revealed that between 37.1% and 60.2% of the student's school day consisted of fine motor activities and 17.8% to 37.4% of the time spent doing fine motor activities actually involved writing, drawing, or coloring. Other fine motor skills used throughout the day involved unzipping backpacks, gathering small items, zipping/buttoning jackets, and technology use. This indicates that if a student is struggling with fine motor abilities, they will likely struggle in several areas throughout the school day (Caramia et al., 2020). The research also found that the fine motor demands increase with each grade (Caramia et al., 2020).

Occupational therapists address these handwriting difficulties through a number of intervention approaches; a review of the literature unpacks several of these approaches and their effectiveness as they were used within the school setting. A study done by Zylstra and Pfeiffer (2016) analyzed the effectiveness of the Size Matters Handwriting Program (SMHP) for

kindergarten students who were receiving IEP support. The SMHP protocol incorporates Motor Learning Theory, Cognitive Theory, and Motivation Theory. The Motor Learning Theory is applied through repetition and practice throughout the day; Motivation Theory is incorporated by adding activities that are appealing to the children; and Cognitive Theory involves using an established protocol when teaching letter formation and remaining consistent in verbiage used to teach these techniques (Zylstra & Pfeiffer, 2016). Results of the study indicated that children within the SMHP group demonstrated significant improvements in handwriting legibility, letter recognition, and letter sound recall compared to a group of kindergarteners who were receiving their school's handwriting instruction only (Zylstra & Pfeiffer, 2016). This reveals that pieces from the Motor Learning Theory, Cognitive Theory, and Motivation Theory all have positive implications for improving handwriting abilities.

Research performed by Howe et al. (2013) compared a practiced-based approach and a visual-perceptual-motor approach to improve handwriting. The practiced-based approach is based on motor learning and focuses on repetition to improve the performance of a motor skill. The visual-motor-perceptual approach focuses on visual-motor integration skills and how it impacts handwriting performance (Howe et al., 2013). There were 72 participants from first and second grades who attended the 12-week handwriting club which met twice a week for 40-45 minutes. Participants were divided into two groups: the practiced-based approach group and the visual-motor-perceptual group. Results indicated that students in the practice-based approach group displayed scores in handwriting legibility that were significantly higher than the visual-motor-perceptual group. These results demonstrate that handwriting practice and repetition are important elements in handwriting instruction and produce better outcomes in handwriting legibility than visual-motor activities alone (Howe et al., 2013).

A systematic review was conducted by Grajo et al. (2020) which looked at the literature on various occupational therapy interventions used to promote academic participation. 46 studies were included in the review and any studies that included children with confirmed diagnoses were excluded. Of the 46 articles included, 25 studies pertained to handwriting interventions. The results were separated into four intervention approaches: component skills, sensorimotor vs therapeutic practice, interventions in addition to usual classroom activities, and interventions in place of usual classroom activities. Four articles examined interventions which target component skills such as kinesthesia, visual perception, visual-motor integration, and in-hand manipulation. The articles did not present evidence that targeting component skills improves handwriting legibility (Grajo et al., 2020). Seven articles compared therapeutic practice to sensorimotor strategies. Therapeutic practice includes repetition of paper and pencil activities, self-evaluation strategies, and feedback from others. Sensorimotor consists of activities which address biomechanical components of handwriting, in-hand manipulation, visual-motor integration, and kinesthesia (Grajo et al., 2020). The evidence from three level I studies and one level II study supports the use of therapeutic practice to improve handwriting legibility. The results displayed low strength of evidence for interventions in addition to classroom activities and for interventions in place of usual classroom activities (Grajo et al., 2020).

A randomized controlled trial was performed by Zwicker and Hadwin (2009) which analyzed the effectiveness of a multisensory approach versus a cognitive approach to improving handwriting in first and second grade students who were currently receiving school-based occupational therapy services. Researchers hypothesized that students in either group would demonstrate improvements in handwriting compared to those receiving no interventions. They also hypothesized that students in the cognitive group would display greater improvements in

handwriting legibility than those in the multisensory intervention group. Intervention sessions were 30 minutes long and students received one session a week for ten weeks. The cognitive intervention sessions included an alphabet warm-up, modeling of letter formation using cards with numbered arrows showing the directions to form the letters, imitation as the student traces the letter and describes how to make it, discussion of how the letters in the group were similar and different, practice writing the letters, and ending with self-evaluation and circling the best-formed letters. The multisensory interventions consisted of therapist creating letters on a chalkboard, student then copied each letter on the chalkboard three times, "sky writing" the letters three times, formation of each letter in a sand tray three times, tracing the letters over bumpy or textured paper three times, tracing and copying letters with a marker on a worksheet three times, and finally copying each letter with a pencil on lined paper three times. The findings did not display significant improvements in handwriting legibility with or without interventions. There were also not significant differences in handwriting legibility between the cognitive group and the multisensory group (Zwicker & Hadwin, 2009). Researchers speculated that there may not have been significant differences due to the lack of intensity of interventions and that the treatment protocols may have been too similar to see any major differences.

Weintraub, Yinon, Hirsch, and Parush (2008) performed research to analyze the effects of handwriting interventions that were employed with a group of students in grades second to fourth. Researchers compared a task-oriented intervention, a task-oriented combined with a sensorimotor intervention, and a nontreatment control group. The research aimed to determine if the sensorimotor intervention had a specific contribution to improving handwriting legibility. The program included one-hour sessions per week for 8 weeks. The sensorimotor group spent the first 15 minutes of the sessions performing preparatory activities and working on postural

control, bilateral coordination, and overall fine motor ability. Students then practiced groups of letters through sensory experiences which included kinesthetic, tactile, and auditory approaches. Specific handwriting techniques such as letter size, spacing, and alignment were taught during the last three sessions. The task-oriented group learned letters in the same groupings as the sensorimotor group but focused on practicing handwriting and feedback. They practiced writing through activities such as word games and writing cards. Handwriting was evaluated immediately after the intervention concluded and four months after the intervention. Short-term results found that both the task-oriented group and the sensorimotor group scored higher in handwriting legibility than the control group, however, the difference was only significant between the control group and the task-oriented group. The scores taken four months later displayed that the sensorimotor and task-oriented groups did not differ significantly in handwriting legibility. But there were significant differences in spatial organization, in which the task-oriented group scored higher. The task-oriented group and sensorimotor group both scored higher in handwriting legibility than the control group four months post intervention (Weintraub et al., 2008). Overall, the results displayed that both the task-oriented group and sensorimotor groups were effective in improving handwriting legibility. Researchers speculated that this was due to the fact that both groups employed higher-level functions that were effective which include: teaching letters in groups of similar formation, use of mnemonics, and self-evaluation techniques. However, there is not enough evidence to state whether the sensory components improved handwriting (Weintraub et al., 2008).

A systematic review was conducted by Hoy, Egan, and Feder in 2011 which analyzed the literature on handwriting interventions. Eleven studies were included, and the interventions utilized were categorized into relaxation and practice with or without electromyogram (EMG)

biofeedback, sensory-based training without handwriting practice, and handwriting-based practice. The interventions involving EMG biofeedback and muscle relaxation displayed significant improvements in handwriting (Hoy et al., 2011). The sensory-based training without handwriting practice also did not display significant improvements in handwriting and in some studies, students performed worse than the students in control groups (Hoy et al., 2011). Seven of the eleven studies examined interventions which included handwriting practice. Results displayed significant improvements in handwriting legibility following these interventions. The overall results of the systematic review found that targeting component skills without addressing handwriting practice directly appears to be ineffective (Hoy et al., 2011). Handwriting interventions also must occur at least two times per week for at least 20 practice sessions in order to produce handwriting improvements (Hoy et al., 2011). These findings highlight the importance of repetition and a minimum number of practice sessions are in line with the Motor Learning Theory and show ways in which this theory can be applied to handwriting interventions (Hoy et al., 2011).

Movement Breaks

The role of occupational therapists in the school setting is to help students functionally participate in the various activities which make-up their school day. This includes finding ways to improve academic participation and promote success in this area (American Occupational Therapy Association, 2016). Research has found that opportunities for physical activity within the school day has positive outcomes on overall academic performance (Centers for Disease Control and Prevention, 2010). However, due to the growing demands placed on students, allocating time for physical education, recess, and other physical activity opportunities has become difficult (Centers for Disease Control and Prevention, 2010).

A systematic review assessed current methods used within schools when implementing physical activity lessons and how they impact overall physical activity levels and educational outcomes (Norris et al., 2015). Physical activity lessons include incorporating movement and physical activity as a way to learn math, science, or other academic concepts. When provided in this format, it is not taking away from educational time but being provided in conjunction. This systematic review found that the content of the physically active lessons included math, language arts, or social sciences. A few ways the interventions were implemented included "virtual walks" where students recorded their steps and it translated into travel to various cities or places, tracking posters and stickers to keep record of physical activity in lessons, "Jump In" mats where students jumped into squares which had answers to questions in them or using equipment such as balls and hula hoops (Norris et al., 2015). Seven of the studies analyzed in this systematic review looked at ways in which the physically active lessons improved overall physical activity participation and educational outcomes. Six of the seven studies found that levels of physical activity increased following the physically active lessons (Norris et al., 2015). One study looked at physical activity levels three months post-intervention and found participants of the physically active lessons had maintained increased levels of physical activity (Norris et al., 2015). Six of the studies also looked at how the physically active lessons impact educational performance. Two studies looked at on-task behaviors following the physically active lessons; in one study on-task behavior improved by 20% following physically active lessons during the day the active lessons took place. Two of the studies looked at education achievements through standardized tests and found that participants of the physically active lessons scored significantly higher compared to the control groups (Norris et al., 2015). Differences in fluid intelligence were also analyzed among the control group and the physically active lesson group and results displayed

significantly higher scores in fluid intelligence in the physically active lessons group (Norris, et al., 2015).

To summarize, this systematic review looked at physical activity levels and educational outcomes following physically active lessons which focused on content such as math, language arts, and social sciences. In all seven studies, there were positive relationships between physically active lessons and physical activity participation. The studies also found positive associations between these physically active lessons and educational outcomes, along with improvements in learning and attention (Norris et al., 2015).

Vazou et al. completed a systematic review (2020) in order to unpack and better understand movement integration (MI) interventions used in elementary schools. MI involves using any form of movement and incorporating it into regular scheduled classroom time (Vazou et al., 2020). This systematic review hoped to classify the ways MI is applied and group them into various intervention approaches. 72 MI interventions were grouped into 4 categories according to the way they were implemented. This included: student-drive, teacher-driven, researcher-teacher collaboration, and researcher-driven interventions (Vazou et al., 2020). Student-driven interventions included alternative seating options (stability balls, height-adjustable desks) or changes in physical environment (fitness stations) that occurred without prompting from the teacher. Teacher driven interventions included implementation of movement activities lead by the teacher or physical activity that incorporated the academic lesson. The systematic review found that there was limited evidence in MI being implemented as a starting activity for the school day (Vazou et al., 2020). Researcher-teacher collaborations included researchers designing the MI program and teachers adjusting it to best suit their unique class. A few of the researcher-teacher collaborations used movement breaks, while most infused the

physical activity into lessons. Finally, researcher-driven consisted of the researcher controlling the design and implementation of the MI interventions. These consisted of both movement breaks and physical activity that went along with the academic teaching. Some of the researcher-driven MI techniques included mindful movements, breathing, body posture, and relaxation (Vazou et al., 2020). In conclusion, the MI interventions that were found in this systematic review contained more researcher-driven interventions. Researchers note that interventions designed and implemented by solely researchers may not be sustainable due to barriers within the school, lack of resources, and less teacher buy-in due to not knowing the specific needs of the classroom (Vazou et al., 2020). The research also found that teachers are more willing to incorporate MI interventions when they have support and assistance with establishing the activity plans. When interventions are teacher-driven, the equipment and resources needed are low making it more of a possibility to be implemented within the classroom (Vazou et al., 2020).

An additional systematic review was completed to analyze the literature on school-based physical activity and its impacts on physical activity, academic performance, cognitive skills, academic behaviors, and academic achievement (Centers for Disease Control and Prevention, 2010). A total of 50 studies were included in the review. The results were grouped into categories of school-based physical education studies, recess studies, classroom physical activity studies, and extracurricular physical activity studies. In the category of school-based physical education studies and its effect on educational outcomes, overall, there is a positive relationship between time spent in physical education and academic achievement or no relationship at all, but it does not have a negative impact on academics (Centers for Disease Control and Prevention, 2010). When looking into increased time spent in recess, the literature displayed that there appears to be a positive relationship between recess duration and attention, concentration, and

on-task behavior among students or no relationship (Centers for Disease Control and Prevention, 2010). The classroom physical activity studies analyzed any movement activities that took place within the classroom which consisted of 5-20-minute activity breaks or incorporating movement into the lessons. Nine studies were included in this category and eight of them found that classroom-based physical activity improved cognitive skills, academic behavior, and academic achievement (Centers for Disease Control and Prevention, 2010). Finally, 19 studies looked at the impact extracurricular physical activities have on academics. There were positive associations in all 19 studies between extracurricular physical activity and academic performance (Centers for Disease Control and Prevention, 2010). Additionally, the systematic review displayed that increasing time for physical activity, whether it be through physical education, recess, in the classroom, or through extracurricular activities, it does not have a negative impact on academic performance (Centers for Disease Control and Prevention, 2010).

A study done by Mullins et al. (2019) analyzed the student and teacher perspectives of classroom physical activity breaks (CPABs). A 14-week program was implemented where exercise science interns lead 10-minute movement breaks each day in 16 first through fourth grade classrooms daily. The perceptions of the program were assessed via survey sent to students and teachers to complete following the 14 weeks. 254 children responded to the survey and results displayed that 86% thought the CPAB program was fun, 94% felt that it was good for their health, and 50% reported the program helped them learn better (Mullins et al., 2019). 100% of the teachers reported that their students enjoyed the movement breaks and 94% of the teachers reported enjoying the movement activities. 67% of the teachers reported that the students appeared more ready to learn following the movement breaks and 56% of the teachers reported it helped the students learn better (Mullins et al., 2019). The survey also asked teachers about their

comfort levels with leading CPABs and 72% reported feeling very confident to do so and 28% reported they felt confident to lead the CPABs (Mullins et al., 2019). The survey included a qualitative component to better understand teacher and student perspectives. Here they were able to also see any disadvantages of CPABs. One major disadvantage reported by teachers was the difficulty in calming students down when the CPABs were completed. The qualitative component also supported findings of the quantitative component with teachers reporting the student's excitement in participating and that students appeared more focused and ready to learn following the CPABs (Mullins et al., 2019). Research such as this and the literature mentioned above highlights the importance and advantages of programs such as CPABs within the school setting and the ways it can improve participation and success in education, however, there is still little implementation of any such program across the United States (Mullins et al., 2019).

Due to increasing demands within the schools and the stress placed on maximizing student academic outcomes, it has made providing opportunities for physical activity within the school setting a challenge (Turner & Chaloupka, 2017). As several studies mentioned above, a promising solution to this issue is for teachers to facilitate physical activity breaks within their classrooms through either a brief movement break or teaching academic content through some form of physical activity. A study by Turner and Chalopka (2017) examined the use of activity breaks (ABs) and active lessons (ALs) within elementary schools in the United States. Surveys were sent via mail to a nationally representative sample of elementary schools for school administrators to complete during the 2013-2014 school year. Results displayed that 71.7% of school administrators reported that at least one of their teachers use ALs, 18.8% did not know, and 10.2% reported that their teachers did not use ALs (Turner & Chaloupka, 2017). When examining the results of the presence of ABs in schools; 75.6% of schools reported using ABs,

13.7% did not know, and 10.7% reported that no teachers used ABs. Researchers also looked at the prevalence of schools which use ALs and ABs and found that 64.1% of schools use both, 7.7% use only ALs, 11.5% use only ABs, and 16.8% use neither or reported not knowing (Turner & Chaloupka, 2017). These results demonstrate that even though several schools have at least one teacher implementing ALs or ABs, these programs are not being used among the majority of teachers and overall implementation of ABs and ALs is low (Turner & Chaloupka, 2017).

Needs Assessment

A research study displayed that 92.1% of school-based occupational therapists use a sensory approach to addressing handwriting concerns (Zwicker & Hadwin, 2009). However, studies mentioned above demonstrated that this may not be the most effective approach to target handwriting improvements. Wallen et al. (2013) reviewed various pieces of literature and highlighted what evidence displayed; that handwriting interventions must include handwriting instruction and practice. The article goes on to mention that there is no evidence to support that addressing performance components alone, such as visual-motor integration, kinesthesia, and biomechanical factors results in improved handwriting, however this is used largely in occupational therapy interventions when targeting handwriting deficits (Wallen et al., 2013). Wallen et al. (2013) reported that evidence demonstrated the Cognitive Orientation to daily Occupational Performance (CO-OP) and the motor learning theory are useful when targeting handwriting difficulties.

The elementary school I am completing my capstone at targets primarily handwriting within therapy during the second half of the school year. Nearly every student on the occupational therapy caseload has a goal related to handwriting which reveals the importance

and need for an effective, evidence-based program to promote improvements in handwriting. The evidence above states the importance of including handwriting instruction and practice for a specific set of time per week to improve handwriting, consistent with the motor learning theory. For my project, I will be creating a list of intervention strategies to incorporate handwriting instruction and practice that are backed by evidence which can be applied during treatment sessions.

Also, the literature review above displays the importance of movement breaks throughout the school day and the ways in which it can improve focus, attention, and academic outcomes. With restrictions placed on schools due to COVID-19, kids are spending less time away from their desks. Recesses are cut short to avoid overlapping with other classes, free play within classes is removed to avoid coming in contact with contaminated surfaces, and children are unable to play closely with others as you would in several games and activities. Movement breaks can easily be implemented in a safe, distanced manner and can require little to no equipment making it an easy solution with huge advantages. The need is even greater than before due to the growing number of changes students have faced during the pandemic and how it has impacted their physical activity levels and overall academic performance. The next project includes leading a movement break activity in a first-grade classroom, per the teacher's request. The goal will be to lead until the teacher feels comfortable to lead this movement break so it can be used as needed throughout the day within the classroom.

Goals and Objectives

Listed below are the three main goals of my capstone experience along with two objectives for each goal. Below each goal, I provided details on the process and results of achieving these goals.

1. Student will be able to complete evaluations, create treatment plans, and implement interventions based off the needs and goals of the children and maintain current knowledge on policies and procedures within the Manatee County School System regarding eligibility requirements for therapy, Medicaid billing, IEP formats, scheduling, evaluation requirements, etc. by the end of 16-week capstone experience.
    a. Student will use IEPs to create treatment plans based off the specific needs of the child.
    b. Student will maintain current knowledge of the policies and procedures within the Manatee County School System evident through implementation of policies throughout evaluations, interventions, and documentation

Starting with goal number one; this was a goal I worked on throughout the entire 16 weeks. I administered assessments which included the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) and the Motor-free Visual Perception Test (MVPT-3). I also performed handwriting clinical observations which included having students copy letters, numbers, write their name, copy a sentence from a paper positioned on the table, and copy a sentence written on a whiteboard from a distance. Evaluations also included clinical observations such as posture, grip and arm positioning when writing, scissor use, reflex integration, and strength. The information collected from IEPs and evaluations was then used to generate a treatment plan to implement throughout intervention sessions. I was constantly looking through IEPs to ensure treatments were targeting goals on each student's IEP throughout the 16-weeks. I had a binder of resources to refer to ensure I was staying consistent with the policies and procedures of the Manatee County School System. The biggest policy I had to remind myself of frequently was to be certain my treatments could always tie into the student's educational goals. Some of the students had

difficulties that were not listed on their IEP as impeding their education, so if I performed interventions which helped with those difficulties, I had to be sure I could also relate it to a goal on the student's IEP. I achieved this goal throughout my 16-week capstone experience through the several responsibilities I had functioning as a full-time school-based occupational therapist. These skills were ever evolving, and still continue to evolve, as new challenges arose, and I received feedback from my mentor.

Through achieving this goal, it has helped me meet the needs of Bayshore Elementary in creating handwriting interventions and movement breaks for the students. The way the two are connected is that in order for me to create client-centered interventions and activities for the students, I needed to build rapport and understand the population I was working with to create something that best fits their needs.

2. Student will complete literature review and collaborate with occupational therapist to develop a handwriting program that can be used as an intervention tool to assist children in improving handwriting to promote functional engagement in education by the end of 16-week capstone experience.
    a. Student will complete a literature review and formulate a condensed handout for site summarizing this information.
    b. Student will collaborate with occupational therapist in order to create evidence-based interventions that will be used with the caseload at this school.

Beginning the first week of my capstone experience, I started completing the literature review of evidence-based handwriting interventions. My mentor had stated she has sensory interventions, hand strengthening interventions, postural interventions, etc.; but wanted to know what current research was displaying on the best ways to treat handwriting due to lack of time on

her end for reviewing this content. I completed the review of literature for several weeks to end with condensed handouts summarizing what I had found, which can be found in Appendix A. That way she is provided with interventions and the research which supports these interventions. I then created interventions broken down by theories and approaches supported by the literature, which can be found in Appendix B. Within each of these approaches, if my mentor had any resources in her therapy room which fit within these approaches, I placed them in the binder under a tab with that theory or approach written on it. This was a way to still use resources she currently has, but to keep them all together in one location. Through these handouts and intervention list, I had goal number two completed.

This goal directly relates to one of the needs of this school, which was creating current, evidence-based interventions for handwriting due to the fact that most of the students on the OT caseload have goals related to handwriting which highlights the importance of providing effective intervention in this area.

3. Student will collaborate with occupational therapist and school nurse and complete review of literature to create a "sensory break room" on school grounds to be used in an effort to improve sensory modulation amongst children as needed through various sensory inputs, while adhering to Manatee County School System guidelines related to COVID-19 safety by the end of 16-week capstone experience.
    a. Student will complete literature review on sensory strategies or movement activities that can be implemented within a "sensory room" for children on school grounds as needed.
    b. Student will collaborate with occupational therapist and school nurse to create a "sensory room" with available resources.

Goal number three had the most modifications throughout the 16-weeks largely due to COVID-19. The idea of a sensory break room was requested by my mentor pre-COVID. The school had a room on campus which students came to if they needed a "break" throughout the school day. This room did not have many resources for students to engage in any kind of sensory or movement activity, which led to the creation of this goal. We were hopeful this was something we were still able to create, but due to COVID-19 restrictions placed on the school, the ability to create what was envisioned was currently not feasible. The next possibility came about as a first-grade teacher asked if we would lead some kind of movement break in her classroom a few mornings a week. I began looking through the literature and conducting a plan on how to orchestrate this in her classroom, but on two occasions students in her classroom were quarantined. This resulted in the entire class missing two weeks of in-person school, twice. With the uncertainty of the classes being present due to frequent quarantines, we decided to determine a new option. My mentor had a resource on hand which had several sensory-motor stations which required little to no equipment that were easy to implement by teachers or the nurse that she requested to use (Greutman, 2020). This resource was created by a certified occupational therapy assistant, but the author of this resources mentions the importance of ensuring an occupational therapist is able to demonstrate proper form for each station. My mentor needed a video demonstration of each station to be sent out to teachers and the school nurse in order for everyone to know how each station works if a student comes to the break room. The stations included activities such as jumping jacks, wall push-ups, scooter board activities, breathing exercise, core exercises, and yoga poses. The link to the video I created performing each station is listed in Appendix C. This is also easy enough for teachers to implement in their classroom as well, which is why creating videos added an additional advantage and allowed for this sensory

motor activity to reach more students as needed. Through reviewing the literature on the importance of movement activities, creating the videos, and sending them to staff at the elementary school, I have met goal 3. This was not at all the intended plan, and I was hopeful to be able to do more, but this was the reality of working around COVID-19.

This goal has met a need at this elementary school due to the fact that it provides students who are having a hard time focusing or engaging in the classroom the opportunity to step away for a movement break, which research has shown improves focus and academic performance. The teachers I have interacted with during my time here also appear to understand the importance of movement and appear to do anything it takes for a student to be successful, so they are all willingly to allow students to take breaks for this type of activity as needed. By creating the videos and setting up the stations, there is an organized activity for the teachers or nurse to lead the students through. The students also do not have recess daily anymore due to COVID-19 precautions, so any additional movement that can be implemented throughout their day is advantageous. The videos and ease of the stations allows for this to be used in any classroom and with it requiring little equipment, sanitizing materials can be done quickly.

Summary

To summarize my experience, by the end of my 16-weeks, I was seeing the full caseload. I began treating independently on week three and by week nine I was seeing the entire caseload. I completed all documentation and attended IEP meetings with my mentor. Evaluations did not occur much due to it being the second half of the school year, but there were a few re-evaluations during my time here, which I completed. I also assisted in the Special Olympics Young Athletes program each Friday morning with the preschool group. During any down time throughout the week, I worked on completing a review of the literature and compiling resources for the

handwriting interventions. The handwriting project was completed during weeks 13 and 14 after reviewing the literature and interventions with my mentor and ensuring they were resources that would be helpful for the site following my completion. I had completed the review of the literature for the sensory-motor movement activities early on in my capstone, but the videos were not completed until later into the capstone as we continuously modified this goal.

Through meeting the three goals of my capstone experience, they have each helped me gain important skills that I am thankful to move forward with as I begin my career as an occupational therapist. First, through the evaluations, treatment planning, interventions, and documentation, I gained extensive practice and knowledge in the clinical skills involved in being a school-based occupational therapist. The biggest challenge I faced in this area included working with groups of students versus treating one-on-one. With the groups usually being three to four students, I had to ensure treatments targeted goals for each of them, grade activities up and down within the session as needed for each student and made sure each student still had individual attention to be able to notice any improvements or struggles.

The second goal provided the opportunity for me to gain further skills in conducting a literature review and synthesizing the findings from several sources into something that makes sense to be applied in interventions. I also learned a great deal of information on the skills required of handwriting, handwriting instruction, and ways to incorporate handwriting into OT sessions. The findings of my literature review and the handouts I provided for my site can be found in Appendix A. The interventions broken down by theories and approaches supported by literature can be found in Appendix B. The challenges I faced regarding this goal included trying to determine ways to implement handwriting in a way the students will engage in. If handwriting is difficult, students will not want to participate in this sort of activity. An additional challenge

was using clinical observations to determine which students were ready for these sorts of occupation-based, handwriting interventions. If students are still struggling to sit upright in a chair, hold a writing utensil effectively, attend to a task, or regulate themselves; focusing strictly on handwriting is not an appropriate activity.

The third goal again allowed me to further improve on skills involved in reviewing literature and the importance of finding evidence to back a need you are trying to meet. As mentioned above, the goal was modified several times and just as I began to establish a plan, we had to change things up. This revealed the importance of being flexible and working with the situation you are given. As I've learned while working with the pediatric population, you can't get stuck on the plan you have in your head as to how something is going to go. It also allowed me to find ways to continue to help the population I am serving; despite the barriers we are faced with in the environment. The pandemic has lessened the students' time for movement throughout the day and it made it difficult to create an ideal space for students to come to as needed for sensory modulation. But, by setting-up some kind of defined activity, the school nurse and teachers now have an option already created for them to allow their students to engage in. The link to the video that was created displaying each sensory-motor station is listed in Appendix C.

Future work at this site may include developing a "Handwriting Club". As the state writing test approached at the end of my 16-weeks, teachers reached out to my mentor about students struggling with handwriting who were not on an IEP and receiving therapy services. My mentor began seeing them for 20-30 minutes each day leading up to their test to work on handwriting skills such as letter formation, letter sizing, line placement, and spacing. Just from the few days these students participated in this, their handwriting displayed improvements. There are certainly more students who would have benefited from this, some on the OT caseload and

some not. It would be beneficial to reach out to teachers to have a list of students who could use something such as this and work on these skills in a “Handwriting Club” that is outside of an OT session. That way students who receive OT can work on other skills during their regular scheduled sessions and students not on an IEP could receive handwriting support.

Additionally, a true sensory breakroom could be created at this site in the future. The space is available, but a year that is everchanging due to COVID-19 was not the best time to implement something such as this. Further research could be done to determine what would be best to include in this space and more videos could be created of different activities that can be performed to improve focus and self-regulation for the students who come to this room.

Finally, there are a few ways in which my projects will be maintained following the completion of my 16-weeks. The videos created of the sensory-motor stations have been sent out to teachers and to the school nurse. We also put the few materials needed for these stations in the nurse’s office to be used as students come in to engage in this activity. This is something that will be used by the nurse and teachers throughout the end of the school year. However, I do believe new activities should be added to this list for the upcoming school year in order to ensure it is still a novel and engaging break for the students. I will be leaving behind a binder including a summary of the literature and resources I compiled for the handwriting interventions. I have placed the handouts, a broken-down list of interventions, and have organized some of the resources the site already had and placed them within this binder, so they are all located in one spot. My mentor will also be passing the handouts of the literature review along to her supervisors who own a pediatric clinic in the area. They are currently advocating for handwriting instruction to be brought back into the classroom to the Manatee County School Board. My

mentor had stated they could use the literature review I conducted to back the importance of handwriting instruction within schools when they are advocating to these leaders.

In conclusion, throughout my 16-week capstone experience I achieved goals related to clinical skills involved in school-based occupational therapy; providing current, evidence-based handwriting interventions; and creating videos for teachers and a nurse to easily implement movement breaks for the students at this school. This experience provided me the opportunity to gain valuable skills through the achievement of these goals that I look forward to taking with me in my next endeavor as an occupational therapist.

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Appendix A

LITERATURE REVIEW OF HANDWRITING INTERVENTIONS

◊ HANDWRITING DIFFICULTIES

- Research has shown that 37.1% to 60.2% of a student's school day consists of fine motor activities and 17.8% to 37.4% of this time actually involves writing, drawing, or coloring (Caramia et al., 2020).
- The educational mandate beginning in 2009, The Common Core State Standards Initiative, does not include handwriting instruction within the classroom, but rather focuses on keyboarding (Collette et al., 2017).
- Orthographic-motor integration: knowledge of orthographic codes combined with the motor demands of handwriting in order to automatically and effectively transcribe words onto paper (Wallen et al., 2013).
    - Lack of sufficient handwriting instruction and practice may result in the inability to develop effective orthographic-motor integration (Wallen et al., 2013).
- Students with handwriting difficulties often have trouble with idea generation, planning, and revision when extended effort is put into the mechanics of handwriting (Wallen et al., 2013).

◊ HOW ARE HANDWRITING DIFFICULTIES BEING TREATED?

- **Visual-perceptual strategies** (Howe et al., 2013)
- **Therapeutic practice** (Grajo et al., 2020), (Howe et al., 2013)
- **Sensorimotor approach** (Grajo et al., 2020), (Hoy et al., 2011), (Zwicker & Hadwin, 2009)
- **Cognitive approach** (Hoy et al., 2011), (Zwicker & Hadwin, 2009)
- **Focus on component skills** (visual perception, kinesthesia, in-hand manipulation) (Grajo et al., 2020)

◊ WHAT IS THE EVIDENCE SHOWING?

- A research study displayed that 92.1% of school-based occupational therapists use a sensory approach to addressing handwriting concerns (Zwicker & Hadwin, 2009).
- Handwriting instruction and practice is a must
- Motor Learning Theory is a promising approach to treating handwriting difficulties
    - CO-OP (motor learning and cognitive approaches applied) (Wallen et al., 2013)

LITERATURE REVIEW OF HANDWRITING INTERVENTIONS

◊ INTERVENTIONS WITHIN THE SCOPE OF OCCUPATIONAL THERAPY TO IMPROVE CHILDREN'S ACADEMIC PARTICIPATION: A SYSTEMATIC REVIEW (GRAJO ET AL., 2020)

- A systematic review was conducted which looked at various occupational therapy interventions used to promote academic participation.
- Children with confirmed diagnoses were excluded from the review
- Four articles examined interventions which target component skills such as kinesthesia, visual perception, visual-motor integration, and in-hand manipulation.
    - The articles did not present evidence that targeting component skills improves handwriting legibility.
- Seven articles compared therapeutic practice to sensorimotor strategies.
    - Therapeutic practice includes repetition of paper and pencil activities, self-evaluation strategies, and feedback from others.
    - Sensorimotor consists of activities which address biomechanical components of handwriting, in-hand manipulation, visual-motor integration, and kinesthesia.
    - The evidence from three level I studies and one level II study supports the use of therapeutic practice to improve handwriting legibility.

◊ EFFECTIVENESS OF A HANDWRITING INTERVENTION WITH AT-RISK KINDERGARTNERS (ZYLSTRA & PFEIFFER, 2016)

- Analyzed the effectiveness of the Size Matters Handwriting Program (SMHP) for kindergarten students with an IEP.
- The SMHP protocol incorporates Motor Learning Theory, Cognitive Theory, and Motivation Theory.
- Results found that children within the SMHP group demonstrated significant improvements in handwriting legibility, letter recognition, and letter sound recall compared to a group of kindergarteners who were receiving their school's handwriting instruction only.
- This reveals that pieces from the Motor Learning Theory, Cognitive Theory, and Motivation Theory all have positive implications for improving handwriting abilities.

◊ ASSESSING HANDWRITING INTERVENTION EFFECTIVENESS IN ELEMENTARY SCHOOL STUDENTS: A TWO-GROUP CONTROLLED STUDY (HOWE ET AL., 2013)

- This study compared a practiced-based approach and a visual-perceptual-motor approach to improve handwriting.
  - The practiced-based approach is based on motor learning and focuses on repetition to improve the performance of a motor skill.
  - The visual-motor-perceptual approach focuses on visual-motor integration skills and how it impacts handwriting performance.
- 72 participants from first and second grade who attended the 12-week handwriting club, twice a week, for 40-45 minutes.
- Participants were divided into two groups: the practiced-based approach group and the visual-motor-perceptual group.
- Results indicated that students in the practice-based approach group displayed scores in handwriting legibility that were significantly higher than the visual-motor-perceptual group.
- These results demonstrate that handwriting practice and repetition are important elements in handwriting instruction and produce better outcomes in handwriting legibility than visual-motor activities alone.

◊ A SYETMATIC REVIEW OF INTERVENTIONS TO IMPROVE HANDWRTING (HOY ET AL., 2011)

- Eleven studies were included which included interventions such as relaxation and practice, sensory-based training without handwriting practice, handwriting based practice
- Results of handwriting practice following relaxation exercises displayed significant changes in handwriting
- Sensory-based training without handwriting practice did not display significant improvement for handwriting legibility and speed and some students did worse than students in the control group without intervention.
- Results of studies which included handwriting practice:
  - Sensorimotor focus with handwriting practice: Students receiving intervention did not display improvements compared to control group
  - Cognitive focus with handwriting practice: Students displayed significant improvements
  - Task-oriented handwriting practice: Significant improvements in handwriting legibility
  - Self-guided correction: No significant improvement
  - 3 additional articles with handwriting practice only found no significant improvements
- The article reports that focusing on handwriting practice as an intervention tool lines up with the theory of motor learning
- “Regardless of treatment type, interventions that did not include handwriting practice and those that included less than 20 practice sessions were ineffective.” (Hoy et al., 2011).

LITERATURE REVIEW OF HANDWRITING INTERVENTIONS

◊ WHAT THEORIES AND APPROACHES IS THE EVIDENCE SUGGESTING FOR HANDWRITING DIFFICULTIES?

- Motor Learning Theory
- Cognitive Theory
- Motivation Theory
- Cognitive Orientation to daily Occupational Performance (CO-OP)

◊ MOTOR LEARNING THEORY

- Through practice, repetition, and transfer of skill to new tasks, long lasting changes to motor behavior will occur (Jarus, 1994).
- Motor learning is impacted by environmental conditions, cognition, and movement organization (Jarus, 1994).
- This is applied through handwriting practice.

◊ COGNITIVE APPROACH

- Involves the use of self-instruction, imitation, self-evaluation, and feedback (Zwicker & Hadwin, 2009).
- This approach also includes letter formation instruction using consistent verbiage when explaining the correct ways to form letters (Zwicker & Hadwin, 2009).

◊ MOTIVATION THEORY

- Client-centered, fun, engaging activities and opportunities to practice handwriting (Zwicker & Hadwin, 2009).

◊ CO-OP

- Top-down approach (using occupation as the primary means of assessment and intervention) (Kraversky, 2020)
- Integration of motor learning theory and cognitive strategies (Kraversky, 2020)
- The main goal is functional participation in daily activities (Kraversky, 2020)
- Enables skill acquisition through problem-solving guided by the client (Kraversky, 2020)
- Four main objectives:
  - Skill acquisition
  - Cognitive strategy use
  - Generalization
  - Transfer of learning

Appendix B

HANDWRITING INTERVENTIONS

◊ COGNITIVE APPROACHES

- Consistent verbiage when teaching letter formation
  - Direction: "Top to bottom"
- Group letters by similar formation and refer to these groupings consistently
  - Uppercase letters: by starting points and developmental progression of pre-writing skills
  - Lowercase letters: small, tall, fall letters
- Self-evaluation
  - Student finds errors in their own writing
    - Ensure they are able to recognize what is wrong
  - Student finds their own improvements or successes
    - "Circle the 3 most legible letters."
    - "Circle 3 areas where words/letters are spaced apart correctly."
    - Place stickers on the most legible letters or where spacing is correct

◊ MOTOR LEARNING APPROACHES

- Practice and repetition
  - Writing prompts
  - Writing out a checklist of activities that will be completed during occupational therapy session
  - Have student write out the steps of an obstacle course they would like to create, then perform this obstacle course.
  - Have a student write out the instructions of a game they will be playing during the occupational therapy session.
- Handwriting club
  - Create an "at-home" handwriting club and have the student complete various tasks to work for some reward.
  - Create a weekly handwriting club where students are grouped together based off similar handwriting goals
    - Prewriting skills
    - Letter formation and sizing
    - Spacing and line placement

HANDWRITING INTERVENTIONS

◊ MOTIVATION APPROACHES

- Write about things of interest to the student
  - Weekend plans, favorite game/activity, what they did over break, their favorite movie, etc.
- Create a list of the student's goals in an age-appropriate way, show the student they have to work on a handwriting goal to help them succeed in school, but they may pick the other goal they would like to focus on first with handwriting.
- Sticker reward log to work towards a prize
  - Research shows there should be a minimum of 20 practice sessions, this should be reflected in the log
  - Provide a smaller "half-way point" reward

◊ COGNITIVE ORIENTATION TO DAILY OCCUPATIONAL PERFORMANCE (CO-OP) APPROACH

- Use "Goal-Plan-Do-Check"; provide a visual of "Goal-Plan-Do-Check" for student to see the plan and strategies to achieve targeted goal.
- Goal setting session:
  - Select the handwriting goal to work on (letter formation, legibility, spacing, etc.) and talk about the benefit of achieving this goal (Ex: Student won't have to redo work in the class if they are able to improve in this area).
- Plan: work with student to develop various strategies to improve the goal (going slower, learning/remembering letter groupings (small, tall, fall), finger spacing, etc.)
- Do: have the student engage in some sort of handwriting activity to put the strategies in their plan to use
- Check: Go through writing and identify any errors, award stickers or circle well written words/sentences, talk about ways to improve for next time

Appendix C

- Link for demonstration of each sensory-motor station: **https://youtu.be/-PpdYcvaqvA**