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Integrating Occupational Therapy-Based Interventions into a Kindergarten Curriculum:

Improving Foundational Skills for At-Risk Students

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A Capstone Project Entitled

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Abstract

Background: State standards have shifted the focus of kindergarten curricula, increasing the amount of testing completed in schools, directly impacting the amount of time students spend in hands-on and exploratory play. With fewer opportunities to improve foundational skills required for handwriting and other school-based occupations, children who require more practice with these skills are falling behind peers.

Purpose: The purpose was to integrate occupational therapy (OT)-based activities into a kindergarten curriculum to provide OT-based services to at-risk children for improved occupational performance and participation in the classroom.

Design: Two kindergarten classrooms completed the Beery VMI pre- and post-program to track progress following the 7-week OT-based program. OT-based activities were implemented during reading block “centers.” Activities were chosen based on performance skills and client factors essential for successful handwriting and completion of daily activities within the classroom.

Findings: Average raw and standard scores from the Beery VMI showed an overall increase in performance skills. Average raw scores in classroom A increased from 12.10 to 13.55 following the program, while average raw scores in classroom B increased from 11.20 to 13.43. Average standard scores in classroom A increased from 76 to 82 following the program, while average standard scores in classroom B increased from 72.67 to 82.48.

Conclusion: Integrating OT-based activities into a kindergarten curriculum positively impacted students’ functional performance skills. Visual-motor and visual-perceptual skills significantly increased with daily exposure to activities that incorporated OT principles. Students demonstrated less difficulty crossing midline and showed an increase in bilateral coordination.

Integrating Occupational Therapy-Based Interventions into a Kindergarten Curriculum: Improving Foundational Skills for At-Risk Students

The U.S. Department of Education (2015) found that 59% of children across the nation are not academically prepared when they enter kindergarten. Children who are unprepared for kindergarten lack pre-academic skills, which negatively impacts their overall occupational performance and participation in the classroom (Elenko & Siegfried, 2018; Gerde, Foster, & Skibbe, 2014; Mabbett, 2018). Pre-academic and fundamental fine motor skills are imperative for students in kindergarten, as a large percentage of activities in school require efficient fine motor abilities (Marr, Cermak, Cohn, & Henderson, 2003; Trummert, 2016). In a school-based setting, occupational therapists are a vital member of a student's educational team. Occupational therapists have the skills and training to appropriately address developmental delays for improved performance in early education settings. Occupational therapists have training in activity analysis, which involves breaking an activity down and determining the skills required to successfully complete the task. They can analyze how an individual's deficits may impact performance and then determine different modifications, adaptations, and interventions that would promote maximal occupational performance and participation. In a school-based setting, occupational therapists can consult with teachers and other staff members in regards to a student's performance within the classroom. Modifications, interventions, and other adaptations can be implemented that aim to increase fine motor skills that would enhance occupational performance. With the use of an occupation-based (OBM) model and an occupational therapy (OT) mindset, interventions can be developed and implemented within the kindergarten curriculum to help improve foundational skills required for successful completion of academic activities.

The guiding OBM utilized throughout this Doctoral Capstone Experience (DCE) will be the Person-Environment-Occupation-Performance (PEOP) model. The PEOP model focuses on the person, their environment, and occupations, with an overall emphasis on occupational performance (Christiansen, Baum, & Bass, 2011). The person includes intrinsic factors, such as physiological, psychological, cognitive, neurobehavioral, or spiritual factors (Christiansen et al., 2011). Within the school setting, the person may include age, gender, motivation, cognition, emotions, interests, and functional status. The environment would be the school building, including the classroom, gymnasium, cafeteria, library, and any other location the child's dysfunction may impact occupational performance at school. A child's occupations when in school are education, play, social participation, dressing, toileting, and feeding/eating. Performance refers to the abilities of the individual to complete various occupations (Christiansen, Baum, & Bass, 2011). In relation to this DCE, performance would be related to client factors and performance skills, and how dysfunction in these areas can impact overall occupational performance and participation within the classroom. Appendix A includes a visual graphic that demonstrates how all components of the PEOP model intertwine and relate to the occupational performance of an individual.

The PEOP involves a much higher emphasis on assessing the person, rather than the environment. According to the PEOP, the most significant goal during the evaluation process is to analyze the client to determine strengths and any problems that may be impacting occupational performance (Christiansen et al., 2011). Two kindergarten classrooms will be observed to determine occupational performance deficits among the children, which will provide more insight to how these deficits impact occupational performance and participation in the classroom. Using the PEOP model provides a basis for observations and helps in selecting an

appropriate assessment and/or screening tool. Because the PEOP focuses more on assessing the person, rather than the environment (Christiansen et al., 2011), assessment and screening tools will be easier to choose from, as one can determine which performance skills and client factors they assess and narrow the selection based on that criteria. Interventions that correspond to the PEOP model include ones that facilitate and enhance occupational performance (Christiansen et al., 2011), such as fine motor activities, pencil grips, certain sensory integration techniques, and literacy components. By addressing dysfunction and providing strategies to improve occupational performance via OT-based interventions, students will have increased performance and participation in the classroom.

Kindergarten Readiness

Gap in Skills. While kindergarten classroom activities appear to be simple at surface level, children may lack exposure to or have limited experience with developmental opportunities that would facilitate growth and improvement of fine motor and cognitive development (Mabbett, 2018). Many activities performed within a kindergarten classroom require simultaneous use of fine motor and cognitive skills (Cameron et al., 2012). Some students enter kindergarten well-prepared, while others do not (Mabbett, 2018). Even when students have age-appropriate cognition, they could still struggle with fine motor tasks resulting in them falling behind peers in class (Elenko & Siegfried, 2018). These students could require more practice and hands-on experience for the development of foundational skills needed to be successful in kindergarten (Mabbett, 2018). With fewer opportunities throughout the school day to improve foundational skills required for handwriting and other school-based occupations, children who require more practice with these skills are falling behind peers because their delays

are not addressed appropriately (Bassok, Latham, & Rorem, 2015; Elenko & Siegfried, 2018; Gerde et al., 2014; Mabbett, 2018).

A lack of exposure to specific activities or pre-academic skills can greatly impact kindergarten readiness and academic performance in school, leading to a gap in skills among students in the classroom (Isaacs, 2012). One of the most significant factors that contributes to this gap in skills is socioeconomic status, in that some children have the luxury of attending pre-school and are exposed to various activities at home that prepare them for kindergarten, while other children do not experience either (Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010; Mabbett, 2018). Low socioeconomic families are less likely to send their children to preschool, resulting in lower percentages of school readiness (Isaacs, 2012). Families with lower incomes are also less likely to work on crucial pre-academic skills at home, which can be attributed to less educated parents and an increase in single/teen parent households (Isaacs, 2012; Mabbett, 2018). Higher percentages of children are entering kindergarten with little to no pre-academic skills, leading to more children falling behind academically in relation to their academically prepared peers (Elenko & Siegfried, 2018; Gerde et al., 2014; Mabbett, 2018).

Fine Motor Activities in the Classroom. Children entering kindergarten have much higher expectations on what pre-academic skills they should have mastered prior to entering kindergarten (Bassok et al., 2015; Mabbett, 2018; Marr et al., 2003). One specific demand for children is that they possess efficient fine motor skills enabling them to complete classroom assignments (Trummert, 2016). Marr, Cermak, Cohn, and Anderson (2003) found that an average of 46% of activities performed in the kindergarten classroom involve fine motor skills. These activities may include using scissors, folding and ripping paper, manipulating chips, completing puzzles, using counting blocks, manipulating zippers/buttons on their clothing, and

utilizing writing utensils. Nearly half of these fine motor tasks performed in the classroom involve pencil and paper activities (Marr et al., 2003), suggesting that handwriting is one of the most common fine motor related task students have to participate in. With a large percentage of activities in the classroom being fine motor-based, children who do not have those foundational skills may find it more difficult to complete academic activities at the same rate as their peers (Cameron et al., 2012; Gerde et al., 2014; Mabbett, 2018; Marr et al., 2003).

Activities performed in the classroom not only involve fine motor abilities, but cognitive abilities as well (Cameron et al., 2012), specifically referring to the task of handwriting. Handwriting is an essential component to kindergarten, as students learn to write their name, capital and lowercase letters, and numbers. When looked at holistically, handwriting, in itself, is a multisensory skill (Case-Smith, Weaver, & Holland, 2014). A child requires bilateral coordination to manipulate the pencil with the dominant hand and to stabilize the paper with a helper hand; visual-motor and visual perceptual skills are required to copy information onto paper; proprioceptive input is required for appropriate pressure grade when writing on paper and gripping the pencil; cognition is used for attention, problem solving, and planning; and efficient fine motor skills are required to manipulate the pencil and produce legible handwriting (Gerde et al., 2014). To manipulate writing utensils, write letters and numbers, and copy shapes, students should have the fundamental fine motor, visual-motor, and perceptual skills to do so successfully (Mabbett, 2018).

Educational Reform

Changing Standards. State standards have unfortunately shifted the focus of the kindergarten curriculum, causing it to be comparable to the skills and information once learned in the first grade (Bassok et al., 2015). In Indiana, state standards require teachers to complete

two different standardized assessments with students, and districts have the option to choose which assessment they will utilize (C. Manowitz, personal communication, January 14, 2019). The school corporation within this study opted to use Exact Path as their main standardized assessment, and they use the Benchmark Assessment System (BAS) as their other standardized assessment (C. Manowitz, personal communication, January 14, 2019). Exact Path is administered via iPads, and the BAS involves assessing a child's reading level and comprehension (C. Manowitz, personal communication, January 14, 2019). The two observed kindergarten teachers also utilized a quarterly assessment that addressed letter recognition, sound recognition, sight words, ability to write upper and lowercase letters in random order, number recognition, counting by ones, counting by tens, writing numbers, and describing shapes (C. Manowitz, personal communication, January 14, 2019). With such an emphasis on standardized testing and the strict guidelines of state standards, it is not surprising handwriting has not been properly addressed within the elementary educational system for several years (Poole, 2017). This has ultimately resulted in a trend of poor student performance within the classroom (Poole, 2017).

Decreased Play Opportunities. This new curriculum focus has pushed several teachers into decreasing the amount of time students spend in exploratory and hands-on play within their classroom (Bassok et al., 2015). With less emphasis on using hands during free-play, students lack exposure to activities that promote the development of foundational skills required for handwriting and literacy (Bassok et al., 2015; Elenko & Siegfried, 2018; Gerde et al., 2014; Mabbett, 2018). Lynch (2015) investigated American kindergarten teachers' perspectives of play in kindergarten and found that some teachers believed play should not be a part of the classroom dynamic, as activities needed to be academic-focused to meet academic standards.

There were also some teachers in the study who supported play within kindergarten classrooms, but validated play in the classroom only because it differed from play at home (Lynch, 2015). Curwood (2007) found that skill-and-drill exercises are the new norm in kindergarten classrooms, resulting in less imaginative playtime throughout a school day. Time spent in imaginative free-play allows students the opportunity to develop fundamental skills needed to understand numbers and words, which later relates to strengthened mathematic and literacy skills (Bassok et al., 2015; Curwood, 2007).

Technology in the Classrooms. Students coming from low-income families may not share the luxury of playing with tablets or other electronic devices at home, increasing the gap in functional skills (Isaacs, 2012), as more schools are incorporating tablets and laptops into their classrooms. These children may not understand how to operate the device and may have difficulties when participating in academic applications independently. On the other hand, students who were exposed to tablet and iPad use prior to kindergarten may be at a greater disadvantage compared to those who were not because they may have had less exposure to hands-on and imaginative play (Lin, Cherng, & Chen, 2017). Lin, Cherng, and Chen (2017) investigated the impact of tablet use on fine motor skills of preschoolers without developmental delays. Preschoolers who did not participate in tablet use during activities made significant improvement in fine motor precision, fine motor integration, manual dexterity, and pinch strength (Lin et al., 2017). This suggests that children who have more exposure to tablet use prior to kindergarten may have limited abilities in other daily tasks due to limited fine motor development from extensive use of electronics. For example, students may not be able to turn pages in a book because they were swiping to flip pages on a tablet, as opposed to physically turning the page of a book (H. Barber, personal communication, January 11, 2019).

Integrated OT Services

Unserved Children. Occupational therapy-based interventions integrated into the kindergarten curriculum can improve the occupational performance and participation of all students in the classroom (Ohl, Graze, Weber, Kenny, Salvatore, & Wagreich, 2013; Zylstra & Pfeiffer, 2016;). Students with a previously established Individualized Education Program (IEP) or a Section 504 plan are eligible for OT services within the school setting. Poole (2017) found that 3.2% of students in kindergarten and first grade at three elementary schools were eligible for OT services. This low number of students who were eligible for services may indicate that some students are overlooked or do not have a qualifying diagnosis that allows them to receive OT services in the school setting (Poole, 2017). Clark (2001) discussed how student's needs are often unnoticed or overlooked within the classroom. While Clark (2001) directly discussed mental health needs being overlooked among students in elementary school, fine motor needs could also be overlooked as teachers are being pushed to include more academics into their classroom. With teachers being required to maintain strict state standards, they are focused on ensuring all students are meeting and maintaining academic standards (Poole, 2017), which could lead teachers to overlook fine motor difficulties by prioritizing academics. Bazyk et al. (2009) found that at-risk children who do not have an identifiable disability that would qualify them for services may benefit from an integrated OT approach within the classroom. When these students' developmental delays are not addressed appropriately, they continue to fall further behind their peers and risk potentially repeating their kindergarten year (Gerde et al., 2014; Mabbett, 2018). When OT-based interventions are integrated into the general kindergarten classroom, it benefits all students (Bazyk et al., 2009; Case-Smith et al., 2014).

Preventative Services. Students with little to no exposure to developmental activities prior to kindergarten may flourish once given the opportunity to engage in these developmental opportunities at school (Mabbett, 2018). As mentioned previously, efficient fine motor skills are a demand of children entering kindergarten for successful participation (Trummert, 2016). When teachers identify students with fine motor deficits in kindergarten, they would typically consult with the occupational therapist within the school corporation and request an evaluation for services; however, if the student does not have an established IEP or 504, they cannot receive OT services in school until one is completed. Establishing an IEP in kindergarten can be a lengthy process, which still leaves the child at a disadvantage, as they often cannot be evaluated until later in the second semester of school (H. Barber, personal communications, January 11, 2019). Students who do not have an identified IEP or 504 may struggle with fine motor abilities, causing them to fall behind their peers academically (Gerde et al., 2014; Mabbett, 2018); however, these students may quickly pick up on those foundational skills if given more opportunities in school. Occupational therapy interventions as a preventative service in the kindergarten classroom would help those students who were not meeting state education standards, but who also do not meet requirements that would make them eligible for OT services in the school system (Trummet, 2016). Taras, Brennan, Gilbert, & Reed (2011) concluded that OT as a preventative service in kindergarten could potentially decrease the number of referrals made by teachers, especially those referrals that may be inappropriate.

Impact on Performance and Participation in the Classroom. Integrating OT-based interventions into a kindergarten curriculum can improve fundamental skills, resulting in better performance in writing, early literacy development, and other areas of academia (Case-Smith et al., 2014; Gerde et al., 2014; Mabbet, 2018; Ohl et al., 2013; Trummert, 2016; Zylstra & Pfeiffer,

2016). When students possess foundational skills required for handwriting, they tend to be more engaged and miss fewer instructions in the classroom because they are not cognitively focused on the process of handwriting itself (Case-Smith et al., 2014). Zylstra and Pfeiffer (2016) and Gerde et al. (2014) found that OT-based interventions in the classroom were more likely to effectively promote developmentally appropriate handwriting as opposed to typical educational classrooms. Mabbett (2018) specifically studied the effects of integrated OT-based interventions on student's fine motor and visual motor abilities. When integrated into the kindergarten curriculum, OT-based interventions were found to help improve those foundational skills required for successful completion of classroom activities (Mabbett, 2018). In 2016, Trummert explored the idea of incorporating fine motor specific centers in the classroom during group work. This study closely parallels the purpose of the proposed program for this DCE, and it strongly supports the inclusion of these OT-based services in the kindergarten classroom for increased performance and participation among students.

To integrate these OT-based services effectively in the classroom, one must understand and be able to identify what areas of dysfunction the students are experiencing. Using the PEOP model as a guiding framework, appropriate observations and assessment tool selection can be made in order to identify deficits that are impacting overall occupational performance and participation in the classroom. These identified deficits can then be analyzed to determine what interventions and strategies would be most beneficial for increased performance for all students. The purpose of the program is to integrate OT-based services into a kindergarten curriculum in order to provide OT-based services to at-risk children who do not qualify for OT services in the school setting to improve occupational performance and participation in the classroom.

Screening and Evaluation

Occupational Performance and Participation

This project focused on increasing overall occupational performance and participation for all students within a general kindergarten classroom; however, the main purpose was to target at-risk children with developmental delays who do not qualify for OT services, which are intended to increase fundamental pre-academic skills. These children may fall academically behind because they have not mastered foundational skills required for typical advancements made once they have entered kindergarten (Elenko & Siegfried, 2018; Gerde et al., 2014; Mabbett, 2018). It is important to assess these skills in the natural environment a child performs them in (Clark, 2001), as it gives better insight on how the person, environment, and occupation impact overall occupational performance and participation. Because the PEOP focuses more on assessing the person, rather than the environment (Christiansen et al., 2011), assessment tool selection was narrowed down based on observations of performance skill and client factor deficits in the classroom, as well as general statements from the teachers and assistants. With handwriting being one of the most common activities performed within the kindergarten classroom (Marr et al., 2003), client factors and performance skills that impact handwriting were analyzed when choosing an appropriate assessment tool as well.

Instrumentation

The Beery-VMI. The Beery-Buktenica Developmental Test of Visual-Motor Integration (Beery VMI) was chosen based on client factor and performance skill deficits observed in the classroom, as well as from statements given from both kindergarten teachers. This standardized, norm-referenced assessment is one of the most commonly used tools among occupational therapists (Feder et al., 2000). A 2000 study revealed nearly 81% of occupational therapists in eight Canadian provinces utilized the Beery VMI when assessing student's handwriting deficits

(Feder et al., 2000). The Beery VMI evaluates an individual's ability to integrate their visual and motor skills, and it is available in full form or short form (Beery & Beery, 2004). The short form was chosen for this DCE project, as it is used specifically for children 2 through 7 years of age (Beery & Beery, 2004). The short form of the Beery VMI consists of 21 geometric shapes in a developmental sequence to evaluate a child's visual motor and visual perceptual skills (Beery & Beery, 2004) needed for daily occupations performed in the classroom and throughout the school day. The Beery VMI has been proven to be a valid outcome measure for fine motor and handwriting interventions (Salls, Benson, Hansen, Cole, Pielielek, 2013). In a 2013 study, the Beery VMI was used as an outcome measure to track progress following implementation of two different handwriting programs in two different first grade classrooms (Salls et al., 2013). While initial raw scores and final raw scores were not significantly different, the Beery VMI was successful in showing progress made following both handwriting programs (Salls et al., 2013).

Clinical Observations. The PEOP does not have an associated assessment tool, so in combination with the Beery VMI, clinical observations were also completed to fully understand the impact of dysfunction on occupational performance and participation (Kramer, 2018). Collective observations of both classrooms were made during writing activities, which allowed for further insight on the student's performance on the function/dysfunction continuum (Kramer, 2018). When referring to visual-motor, visual-perceptual, and overall fine motor abilities, clinical observations were made to determine deficits in these areas in combination with the Beery VMI. Clinical observations are useful when screening and evaluating a child, as it provides insight to possible problems with academic performance (Kramer, 2018). Each classroom was observed for one full school day, which included a 90-minute reading block, 2

recesses, physical education, a 30-minute math block, lunch, and other various activities performed throughout the day.

Needs Assessment

To determine appropriate interventions that would be integrated into the kindergarten curriculum, a needs assessment was completed. The needs assessment consisted of an informal interview with both kindergarten teachers and occupational therapist, a discussion with the kindergarten assistant(s), observations made in each classroom, the Beery-VMI, and clinical observations when administering the assessment tool. These specific strategies provided insight on which students were struggling, areas the students were struggling in, and strategies the teachers have previously tried with specified students. Classroom observations provided detailed classroom routines and a quick view of the student's function/dysfunction by closely observing handwriting during group work.

Informal Interviews. Following interviews with both kindergarten teachers, it was evident that fine motor difficulties were the most common among both classrooms. Specific students were identified to have more fine motor difficulties compared to the majority of the classroom. Both kindergarten teachers stated that students had made a lot of progress compared to the beginning of the year, as there were a few students who had no idea how to hold a pencil. Even at the beginning of the year when some students were struggling with pencil grasp, no students in either kindergarten classroom received OT services. It was also found that correct progression of pencil grasp and other identifiers of hand weakness were not taught in either of the teacher's schooling. The teacher in classroom A has been teaching kindergarten for fifteen years, while the teacher in classroom B has only been teaching kindergarten for three years. Both teachers reported they were not fully aware of the versatility of occupational therapy and

did not realize all that went into handwriting, but the seasoned teacher had more experience and interactions with the occupational therapist, which has helped her when identifying students with difficulties. The teacher in classroom A has utilized different pencil grips for a few of her students, which were provided to her at the beginning of the school year through the school, not the occupational therapist. The teacher in classroom A used a Stetro grip for one student and an egg-shaped grip for another student. The teacher in classroom B did not utilize pencil grips for any of her students, but she was observed using hand-over-hand with one student to correct pencil grasp when completing a writing assignment in class. Both teachers and occupational therapist reported no OT referrals this school year, and also no current students receiving OT services under an IEP or 504. From previous experience and knowledge, the occupational therapist at the participating elementary school stated that all kindergartners would benefit from further interventions that address dexterity, bilateral coordination, visual-motor coordination, proprioception, and crossing-midline.

Beery VMI Results. A total of forty-one students completed the Beery VMI, with 20 students in classroom A and 21 students in classroom B. Following administration of the Beery VMI, test booklets were scored to produce raw scores using the Beery VMI manual. Raw scores were then converted to standard scores, and standard scores were used to determine scaled scores and age equivalents for all students in the classroom. Visual graphics and averages were not computed or provided for scaled scores and age equivalents, as they showed similar trends in performance, which would have resulted in similar graphics. An average was determined for students' age, raw scores, and standard scores. The average age for students in classroom A was 6.08 years, the average raw score was 12.10, and the average standard score was 76. The average age for students in classroom B was 6.0 years, the average raw score was 11.20, and the

average standard score was 72.67. The youngest students in classroom A and classroom B were both 5.5 years of age. The oldest student in classroom A was 7 years and 5 months, while the oldest in classroom B was 6 years and 7 months of age. When interpreting the Beery VMI, a higher standard score represents a higher level of visual-motor performance. Standard scores can go higher than a 129, which categorizes students' level of visual-motor performance at very high (Beery & Beery, 2004). A lower standard score represents a lower level of visual-motor performance. Standard scores that go below 70 categorize students' level of visual-motor performance at very low (Beery & Beery, 2004).

Percentages of students that fell within each performance range are provided in Figure 1. Students in classroom A produced slightly higher standard scores compared to students in classroom B. Results of the Beery VMI indicate that a very high percentage of students in the participating kindergarten classrooms have not fully integrated their visual and motor abilities.

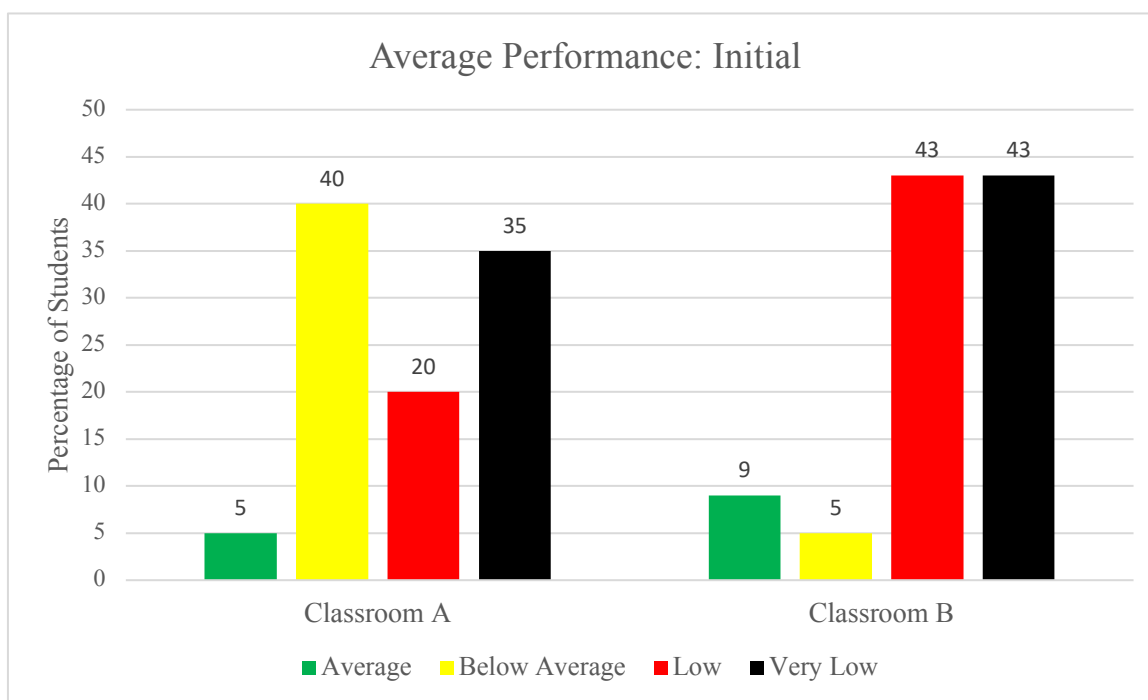


Figure 1. Performance Range Based on Standard Scores for Kindergarten Students

Clinical Observation. Clinical observations were made in both classrooms as a whole and for each individual student when completing the Beery VMI. Similar client factors and performance skills were observed during whole classroom and individual observations. It was found that decreased fine motor strength was the most common among all students, which was evident by inefficient pencil grasps and difficulty opening containers/packages during lunch. Inefficient pencil grasps observed during administration of the Beery VMI included thumb wrap, thumb tuck, index wrap, and a 5-point grasp. One student was observed using an index wrap for pencil and crayon use. Another student would have an efficient grasp on a pencil, but would use an index wrap and 4-point grasp inconsistently. During the initial whole classroom observation, one student was observed using a palmar supinate grasp when coloring, which is typical up to 18 months of age (Case-Smith & O'Brien, 2015). Two students were observed holding their pencil and crayon with a digital pronate grasp, which is typically observed with children between 18 to 30 months (Case-Smith & O'Brien, 2015). When completing the Beery VMI, a high percentage of students demonstrated difficulty crossing midline, as they would lean or shift their body left if they were right handed and they would lean or shift their body right if they were left handed. Only a few students demonstrated decreased bilateral integration, as they were not utilizing their opposite hand to stabilize the paper when writing. Overall, specific areas of concern observed in both classrooms include crossing midline, visual-motor deficits, visual-perceptual deficits, and decreased fine motor strength.

Compare and Contrast Within Different Practice Settings

Handwriting is not only addressed by school-based occupational therapists, but within other OT practice areas as well. Occupational therapists can address handwriting in pediatric acute care (hospital setting), pediatric rehabilitation centers, and in private practices (Feder,

Majnemer, & Synnes, 2000). A study conducted in eight Canadian provinces found that 34% of pediatric occupational therapists practiced in a school-based setting, whereas 32% practiced in a hospital setting, 22% in a pediatric rehabilitation center, and only 12% in private practice (Feder et al., 2000). Among the pediatric occupational therapists surveyed, 90% of them assessed fine/gross motor skills, motor planning, perceptual skills, and overall quality of movement when a child was referred for handwriting and/or fine motor deficits (Feder et al., 2000). A small percentage of pediatric occupational therapists within all practice settings assessed functional performance or handwriting itself within evaluations (Feder et al., 2000). This finding suggests that pediatric occupational therapists across different practice areas are assessing client factors and performance skills related to efficient handwriting, rather than assessing handwriting itself. When addressing handwriting difficulties; however, therapists across pediatric practice settings appear to be using similar approaches to improve occupational performance and participation for children with handwriting and other fine motor difficulties (Feder et al., 2000).

Within a school-based setting, motor learning and visual-perceptual-motor (also known as “perceptual-motor”) are two common approaches used for developing interventions that address handwriting and other fine motor difficulties (Feder et al., 2000). These different intervention approaches, however, are not confined to school-based therapists. A motor learning approach was utilized by 61.1% of school-based therapists. In comparison, 100% of pediatric occupational therapists in private practice, 72.7% of therapists in a pediatric rehabilitation center, and 62.5% of therapists in a hospital setting used a motor learning approach to develop appropriate interventions (Feder et al., 2000). A perceptual-motor approach was used by 66.7% of school-based therapists. Conversely, 80% of therapists in private practice, 72.7% of therapists in a pediatric rehabilitation center, and 81.3% of pediatric therapists in a hospital setting used a

perceptual-motor approach to guide handwriting and fine motor-based interventions (Feder et al., 2000).

A multisensory approach is another common way pediatric occupational therapists guide interventions for handwriting and fine motor difficulties (Feder et al., 2000). Two approaches that can incorporate multisensory aspects are sensory integration and sensorimotor (Feder et al., 2000). In a school-based setting, sensory integration was used by only 50% of occupational therapists, while a sensorimotor approach was utilized by 77.8% of pediatric occupational therapists (Feder et al., 2000). Conversely, 80% of private practice occupational therapists utilized a sensory integration approach and 100% utilized a sensorimotor approach in practice (Feder et al., 2000). Within a pediatric rehabilitation center, 54.5% of therapists utilized a sensory integration approach, while 90.9% used a sensorimotor approach (Feder et al., 2000). In a hospital setting, 100% of pediatric occupational therapists utilized a sensorimotor approach. A sensory integration approach was utilized the least within a hospital setting, with only 37.5% of pediatric occupational therapists using to address fine motor and handwriting difficulties (Feder et al., 2000). While different approaches are used to address the deficits related to handwriting and fine motor skills, children are still being provided with effective treatment opportunities aimed at increasing overall occupational performance and participation.

Implementation

Centers in the Kindergarten Classroom

For both classrooms, implementation of the OT-based interventions occurred during the kindergartens' 90-minute scheduled reading block in the morning, with the exception to classroom B, where one group was seen during Multi-Tiered System of Support (MTSS) time. Within that 90-minute reading block, the students completed centers for 30 minutes. These

centers consisted of different teacher-chosen literacy activities that involved sight words, writing, reading to self, pocket chart, and working with the teacher. The teacher in classroom B had two extra centers that allowed students to play on their iPads on an application called Reading Eggs, which is an academic reading-based game, or complete literacy puzzles. Even though the specific activities at each center were pre-planned by the teacher, the students still had the opportunity to choose which center they wanted to start at and which center they rotated to after completion.

Classroom A. In classroom A, the teacher had her class divided into different groups based on scores obtained from the BAS, which was completed with all kindergarten students following the second nine weeks of school. The groups consisted of Reading Behavior (RB), Level A, Level B, Level C, and Level D students. For weeks 1-3, students were classified into RB, Level A, Level B, and Level C groups. During weeks 1-3, the teacher worked with students in who were classified into RB and Level A every day for 15 minutes, while students in Level B and Level C rotated working with the teacher every other day. The students completed the BAS again during the third nine weeks of school and groups for centers changed, therefore, changing the rotation of students who participated in the OT-based center. For weeks 4-7, students were classified into RB, Level A, Level B, Level C, and Level D groups. During centers, the teacher worked with students in RB and Level A groups every day for 15 minutes, while Level B and Level C groups were seen twice a week by the teacher. Level D students were the only group to work with the teacher once a week. Figure 2 and Figure 3 illustrate how the different groups of students filtered through the OT-based center during the allotted reading block in classroom A. There were 21 students total who participated in classroom A. In Figure 2, the groups highlighted in red and orange were seen every day, so those specific groups included the same

students every day. The group highlighted in green and the group highlighted in blue were two separate groups of students that rotated every other day. In Figure 3, the groups highlighted in red and orange were seen every day, so those specific groups included the same students every day. The group highlighted in green, blue, and purple were three separate groups of students that rotated throughout the week.

	Monday	Tuesday	Wednesday	Thursday	Friday
8:30-8:45	Reading Behavior (6 students)	Reading Behavior (6 students)	Reading Behavior (6 students)	Reading Behavior (6 students)	Reading Behavior (6 students)
8:45-9:00	Level A (5 students)	Level A (5 students)	Level A (5 students)	Level A (5 students)	Level A (5 students)
9:00-9:15	Level B (5 students)	Level C (5 students)	Level B (5 students)	Level C (5 students)	Level B (5 students)

Figure 2. Weeks 1-3 rotation with OT-based center in classroom A

	Monday	Tuesday	Wednesday	Thursday	Friday
8:30-8:45	Level A (5 students)	Level A (5 students)	Level A (5 students)	Level A (5 students)	Level A (5 students)
8:45-9:00	Reading Behavior (3 students)	Reading Behavior (3 students)	Reading Behavior (3 students)	Reading Behavior (3 students)	Reading Behavior (3 students)
9:00-9:15	Level B (5 kids)	Level C (3 students)	Level D (5 kids)	Level B (5 kids)	Level C (3 students)

Figure 3. Weeks 4-7 rotation with OT-based center in classroom A

Classroom B. In classroom B, the teacher did not divide students into specific groups based on academic performance, unlike the teacher in classroom A. During centers, the teacher in classroom B pulled students with similar BAS scores to work with her for 15 minutes and then switched groups. Regarding implementation of the OT-based interventions with the OT student, the interventions were still completed primarily during the center time; however, per teacher request, one larger group of students completed the OT-based intervention during MTSS time. In order for all students to complete the same activity, different groups of students completed the same activity within a two-day timeframe. Figure 4 illustrates how the different groups of students filtered through the OT-based center during the allotted reading block for classroom B. There were 21 students total who participated from classroom B. Monday and Tuesday are highlighted gray, which indicates the same activity was performed for the entire class in a two-day time frame. Groups are written in different colors (red, orange, green, purple, blue and pink), indicating that groups remained the same Monday through Thursday. On Friday, the teacher would select which students would participate in the OT-based center, so the groups were left in black; however, the groups are written in different font styles in order to indicate different groups of students being chosen each day.

	Monday	Tuesday	Wednesday	Thursday	Friday
9:30-9:45	3 students	3 students	3 students	3 students	3 students
9:45-10:00	3 students	3 students	3 students	3 students	3 students
10:45-11:00	4 students	5 students	4 students	5 students	5 students

Figure 4. Weekly rotations with OT-based center in classroom B

Activities Completed with Students. Each classroom had a different schedule for reading centers, so activities were completed differently within each classroom. Activities were picked based on performance skills and client factors that were essential for successful handwriting and completion of daily activities within the classroom. After completion of the needs assessment, it was determined that activities would incorporate visual-motor, visual-perceptual, fine motor strengthening, shoulder strengthening, bilateral coordination, and in-hand manipulation skills. Table 1 and Table 2 provide an example of how the different activities were completed throughout the week within each classroom. All performance skills were addressed within classroom B; however, they were not addressed weekly as compared to classroom A. They were divided up among the 7-week program since it took two complete days to see all 21 students in classroom B. For a complete schedule of all activities performed within each classroom, refer to Appendix B and Appendix C.

Table 1

Rotation of Activities Completed Throughout the Week in Classroom A

Week/Day in Program	Activity Focus	Activity	Materials Needed
Day 6	Bilateral Coordination	I Love You to Pieces	Scissors, construction paper, glue sticks, hole punch (incorporate fine motor strengthening), 42 copies of page number 6
Day 7	Shoulder Strengthening	Prone Play: Valentine's Day Roll and Cover with Numbers	Paper Dice in plastic jar, 6 copies of page number 7
Week 2 Day 8	Visual-motor & visual perceptual	Valentine's Day Maze & Hidden Pictures	Dry-erase markers, 3 laminated copies of page number 8 , 6 laminated copies of page number 9 , 6 laminated copies of page number 10
Day 9	In-hand manipulation	Do-a-Dot Heart Page with Matching Letters	Red/Yellow foam circles, 6 laminated copies of page number 11
Day 10	Fine motor strengthening	Sight Word BINGO	BINGO cards, tongs, beads, original copy on page number 12

Note: Example was provided from week two of program, as changes were made throughout week one to the organization of the rotation schedule.

Table 2

Rotation of Activities Completed Throughout the Week in Classroom B

Week/Day in Program	Activity Focus	Activity	Materials Needed
Day 6 & Day 7	Bilateral Coordination	I Love You to Pieces	Scissors, construction paper, glue sticks, hole punch (incorporate fine motor strengthening), 42 copies of page number 6
Week 2 Day 8 & Day 9	In-hand manipulation	Do-A-Dot Heart page with letters	Paper Dice in plastic jar, 6 copies of page number 7
Day 10	Shoulder Strengthening	Prone Play: Valentine's Day Roll and Cover with Numbers	Red/Yellow foam circles, 6 laminated copies of page number 11

Note. Example was provided from week two of program, as changes were made throughout week one to the organization of the rotation schedule.

Leadership in the Implementation Phase

Leadership was exemplified through independence within the school environment, easily building rapport with students in both classrooms, and connecting with the kindergarten teachers and other faculty members. By reaching out to other OT practitioners in regard to this DCE project, leadership was shown by initiative and passion for the field of occupational therapy. The resources provided via these other practitioners aided in the development of an effective and reliable resource binder for the teachers in kindergarten. Effective communication between the site mentor, both kindergarten teachers, and other relevant individuals was imperative for successful completion of the OT-based interventions during centers. Another way leadership

was shown throughout the implementation phase was giving advice and suggestions on how to modify current centers to incorporate OT principles. Teachers were provided with an online resource that focused on incorporating fine-motor activities into a kindergarten curriculum, created specifically by a kindergarten teacher. The website also offered various resources for teachers to use, such as curriculum guides and specific activities to use in the classroom. Some of the activities used within the program were “freebies” from this online resource and they were also provided in the resource binder intended for the teachers following completion of the program. When creating the resource binder, including the teachers when compiling resources was an act of leadership, as it implied that their opinions were valuable and that they had an important role in regards to this DCE project’s overall quality improvement. Leadership was demonstrated every day within the classroom, whether it was just the teacher in the room, or with all the students present. It was important to lead by example during the implementation phase, as students in kindergarten are susceptible to copying behaviors of others, which was frequently observed throughout the implementation phase of this DCE project.

Staff Development in the Implementation Phase

During the implementation phase of this DCE project, staff development was promoted by educating kindergarten teachers on the benefits of the OT-based centers, which focused on fine motor strengthening, shoulder strengthening, in-hand manipulation, visual-motor, visual perceptual, and bilateral coordination. By doing so, the teachers were better able to understand the means behind each activity and realize how important these skills are for the establishment and improvement of fundamental skills and meeting developmentally appropriate milestones. Staff development was also promoted when compiling information for the resource binder. Each kindergarten teacher was asked if they had certain areas of interest to include in the binder that

would be specifically beneficial for meeting their students' needs. The resource binder would serve as a reference and guide for the kindergarten teachers following completion of this DCE project, as it included background information on fundamental skills, developmental sequences, quick checklists for age-appropriate skills, remediation strategies for the classroom, and activities to promote performance skills required for successful completion of school-based activities. The kindergarten teachers were also informed on ways to incorporate OT principles by modifying their current activities used during centers.

A formal presentation was given to several individuals, including those amongst the school administration. Individuals included the Director of Special Programs, one of the two Assistant Directors of Special Programs, the special education teacher at Hayden Elementary, the principal at Hayden Elementary, the two kindergarten teachers involved in the project, and the physical therapist and two occupational therapists within the school corporation. A member of the Jennings County School Board was also interested in attending, but unfortunately, she was not able to attend. The data presentation aimed to promote staff development by educating all individuals on the importance of hands-on exposure within the classroom to foster the development and improvement of fundamental and age-appropriate skills. Based on the progress made during the OT-based centers, one could see how daily exposure to OT-based activities in the kindergarten classroom improved fundamental skills required for successful completion of daily school-based activities. All individuals present at the presentation were very pleased with the outcomes of the program. The Director of Special Programs seemed to think this program could be something easily implemented into other classrooms, as she stated it was mostly a matter of teaching the information to the teachers and having them implement the activities into their centers. She brought up the topic of having a list of appropriate materials that would be

needed in order for this to be institutionalized into other schools. The binder that was created in addition to the 7-week program listed all activities completed, the focus of the activity, and the materials used for each activity, so distributing that information to other schools would be beneficial when institutionalizing the concept of this program.

Discontinuation and Outcome

Project Outcomes

Final Raw and Standard Scores. Students in both kindergarten classrooms completed the Beery VMI to obtain final scores following completion of the 7-week program. Initially 21 students in classroom A completed the Beery VMI; however, one student was not present during post-test administration, so all collected data was omitted for this student. All 21 students in classroom B were present during final administration of the Beery VMI. Final scores were compared to initial scores to assess student progress made during the 7-week program. The final average raw score in classroom A was 13.55, which was an increase compared to the initial average raw score of 12.10. The final average standard score in classroom A was 82, which was an increase compared to the initial average standard score of 76. Five students in classroom A scored the same on the final assessment as they did on the initial assessment, which resulted in slightly lower standard scores since their chronological age differed from the initial assessment. The students' chronological age directly impacted standard scores, as it and raw scores were used to compute standard scores for each student. In classroom B, the final average raw score was 13.43, which was an increase compared to the initial average raw score of 11.20. The final average standard score in classroom B was 82.48, which was an increase compared to the initial standard score of 72.67. Four students in classroom B scored the same on the final assessment as

they did on the initial assessment, which resulted in slightly lower standard scores since their chronological age differed from the initial assessment.

Final Performance Levels. Once standard scores were computed, average performance levels were determined for each student following the completion of the 7-week program. Figure 5 and Figure 6 illustrate the comparisons of initial average performance levels to final average performance levels in the kindergarten classrooms. Students' standard scores were used to determine performance levels, then each category was totaled and calculated into percentages. Final scores in classroom A showed an increase in the percentage of students classified as average, while below average remained the same. The number of students in classroom A classified as low and very low decreased, meaning that students' visual-motor and visual perceptual skills improved. Final scores in classroom B showed an increase in the number students classified as average and below average. The number of students classified as low and very low significantly decreased, meaning students in classroom B greatly improved their overall visual-motor and visual-perceptual skills.

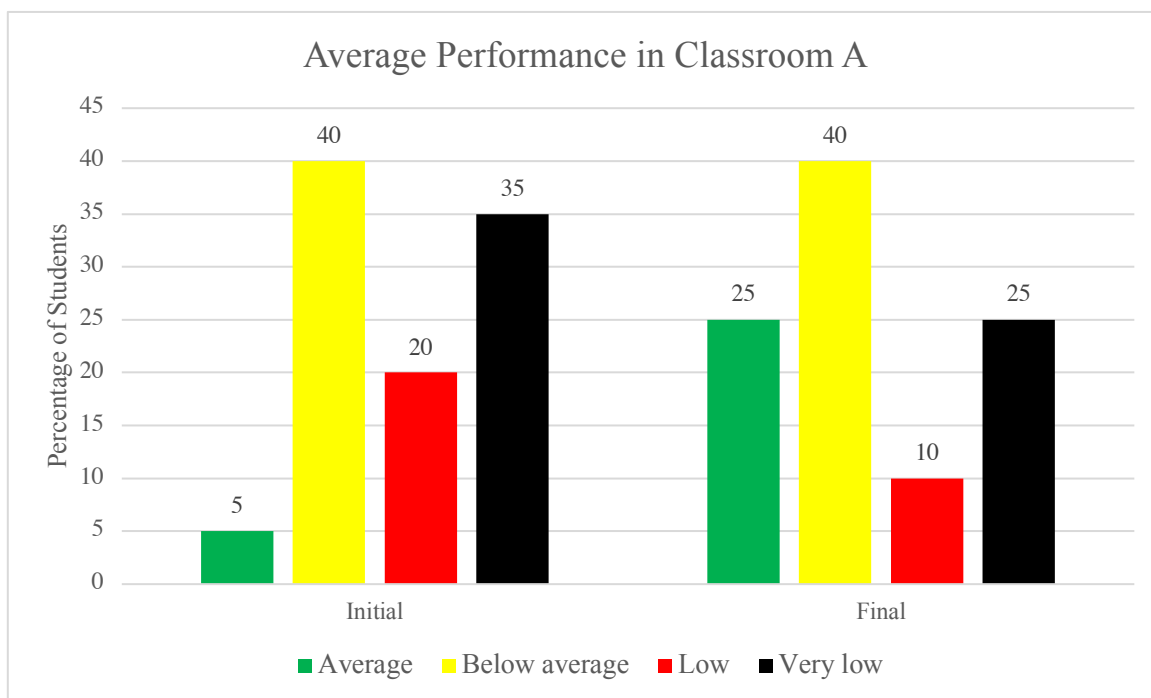
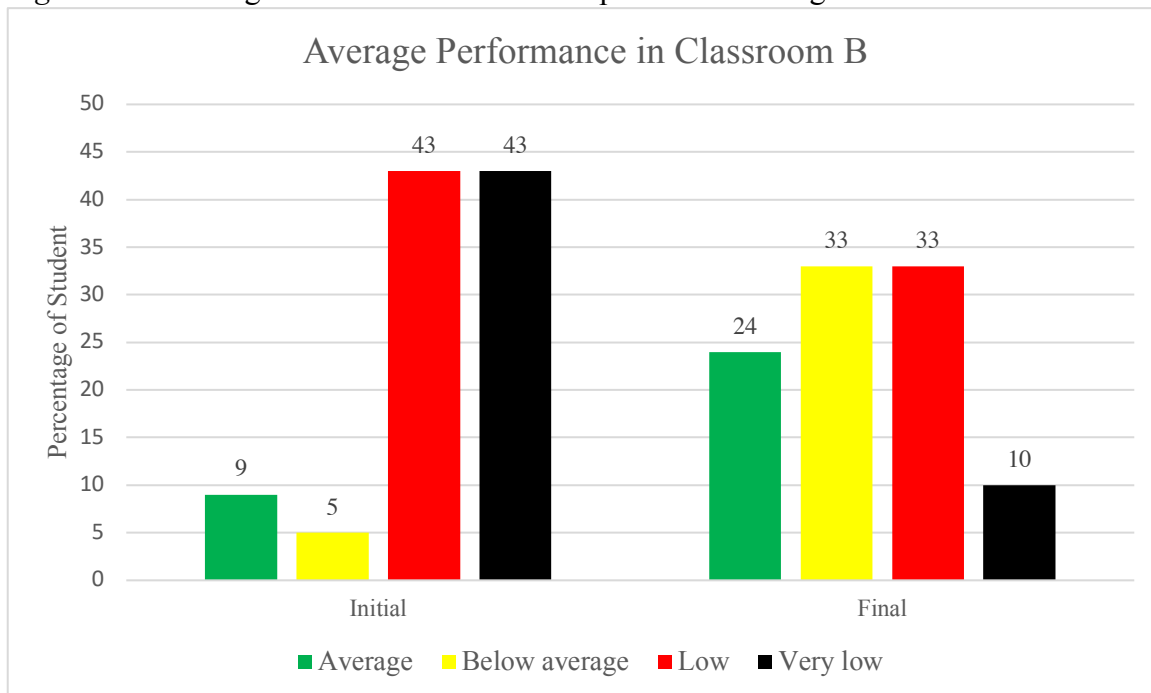


Figure 5. Percentages of students within each performance range based on standard scores for Classroom A.

Figure 6. Percentages of students within each performance range based on standard scores



for Classroom B.

Interpretation of Data. Based on the final data obtained following the 7-week program, it was evident that integrating OT-based activities into the kindergarten curriculum positively impacted student's functional performance skills. Visual-motor and visual-perceptual skills significantly increased with daily exposure to activities that incorporated OT principles. While the rotation of the OT-based center varied between classrooms, students still demonstrated an average increase in scores based on the Beery VMI. Clinical observations were also made during the final administration of the Beery VMI. Students demonstrated less difficulty crossing midline, as fewer students were observed rotating or shifting their bodies when copying the shapes in the test booklet. Fewer students showed difficulties with bilateral coordination, evident by using their helper hand to stabilize the paper when copying shapes in the test booklet with fewer verbal cues.

Quality Improvement

Several quality improvement efforts were made to enhance performance in the kindergarten classroom to guarantee maximum performance by students. To ensure students were performing activities that would benefit their overall fine motor skills, extensive research was completed to determine appropriate activities targeting specific performance skills and client factors needed to be successful in a school environment. Once an extensive list of activities was established, all activities and rationales were reviewed by an experienced school-based occupational therapist. Activities were completed with both kindergarten classrooms for three consecutive weeks prior to the first quality improvement analysis. Activities were improved and changed based on responses from students, amount of effort made by students during centers, and attention given from students when completing the activity at hand. Each activity was modified for students' level of academic performance. Students reading at Level RB completed

the same activity as students in Level D; however, different instructions and goals were achieved based on academic performance. The activities completed with poor effort or ones that had negative reviews were replaced by more exciting and motivating activities to increase performance and participation during centers. Based on teacher preference, activities were modified to include literacy components, so students were receiving both academic and OT-based interventions.

Quality improvements were also made in regards to when the OT-based centers would take place in the kindergarten classroom. In classroom A, the OT-based center was treated as just another rotation for all kids to freely move to on the first day. After analyzing and discussing a better rotation with the teacher in classroom A, students would not get to choose if they came to the OT-based center that day. Rather, students rotated through the OT-based center in their groups determined by BAS scores. The following six weeks in classroom A operated much smoother following improvements made to the organization and rotation during centers. In classroom B, only five students were seen per day in the OT-based center, so it took the entire first week to complete one activity with the whole classroom. Following multiple discussions with the teacher in classroom B and several example rotations, a decision was made to increase the number of students seen during centers and to add a separate group during MTSS time, so all students could participate in the OT-based center in two days. Per teacher request, Fridays were used to see students with lower scores obtained from the Beery-VMI.

Sustainability

Sustainability was accounted for by providing teachers with a resource binder and a list of online websites that emphasized fine motor activities in the classrooms. Both resources were meant to be used as a reference guide by teachers following completion of this DCE project.

One website in particular offered detailed information on how the curriculum was organized so that academic activities completed in the classroom also focused on fine motor skills. The creator of the website was a kindergarten teacher, so the content was relatable and easy to follow. These resources were to help ensure activities completed in the program would continue to be implemented in the kindergarten classroom following completion of this DCE project. While a list of activities and supplies was provided to the teachers, not all activities will be expected to be completed as some were not solely academic based. Some activities would be more appropriate to complete at the beginning of the year as opposed to the middle of the school year, or more appropriate to complete toward the end of the school year as opposed to the middle of the school year. Teachers were given ideas on how to modify and alter activities based on the students' current skills. For example, one activity could focus on letter recognition at the beginning of the year, then it could be modified at the middle of the year to work on sight words, and then finally modified to work on simple sentences toward the end of the school year. It was important to adapt activities in the program to meet teacher preferences and expectations to ensure sustainability following completion of this DCE project.

Societal Need

State standards have shifted the focus of school curricula resulting in higher expectations for children who are entering kindergarten (Bassok et al., 2015; Mabbet, 2018, Marr et al., 2003). Children entering kindergarten are expected to have mastered certain skills and learned specific information prior to entering kindergarten; however, these skills now learned in kindergarten are comparable to skills that were once learned in the first grade (Bassok et al., 2015). Some of these skills and prior knowledge include writing their name, manipulating scissors and cutting independently, recognizing letters in the alphabet, knowing basic shapes and colors, and

counting. There is less emphasis on using hands during free-play due to the curriculum shift, resulting in an increased number of students who lack exposure to activities that promote the development of foundational skills required for handwriting and literacy (Bassok et al., 2015; Elenko & Siegfried, 2018; Gerde et al., 2014; Mabbett, 2018). For some students, exploratory play and hands-on activities at school are their only encounter with developmentally appropriate activities aimed to increase their functional skills (Mabbet, 2018). This lack of exposure to specific activities or pre-academic skills can greatly impact kindergarten readiness and academic performance in school (Isaacs, 2012). The societal need addressed during this DCE project was allowing students to experience more hands-on, OT-based activities in the classroom to improve performance and participation in daily school activities. By providing an OT-based center during the kindergarten allotted reading block, students were given the opportunity to improve or further enhance foundational skills required for success in the school environment. Mathematic and literacy activities completed in the kindergarten classroom could easily be modified to incorporate OT principles to target specific client factors and performance skills.

Overall Learning Experience

Communication

Starting from day one of this DCE project, communication between different professions was key within the school environment. The occupational therapist communicated with speech therapy, physical therapy, social work, special education teachers, teachers of students with emotional disturbances, grade level teachers, the school psychologist, and various school administrators. I gained insight on how the processes of interdisciplinary communication takes place, such as IEP meetings, informal conversations with staff members, or collaborative meetings with several staff members. While completing this DCE project, interactions with

school staff, students, and administration occurred through written, oral, and nonverbal means of communication.

Site Mentor. Effective communication was required for successful implementation into the kindergarten classrooms during this DCE project. When communicating with the site mentor, verbal and electronic communication were used when collaborating about the program. Verbal communication occurred on a daily basis up until week five, which was the beginning of the implementation phase. After week five, electronic communication was frequent and verbal communication occurred every Monday. These forms of communication ensured smooth implementation of the program, and to review appropriate activities the students were to complete during the program. All means of communication with the site mentor were professional, confidential, and appropriate throughout this DCE project.

School Staff and Students. While at Hayden Elementary, daily communication occurred with all students and both kindergarten teachers. Frequent interactions occurred with the school principal, the special education teacher, and the classroom assistants. Verbal communication occurred when educating the students on the importance of strong hand muscles and when giving simplified instructions during more difficult activities. Nonverbal communication was an extremely important means of communication with the students, as well. When completing activities with students, it was important to refrain from any negative facial expressions, as they could have been interpreted differently by each student. These gestures could have created feelings of failure or made the student feel unimportant during centers.

Verbal communication was the most common form of interaction to occur between the kindergarten teachers. During centers, one teacher would ask questions about the activity and what it focused on. By explaining the activity and providing a rationale to why the students were

completing it, the teachers developed a better understanding of the importance of working on different client factors and performance skills. When changes occurred with scheduling or when group rotation changed in classroom A, communication was vital when determining an alternative schedule for the OT-based center. Effective communication and remaining flexible with the school schedule had to happen in order for the OT-based center to be appropriately and smoothly implemented into the curriculum.

Leadership and Advocacy

Leadership was embodied throughout this DCE project by maintaining professionalism in the school building and positively representing the university and OT profession. When discussing program details with the facility's speech therapist, it was brought up several times that as a practicing occupational therapist or any other profession in the school environment, advocating for the student is extremely important. Advocacy for the OT profession was ingrained within the program being piloted at the elementary school. With assessments and testing becoming more frequent in the school environment, students are experiencing less hands-on and exploratory play within the kindergarten classroom (Bassok et al., 2015). Integrating the OT-based center and collecting data to show how functional performance increased with exposure to developmentally appropriate activities helped validate the need for an integrated OT-approach in the kindergarten classroom. Data was presented to school administration to show progress made, which was advocating for the needs of kindergarten students. From advocating for the students via informal conversations, to advocating for students via formal presentation to school administration, it was learned throughout this DCE project that no matter how small an act of advocacy is, the profession of OT is always willing to go above and beyond for clients in need.

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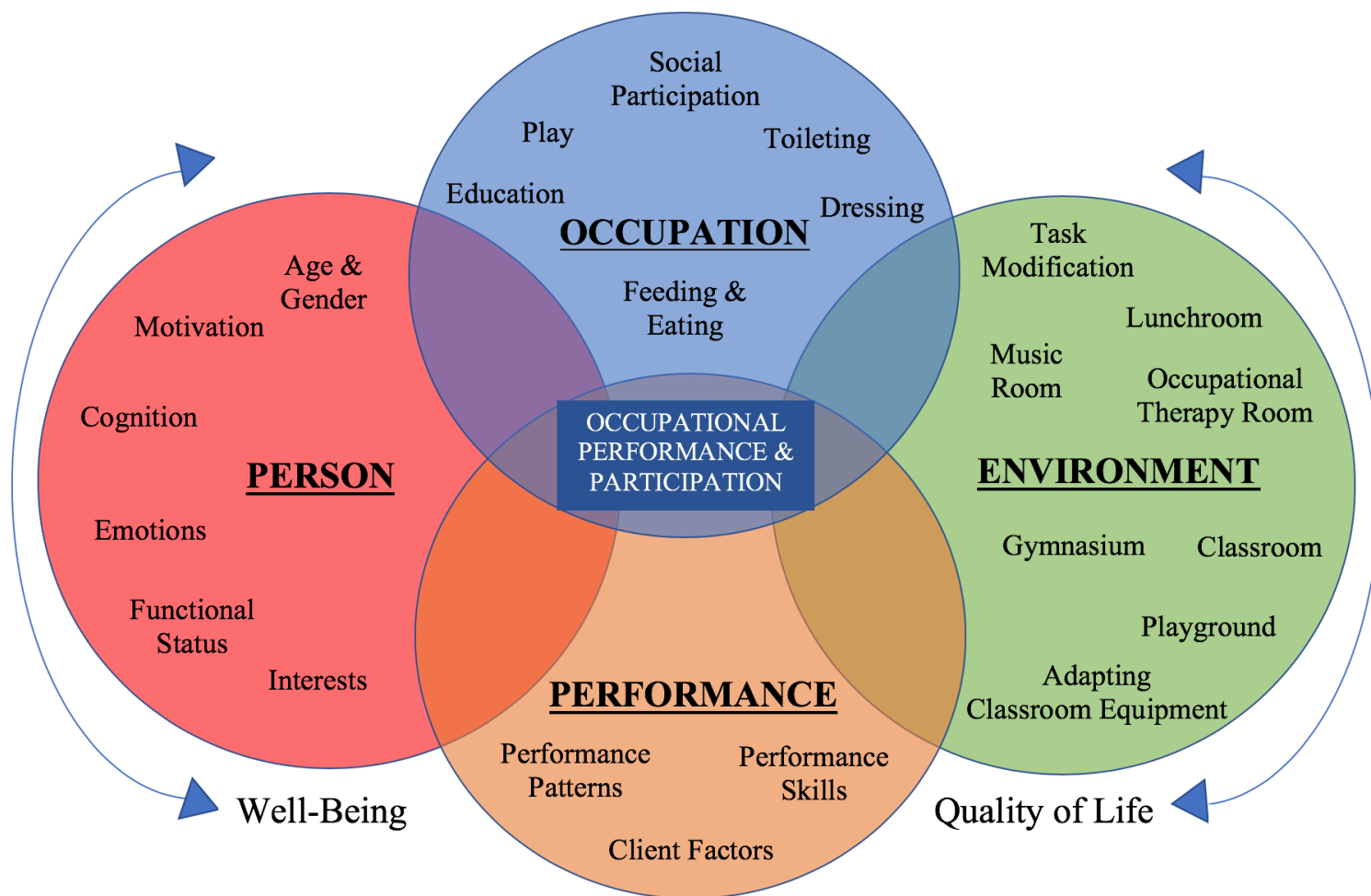
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Appendix A

PEOP Model and Corresponding School-Based Components of Students and How They Relate to Occupational Performance and Participation



Note. Adapted from “The Person-Environment-Occupational Performance (PEOP) model. In E. Duncan (Ed.), *Foundations for practice in occupational therapy*,” C. Christiansen, C. Baum, & J. Bass, 2011, *Foundations for practice in occupational therapy*, p. 93-104. Copyright 2011 by Churchill Livingstone. The definitions for each component were related to this DCE project and specific descriptions were placed within each circle to provide an easy reference to show the interrelationship between the person, environment, occupation, and overall performance.

Appendix B
OT-Based Activities in Classroom A

Week/Day		Activity Focus	Activity	Materials Needed
Week 1 Feb 4 to Feb 8	Day 1	In-hand manipulation	Hungry man: handful of beads, place one at a time	Tennis ball with 1.5" slit, decorative beads (10 per ball)
	Day 2	Fine motor strengthening	Hole Punching & Decorating Mittens	Hole punch, colored construction paper (green, red, blue, pink, purple, orange), 43 copies of page number 1
	Day 3	Shoulder Strengthening	Prone Play: Pattern Block Building	Block pattern cards, pattern blocks (foam blocks or cut out), laminated copies from page number 2 & 3
	Day 4	Bilateral coordination	Stringing Sight Words	Pipe cleaners, letter beads, cards with sight words, tongs (incorporated fine motor strengthening too)
	Day 5	Visual-motor/visual perceptual	Mazes and Hidden Pictures	dry-erase markers, 6 laminated copies of page number 4 and 5
Week 2 Feb 11 to Feb 15	Day 6	Bilateral coordination	I Love You to Pieces	Scissors, construction paper, glue sticks, hole punch (incorporate fine motor strengthening), 43 copies of page number 6
	Day 7	Shoulder Strengthening	Prone Play: Valentine's Day Roll and Cover with numbers	Paper Dice in plastic jar, 6 copies of page number 7
	Day 8	Visual-motor/visual perceptual	Valentine's Day Maze & Hidden Pictures	Dry-erase markers, 3 laminated copies of page number 8 , 6 laminated copies of page number 9 , 6 laminated copies of page number 10
	Day 9	In-hand manipulation	Do-a-Dot Heart page with letters	Red/Yellow foam circles, 6 laminated copies of page number 11

	Day 10	Fine motor strengthening	Sight Word BINGO	BINGO cards, tongs, beads, original copy on page number 12
Week 3 Feb 18 to Feb 22	Day 11	President's Day: NO SCHOOL		
	Day 12	Bilateral coordination	Linking Letters to Make Words	Laminated alphabet cards, links, original copy of letter cards on page number 13 and 14
	Day 13	Visual motor/visual perceptual	Letter Construction	Letter construction game (room 72)
	Day 14	Fine motor strengthening	Don't Spill the Beans with letter beads and tongs	Large tweezers, letter beads, Don't Spill the Beans game, sight word cards
	Day 15	In-hand manipulation	Gumball machine: Sight Words (colors)	6 copies of page number 15 , decorative glass beads or pom-poms, paper dice with colors written on it
Week 4 Feb 25 to March 1	Day 16	Visual-motor/visual perceptual	Color-by-number: reading colors	4-6 copies of page number 26, page number 27, page number 28
	Day 17	Bilateral coordination	Stringing Sight Words	Pipe cleaners, letter beads, cards with sight words
	Day 18	Shoulder Strengthening	Prone Play: Pattern Block Building	Block pattern cards, pattern blocks
	Day 19	Fine motor strengthening	Hungry Man (tennis ball)	Tennis ball, decorative glass beads
	Day 20	NO CENTERS DUE TO SUBSTITUTE TEACHER		

Week 5 March 4 to March 8	Day 21	Bilateral coordination	Linking Letters to Make Words	Laminated alphabet cards, links, original copy of letter cards page number 13 & 14
	Day 22	Visual-motor/visual perceptual No Formal Centers d/t substitute teacher	Cat in the Hat with paint daubers (students pulled during free time to complete on Tuesday/Thursday)	21 copies of page number #, red and blue paint daubers
	Day 23	Fine motor strengthening	Don't Spill the Beans with letter beads and tongs	Large tweezers, letter beads, Don't Spill the Beans game
	Day 24	Visual-motor/visual perceptual No Formal Centers d/t substitute teacher	Cat in the Hat with paint daubers (students pulled during free time to complete on Tuesday/Thursday)	21 copies of page number #, red and blue paint daubers
	Day 25	NO CENTERS DUE TO SNOW DAY		
Week 6 March 11 to March 15	Day 26	Visual-motor/visual perceptual	St. Patrick's Day Color-by-number: sight word COLORS St. Patrick's Day I-Spy	Pencils, dry-erase markers, 7 copies of page number 18 , 7 copies of page number 19 , 7 copies of page number 20, 6 laminated copies of page number 21
	Day 27	Fine motor strengthening	St. Patrick's Day Pokey Play	Push pin, foam mat, green construction paper, 21 copies of page number 20
	Day 28	In-hand manipulation	Manipulating coins into pot with number dice (only 2 groups d/t sub)	Fake coins, container, print out of leprechaun, paper number dice
	Day 29	In-hand manipulation	Manipulating coins into pot with number dice (two different groups)	Tennis ball, decorative glass beads, sight word cards
	Day 30	Shoulder Strengthening	Prone Play: Lucky Shamrock: Roll & Color Pot of Gold:	Paper dice in plastic jar, crayons/markers, 43 copies of page number 22

Week 7 March 18 to March 22	Day 31	Shoulder Strengthening	Coloring Under Table: Spelling sight words	Large pieces of paper, tape, crayons
	Day 32	Bilateral coordination	Spring Lacing Cards	Lacing card template, hole punch, yarn, tape (optional for end of yarn)
	Day 33	Fine motor strengthening	Hungry Man	BINGO cards, tongs, beads
	Day 34	Visual-motor/visual perceptual	Letters on Geoboard	Geoboards, rubber bands
	Day 35	In-hand manipulation	Shape Links: wiggle around linking together	Manipulative Kit: shape links in room 72

Appendix C
OT-Based Activities in Classroom B

Week/Day		Activity Focus	Activity	Materials Needed
Week 1	Day 1	In-Hand Manipulation	Hungry man: handful of beads, place one at a time	Tennis ball with 1.5" slit, decorative beads (10 per ball)
	Day 2	Fine Motor Strengthening	Hole Punching & Decorating Mittens	Hole punch, colored construction paper (green, red, blue, pink, purple, orange), 43 copies of page number 1
	Day 3	Shoulder Strengthening	Prone Play: Pattern Block Building	Block pattern cards, pattern blocks (foam blocks or cut out), laminated copies from page number 2 & 3
	Day 4	Bilateral Coordination	Stringing Sight Words	Pipe cleaners, letter beads, cards with sight words, tongs (incorporated fine motor strengthening too)
	Day 5	Visual motor/visual Motor	Mazes and Hidden Pictures	dry-erase markers, 6 laminated copies of page number 4 and 5
Week 2 Feb 11 to Feb 15	Day 6	Bilateral Coordination	I Love You to Pieces	Scissors, construction paper, glue sticks, hole punch (incorporate fine motor strengthening), 43 copies of page number 6
	Day 7			
	Day 8	In-hand manipulation	Valentine's Day Roll and Cover	Paper Dice in plastic jar, 6 copies of page number 7
	Day 9			
	Day 10	Shoulder Strengthening	Do-A-Dot Heart page with letters	Red/Yellow foam circles, 6 laminated copies of page number 11

Week 3 Feb 18 to Feb 22	Day 11	President's Day: NO SCHOOL		
	Day 12	Bilateral Coordination	Linking Letters to Make Words	Laminated alphabet cards, links, original copy of letter cards on page number 13 and 14
	Day 13	NO CENTERS DUE TO 2-HOUR DELAY		
	Day 14	Bilateral Coordination	Linking Letters to Make Words	Laminated alphabet cards, links, original copy of letter cards on page number 13 and 14
	Day 15	Fine motor strengthening	Don't Spill the Beans with letter beads and tongs	Large tweezers, letter beads, Don't Spill the Beans game, sight word cards
Week 4 Feb 25 to March 1	Day 16	Visual Motor/visual Perceptual	Color-by-number: reading colors	4-6 copies of page number 26 , page number 27 , page number 28
	Day 17			
	Day 18	Shoulder Strengthening	Prone Play: Gumball machine with Sight Words (colors)	6 laminated copies of page number #, decorative glass beads, dice with colors written on it
	Day 19			
	Day 20	Fine Motor Strengthening	Sight Word BINGO	BINGO cards, tongs, beads, original copy on page number 12

Week 5 March 4 to March 8	Day 21	Bilateral coordination	Linking Letters to Make Words	Laminated alphabet cards, links, original copy of letter cards on page number 13 and 14
	Day 22			
	Day 23	Fine Motor Strengthening	Don't Spill the Beans with letter beads and tongs	Large tweezers, letter beads, Don't Spill the Beans game, sight word cards
	Day 24			
	Day 25	NO CENTERS DUE TO SNOW DAY		
Week 6 March 11 to March 15	Day 26	Visual Motor/Visual Perceptual	St. Patrick's Day Pokey Play	Push pin, foam mat, green construction paper, 21 copies of page number 20
	Day 27	Fine motor strengthening		
	Day 28	In-Hand Manipulation	Manipulating coins into pot with number dice	Fake coins, container, print out of leprechaun; paper number dice
	Day 29			
	Day 30	Shoulder Strengthening	Prone Play: Lucky Shamrock: Roll & Color	Paper dice in plastic jar, crayons/markers, 43 copies of page number 22

Week 7 March 18 to March 22	Day 31	Shoulder Strengthening	Coloring Under Table: Spelling Sight Words	Large pieces of paper, tape, crayons
	Day 32			
	Day 33	Bilateral Coordination	Spring Lacing Cards	Lacing card template, hole punch, yarn, tape (optional for end of yarn)
	Day 34			
	Day 35	Visual- motor/visual perceptual	Letters on Geoboard	Geoboards, rubber bands