

**What the Sandpaper Letters Taught me**

By

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A Master's Paper Submitted in Partial Fulfillment of  
The Requirements for the Degree of  
Master of Science in Education-Montessori

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June 11, 2021

University of Wisconsin – River Falls

2021

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### **Acknowledgements**

I would like to acknowledge the support and guidance that has been given to me throughout this action research project. Starting with Dr. Kateri Carver, who has spent hours helping me narrow a plan for my research and showing me patience, support, and guidance. Thank you for all the one-on-one meetings, the articles, and the knowledge that you shared. Next, I would like to thank all the faculty at University of Wisconsin who have helped me in my journey to achieve my Masters. I also want to say a special thanks to my family, especially my husband and parents who have helped support my academic goals and to help at home when I was in class or doing research. Thank you to my employer who has made this goal a reality and given me the opportunity to grow my career.

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### **Abstract**

The purpose of this study was to implement both intensive, oral phonological activities and motor activities to help children who are not retaining sound/letter associations using the Sandpaper Letters. This study took place at a private Montessori school in an upper Midwest state. The researcher worked with 14 students in a Children's House Montessori classroom who showed low sound/letter recognition through a preliminary assessment instrument. Qualitative data was collected using observations and reflections from the lead Montessori teacher. Quantitative data from the use of intervention tools were recorded using frequency charts. Children were assessed at the beginning of the study, biweekly and at the end of the study to record the progress of letter/sound knowledge. The children participated in intensive, oral phonological activities in a small group setting for approximately 7-10 minutes and with a frequency of up to four days a week. It is the researcher's opinion that the positive outcomes are largely attributable to the small group intervention. Motor activities were added to the classroom such as a standing chalk board, sand tray and a Multisensory Instruction Memory Board. Results from the assessment tool showed a distinct increase in sound/ letter recognition (an average increase of 40%). The efficacy of the other tools appears to be harder to identify except for the standing chalkboard, which was very popular with the children. Finally, the action research project proved to be a formative process for the researcher as they realized the power of phonemic awareness games and oral language lessons as preparation for learning letters/symbols.

*Key Words: Montessori, Phonemic Awareness, Sandpaper Letters, Letter/Sound Recognition, Small Group Lessons, Standing Chalk Board, Sand Tray, Multisensory Instruction Memory Board*

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### **Introduction**

Literacy has been something that I have struggled with my whole life and because of these challenges, I have chosen to do my action research project on this topic. When I was in 3<sup>rd</sup> grade, I was diagnosed with Dyslexia and that diagnosis changed my life forever. Reading and writing do not come easily for me and while this is a lifelong challenge, it has also brought with it the benefit of being sensitive and aware of the literacy process among my students.

I have noticed throughout my teaching practicum year that I am able to see when my students are struggling with literacy. After much time trying to figure out why this was happening, I designed a research project about the Sandpaper Letters. These materials represented for me, the keys to literacy since they are the sounds after all, of our language. I had noted that the students were not making connection between the symbol and the sound of the Sandpaper Letters. Something is not right, I thought. I had learned that the Sandpaper Letters are a multi-sensory way to learn the sound-symbol association, yet my students were not learning. I found myself asking “What happens when the Sandpaper Letters are not working?”

My action research project taught me much more than successful literacy-related interventions. It was not until about halfway through my research project that I realized the real problem; my understanding needed shifting. Over and above learning about how to conduct research and how to write a master’s research paper with a learning disability, my research project taught me about gaps in my understanding of the Montessori materials, particularly the Sandpaper Letters. I was expecting them to be as we say, “didactic materials” and therefore, to “work” and that the child, through auto-education would learn from them. But my students were not learning their letter sounds and not advancing in their literacy. I was concerned; hence, my question as to why they were “not working.”

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While the interventions I implemented were actually very successful from a research study point of view, my instructional insights began to become more important to me as I continued and completed my project. My students were not “teaching themselves” (auto-education) to read because unlike Dyslexia, Hyperlexia is rare. Rather, I needed to be very involved in their literacy learning process, do lots of small group and individual lessons on phonemic awareness and most importantly, laugh, play games, and have fun learning to read! The “new teacher” was me.

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### Literature Review

#### Reading and literacy as a life skill

Literacy is a foundational skill because it impacts a person for the rest of their life. The well-known podcasts and documentaries on literacy by Emily Hanford provide a clear backdrop for these issues in today's world. In *What the words say: Why so many kids don't understand what they read*, Hanford vividly paints for her listeners case studies that demonstrate that reading outcomes really are a predictor of success in life. "Reading is essential—not just for school success, but for life. When children have trouble learning to read, it can kick off a devastating downward spiral" (Hanford, 2020, para, 13). In fact, in her podcast, for which she gathered information through interviews and visits to juvenile detention centers, Hanford learned that there is a direct correlation between juvenile incarceration rates and their reading level. For example, in one interview a male juvenile detainee remarks that he never knew that the letters 'ph' make the /f/ sound. He had gone through school not ever learning what letters or combinations of letters make which sounds. In fact, at the time of the recording, he barely knew how to read as a teenager.

It is not just teenagers in detention centers that have poor literacy skills and whose life has been severely impacted. Teenage illiteracy was identified by as a national crisis in a 2002 Carnegie Challenge paper which explains that the "leap" from *learning to read* and *reading to learn* was not happening in this country. And more concerning, the paper cites a study by the Organization for Economic Cooperation and Development that names the gap between America's best and worst readers as wider than any other country in their study, which included Mexico, Russia, Latvia, and Brazil (de León, 2002, 2-3). Further complicating our national

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literacy issues is not just the controversial vocabulary deficit<sup>1</sup> between socio-economic strata, but also the double irony of a literacy-at-risk child whose parents struggle with literacy too, and do not have skills needed to both get their child the services they need and learn what typical development looks like. In their article, “Early Identification and Connection to Services Among Urban Parents Who Have Low Income and Low-Literacy skills” Gallagher et al. (2019) found through their research rooted in focus groups that public agencies need to utilize easy to read printed materials. “Parents tended to interpret words and images too literally, creating misunderstanding of the purpose of the materials. We concluded that most of the materials evaluated in the study required modifications to be useful for this audience.” Therefore, we can see that low literacy not only impacts a person’s life but can be self-perpetuating within families and communities. Ironically, low literacy impacts the ability to get literacy services for children.

Research on literacy has shown that we have a national problem that spans all ages of schooling. Identifying reading issues can be avoided or ignored during schooling and therefore, children get passed on to the next grade or into life without functional literacy skills; and these gaps become generationally entrenched. These situations do, however, share the theme that early identification of literacy problems can make a great difference.

### **Early intervention for literacy skills**

Teachers in PreK and Kindergarten classrooms are critical in identifying early literacy concerns. These teachers play a vital role because it is universally accepted among child

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<sup>1</sup> 30,000,000 word vocabulary deficit identified by the Hart and Risley study in the 1960s –

<https://www.npr.org/sections/ed/2018/06/01/615188051/lets-stop-talking-about-the-30-million-word-gap>

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development specialists that language development during early childhood is like no other period. Between birth and age five, there is broad and extensive language development in the areas of vocabulary, pronunciation, speech and two-way spoken communication and finally oral language.

During the second and third years of life, the ability to not only perceive but actually produce native speech sounds increases significantly, so that by the age of 4-5 years phoneme repertory development doubles, and in the range of 6-to-8 years the typical child's phonological repertoire is complete, regardless of her/his phonological language system. (Rosselli, Ardeila, Matute, Velez-Urive, 2014, p. 3)

During this early phase of language development, we can clearly see the two main components of language: receptive language and expressive language. Receptive language relates to the development of the comprehension of language and expressive language relates to the development of spoken language. Brain research shows that the newborn's brain starts to grow immediately as can be seen in the marked increase in dendrite arbors by age two (Rosselli et al., p. 4). Pujol et al. "suggest simultaneous maturation of the temporofrontal language network, since both comprehension and production regions showed very similar myelination during the first three years of life" (cited by Roselli et al. p. 4). Their research demonstrates that both of these aspects of language need to be nurtured for speaking, reading, and writing skills to develop and to reach their full potential. In other words, the exposure to language in context and opportunities to engage linguistically create the foundation for all subsequent literacy skills.

When the foundation is not there, problems arise. The National Public Media Literacy Initiative, *Reading Rockets* hosts a website where we read that the early detection of literacy challenges is the key:

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Treating communication and language difficulties early on can prevent potential problems with behavior, learning, reading and social interaction. Recent research on brain development reminds us that “earlier IS better” when teaching young children. By age 3, most of the major brain structures are mature, and it becomes more difficult to make significant changes in a child’s growth and development. (2019, para. 2)

Playing sound games with toddlers really do make a difference in laying the foundation for later literacy work. If sufficient groundwork is not laid, it is possible that Sandpaper Letter lessons would fall on “deaf ears.” The child is simply not “cued up” and ready to hear sounds and associate visual symbols.

Literacy is the foundation of reading, writing, and communication. Children with strong reading and writing skills perform better in school and become lifelong learners. To begin to read and write children need to learn phonological awareness - understanding that speech streams consist of sounds --specifically phonemes, the smallest unit of sound that make a difference in communication (Yopp, 2000, p. 130). When children are aware of this, they can isolate individual sounds and recognize their impact on meaning then the important foundation of productive phonemic awareness - the most complex phase of phonological awareness - is happening. “We know that a student's skill in phonological awareness is a good predictor of later reading success or difficulty” (Reading Rockets, 2020, para. 1).

It is now widely accepted that there is a close relationship between learning to read and children’s phonological skills (Hulme, Bowyer-Crane, Carroll, Duff, Snowling, 2012, p. 573). Research has shown that phonemic awareness is a crucial role in the success of reading and writing. And success in literacy skills prepares for reading at grade level which is itself also a predictor of school success. “If children are not reading at grade level, they are less likely to be

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successful in school, less likely to graduate on time, more likely to engage in risky behavior” (Percy, 2019, p. 1).

### **Small group interventions**

Small group interventions can be highly effective especially in an early childhood classroom. Groups with more than five children, especially with three-, four-, and five-year-olds, do not allow for individualized instruction (Wasik, 2008, p. 516). Research shows that a group size of four to five children seems to be the optimal size for an early childhood classroom. In addition to more customized instruction, Wasik cites Morrow and Smith’s (1990) research that clearly showed that children learned more vocabulary words and comprehended the story better when the reading was done in small compared to large groups and to one-to-one instruction (2008, p. 518). Further support of the potency of small group instruction includes Weiss’ work who concluded that small groups have the advantage of developing students’ learning-related behaviors such as attending to tasks, following directions, persisting with challenging tasks, and working independently (2013, pp. 294-295).

### **Embodied Cognition**

In their article from “Movement to Thought: Executive Function, Embodied Cognition, and the Cerebellum,” the authors challenge several contemporary understandings and uses of terms such as executive function, embodied cognition and even, cognition. They also criticize the common neuroscientific divisions of behaviors into categories such as cognitive, attentive/ executive, language, visuospatial, learning and memory and sensory and motor domains (Koziol, Budding, Chidekel, 2012, p. 1). Rather, they suggest a more integrated view of the brain, taking into consideration various subcortical areas, which together show that sensorimotor interaction

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supports procedural and semantic knowledge<sup>2</sup> (p. 507). Finally, they argue to disprove the classic triple “perception-cognition-action” model of learning and move toward a more comprehensive understanding of embodied cognition as a means to explain learning. They propose a deeper aspect of mirror neuron circuitry which theorizes that observation and mental rehearsal are tantamount to doing the activity. They rather believe that the interaction between procedural knowledge and semantic knowledge is grounded in sensorimotor anticipation. In other words, that while watching an action being done before it is executed contributes to its learning and processing as efficiently as actually doing it, but they also believe the anticipation of executing an activity is related to developing the related language; the words, vocabulary and meanings associated with the procedure.

Koziol et al. remind us, “We were not born to think. We were born to move. Human creative ideas are nothing in the absence of manual dexterity that allows tools to be made, complex architecture to be constructed, art to be create and instruments to be played” (p. 515). They posit that the motor system allows cognition to evolve and the reverse as well - that abnormalities in motor development generate developmental disorders. For our purposes for this research, the salient information of their study is that motor development at best dictates or, at worse parallels cognition. Instead of serial processing, we need to think of learning as having integrated and parallel systems at work. And, though their research only refers the use of tools (a child learning to use a spoon and fork), we can expand their conclusions to include writing implements such as a standing chalkboard as this research project used. “Movement and cognition coexist” (Koziol et al., 516).

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<sup>2</sup> The authors propose the following definitions: procedural ( skills) knowledge versus declarative (semantic) knowledge

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### **Montessori and Literacy**

The notion of the Absorbent Mind has informed early childhood education curricula and instruction for over a century and across several continents. In fact, the phenomenon of the Absorbent Mind has been confirmed by contemporary neuroscience; we now know the critical value in child development from birth to six – a period that Dr. Maria Montessori identified without 21<sup>st</sup> century technology. Today, we refer to these as “windows of opportunity.” Montessori referred to these as “Sensitive Periods” after the Dutch scientist deVries. These are moments when children have the opportunity to acquire specific skills easily and effortlessly. The Sensitive Period for language development is identified by Montessori as the preeminent example of the Absorbent Mind, and which also thematically dominates the work of the same title.

Montessori uses language development as the example to prove her point of absorption, “the child takes in information from the surrounding world and uses it to create the specific human capacity for spoken language” (Helfrich, 2011, p. 87). However, this nearly magical ability to absorb from the environment comes as both ‘a blessing and a curse’ as Lillard reminds us, “the child soaks in like a sponge whatever is there: good, or bad, beautiful, or ugly, peaceful, or violent” (1996, p. 26). The growing mind is at work watching and learning in a Children’s House classroom. We often see the child who is learning by observing the lessons; “taking it in” by observing others and wandering about.

Montessori described the Absorbent Mind as having two distinct stages: the unconscious and the conscious. During the first stage, birth to about age three, the child absorbs information unconsciously or unknowingly *and* indiscriminately. Throughout the second stage, which spans

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the period from three to six years old, children consciously interact with their environment, expanding on their previous learning and preparing for their future development.

When planning for the development of early literacy skills, we need to keep in mind the role of the conscious Absorbent Mind as the child learns letter sounds, identifies the corresponding symbols, and ultimately blends letter sounds to read a word. In other words, multiple types of activities in oral language development, as well as visual and auditory discrimination skills contribute to preparing the child to read from birth to elementary school. In fact, when a child learns to read at an early age, they have a greater general knowledge, increased naming vocabulary and better understanding of complex sentence structures, which are all predictors of future reading levels (Committee on the Prevention of Reading Difficulties in Young children, 1998, p. 109-112).

Unlike learning spoken language, reading, and writing need to be taught. And this process takes a significant amount of time and effort as shown by French neuroscientist, Dr. S. Dehaene especially when comparing English and other languages.<sup>3</sup> He cites research that shows that English for example, takes twice as long to acquire due to its irregularities than another language, such as Italian (How the Brain Learns to Read, 32:09).

Reading is the product of decoding and comprehension (Gough et al. 1993). Although this sounds simple, learning to read is much more difficult than people think. To learn to decode and read printed English, children must be aware that spoken words are composed of individual sound parts termed phonemes. This is what is referred to and meant by *phoneme awareness*.

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<sup>3</sup> Maryanne Wolf's life's research and book, *Proust and the Squid: The Story and Science of the Reading Brain* also supports the theory that learning to read is neither intuitive nor an obvious, straightforward brain function.

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<http://www.ascd.org/publications/educational-leadership/mar98/vol55/num06/Why-Reading-Is-Not-a-Natural-Process.aspx>

When considering Montessori education and the didactic materials and method for teaching reading, Lillard (1972) reminds us that, “Because of Montessori’s infinite trust in the child’s powers to teach himself, she did not devise a method for ‘teaching reading. Nor did she think it wise to decide upon a particular time when children should begin to read” (p. 122). While Montessori’s trust in the child to teach himself is truly methodologically powerful, Lillard’s mention of it does not seem to be a good enough rationale for Montessori not to create a method for teaching reading. Rather, I suspect Montessori’s avoidance of a prescribed language method was due to her full understanding of the diversity and complexity of languages. She herself was well versed in Latin, French and Spanish. She likely knew well that her own Italian is a highly phonetic language with only 21 letters and 32 sounds as compared to, for example English with 26 letters, 44 phonemes and 250 graphemes! While Montessori’s students may have taught themselves to read, most children in the United States with English as their first or second language do not spontaneously start reading like the Italian children we read about in her writings (Carver, personal communication, April 19, 2021).

As my title indicates and as I mentioned in my introduction, this research project provided me many insights. The first, my students were not ever going to be like those Italian children who more or less taught themselves to read. Yet, my students were demonstrating normalization, concentration, independence like the Italian children I read about. And, whether due to trust in the child, the variability of the world’s graph-phonetic language systems or other reasons, there is no single Montessori language curriculum and only a few language materials in the early childhood classroom as compared to those, for example, of the Math and Sensorial

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curricula. As mentioned above, we do not know if this is by design or not. We do know, however, that well before 1907, Maria Montessori traveled to Paris to read and translate from French into Italian the works of Dr. Gaspard Itard and his mentee, Dr. Edouard Séguin. There or during these early years, Montessori came to know both the Moveable Alphabet that Itard created to use with his student, the “wild child” and the matching pairs materials of the Sensorial area (Helfrich, 2011, p. 6).

One of Montessori’s great contributions was the integration of multi-sensory materials into the typically developing child’s learning process. Montessori explains her own learning process in her writings: she would apply what she has learned to be successful with the children in the Orthophrenic school to the new group of children. These children from San Lorenzo quarter of Rome were from low income families but otherwise typically developing children. As we know from events only a few years after opening in 1907 in San Lorenzo, such as the “glass classroom” in San Francisco (Panama Pacific International Expo of 1915) and the thousands of Montessori schools that have sprung up throughout the world since then, her multi-sensory approach contributed to the success of the method.

In the area of language, the Sandpaper Letters are a multi-sensory material par excellence. They are designed to teach children the *symbol* (of the sound) through visual and tactual modalities. “Indeed, it commonly happens that a child at this age who cannot recall the phonemic sounds of a letter by looking at it, will at once remember if he runs the tips of his fingers over it, touch conveying more to him than sight” (Standing, 1998, p. 137). The visual and tactile sensory systems as well as the motor system are activated when tracing Sandpaper Letters; “feeling the sound” beneath their fingers, hearing the sound, and seeing the symbol all help the child remember the association of the letter and its phoneme.

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Handwriting is typically taught as a separate skill in the Montessori approach to literacy. This is so that developing motor skills will not impede the encoding process which is carried out in Children's House and lower elementary Montessori classrooms with the Moveable Alphabet and not by writing letters / words with a pencil on paper. In Montessori circles, this encoding activity is often referred to as "building words" (since the child places one letter a time) instead of "writing words." We hear requests such as, "can you build the word, cat?" by the Montessori teacher. However, while the children practice building words over many months, they also need to practice and prepare for actually writing- handwriting. There comes a time when the child wants to write down on paper the words that they built with the Moveable Alphabet and make a booklet to take home and read. To prepare for *this* writing, the Montessori language curriculum offers the Metal Insets.

The Metal Insets consist of a set of ten geometric shapes, and each consists of two components: the square metal frame which is traditionally pink and the metal inset which is traditionally blue and with a centered knob for picking it up. The child uses the frame to trace the shape outline and this provides practice and preparation for writing. After some time and experience, the children can trace the circumferences and outer edges of all the insets thereby also practicing and preparing for writing. The students are attracted to the Metal Insets because of their beauty, the artistic character and because tracing ensures success in reproducing the shape as opposed to free hand. The children will be able to trace the edge of the frame and make a perfect circle which is very rewarding for a child. Thus, they return to this work over and over.

Lillard explains the power of practice with this material, "The Metal Insets complete the possibility for an explosion into writing, for the child now knows letters, can compose words and sentences, and has the necessary control of his hand movements" (1972, pp. 130-131). For many

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children, the development of the hand and motor activities, such as Metal Inset work parallel their phonemic awareness progress and we often see the latter outpacing the former. For example, they can carefully build a word with the Moveable Alphabet but they cannot legibly write that same word on a piece of paper. Their motor skills simply take a long time to develop. However, children who have delays in language development - either formally diagnosed or observed by the teacher – benefit from the integration of motor activities as a means to solidify phonemic awareness. In this scenario, there is often parallel development in writing (forming) the letter and learning its sound. In fact, for this child, the act of writing the symbol as a motor movement helps them associate the sound with the symbol. Handwriting practice thus, becomes an instrument to teach sounds instead of just a fine motor skill to improve letter formation. This is multi-sensory education to the fullest.

We see handwriting in multiples areas of the Early Childhood classroom because, as a motor skill, the only way to improve is to repeat the activity. Common materials found in Montessori classrooms to support handwriting skills include the sand tray and portable chalk boards. When children in three to six classrooms demonstrate difficulties in making the sound/symbol association, we often introduce writing at the same time to help support them.<sup>4</sup> Therefore, we rely on the motor and sensory systems to develop phonological awareness. As we will see on the discussion below of my study, I relied on writing in a standing position to help teach letter sounds.

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<sup>4</sup> This simultaneous presentation of writing the letter, hearing the sound and motor activity is typical of Multi-Sensory education literacy programs such as Orton-Gillingham, SEE, Wilson and Zoo-Phonics.

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### **Research Question**

One of the traditional Montessori language materials presented in a 3-6 classroom is Sandpaper Letters which are used to teach sound/ symbol association. However, when children are not helping themselves to the materials on the language shelf, or are only sporadically tracing the Sandpaper Letters, the children are not getting the literacy foundation that research has established is critical to both developing age-appropriate reading skills and their overall success in life as literate adult.

I noticed that when Sandpaper Letter lessons were given to children over an extended period of time and when the child was not doing other language activities, they were not developing the early phonemic awareness skills that they need to be on target for Kindergarten and first grade reading levels.

My research question involves a deductive approach to phonemic awareness delays: would an intervention that involved small group intensive phonological awareness lessons and the use of three motor activities increase retention of sound/symbol association, which was not being learned with the occasional Sandpaper Letter lessons. Would regular, small group lessons using direct teaching of phonemic awareness increase their knowledge of letters sounds? Would these activities pick up where the Sandpaper Letters were not working in my Montessori classroom?

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### Research Study

#### Purpose

Over the year and a half that I have been working in a Children's House, have regularly observed children in my classroom struggle to accurately associate the letter sound with its symbol despite repeated presentations of the Sandpaper Letters. To verify my initial concerns, I observed students in the other classrooms in my school which confirmed that, as I thought my students were not reaching their potential in reading and writing because of these struggles.

I believe the difference in the various classrooms was due to the level of experience of the Montessori teacher and their ability to discern and act on literacy concerns right away. One teacher has been teaching for more than six years in the same Montessori classroom. She is very addiment about working with children on the Sandpaper Letters as well as encouraging the children to be mindful of using the language materials every day and the extensions she had prepared. Since I was still learning and trying to focus on several aspects of the classroom, I did not give one area more attention but rather was trying to give all areas equal attention. I became curious to discover what I could do to support my students' literacy development and thus, decided to make it into my action research project.

This study was created to determine if children can learn their letter sounds by implementing a routine of intensive small group phonemic lesson along with additional multi-sensory materials on the language shelf. My research was designed to assess the increase in literacy knowledge, particularly their letter symbols and sounds the children in an early childhood Montessori setting could attain by integrating both intensive oral phonemic activities and motor activities. My hypothesis was that this additional support would increase sound – symbol association retention in a fun, interactive way.

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### Location and Participants

I conducted this research in my own Children’s House preschool classroom, which is located at a private Montessori school situated about 20 miles west of a major metropolitan Midwestern city. The school population of about 200 children is spread across four Children’s House classrooms, a transition classroom (24 months to 33 months), a young toddlers/ older infants' classroom (12 months to 24 months) and finally, an infant classroom.

This study took place in Children’s House Two, which is licensed for thirty students with one lead teacher, one assistant teacher and one aide. There are 29 children whose ages range from two and a half to five years old as seen in Table 1. There are seventeen boys and twelve girls of which nine are part time students and therefore, there were never more than 29 children participating in this study per day.

**Table 1**

*Number of Children in Children  
House Two Per Age Group*

| Age (in years) | Number of Children |
|----------------|--------------------|
| 2.5            | 3                  |
| 3              | 9                  |
| 4              | 13                 |
| 5              | 4                  |

A letter of consent was sent home to parents that informed them of the study and any risks involved (Appendix B). Based on the return rate of the informed consent, I performed an initial assessment to determine which students would benefit from the additional phonemic awareness support and thus become the candidates in the study. For the initial assessment, I chose ten symbols / letters even though this is a fairly high number to expect neurotypical three- or four-year-olds to have mastered. This choice was driven by the fact that I knew that our intensive lessons were going to be mixed age in small groups and I did not want to draw

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attention to the older children who were still learning their symbols. Of the 26 assessments given, 14 students were unable to identify the sounds of the ten different symbols by looking at the Sandpaper Letters and therefore, became my study population. These children have been introduced to the Sandpaper Letters before the study. I focused on these children and conducted my research during the morning work cycle, which spans a two-hour period. My choice population included a balance between boys and girls as well as a balance of ages as seen in Table 2.

**Table 2**

*Number of Children in the Study Per  
Age Group*

| Age (in years) | Number of Children in Class |
|----------------|-----------------------------|
| 2.5            | 3                           |
| 3              | 6                           |
| 4              | 4                           |
| 5              | 1                           |

### Methodology

My methodology might appear not to reflect the Montessori adage, “Follow the child.” Further, it may look as though a child’s Sensitive Periods were not considered as a guide for instruction or for the design of the study. On the contrary, my experience and time with these children which has been for some of them up to two years, directed me to pay closer attention to their abilities in sound/ symbol association. All of my students are in the general period for absorbing language due to their age however, my study did not take into account students’ specific Sensitive Periods related to writing, word building, and new vocabulary. I wanted to take advantage of their collective ability to absorb oral language and for it to be an equalizer among them.

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Most of these children had been previously introduced to sounds games for several months prior to the start of the research though this was not formally documented in the study. We had done numerous sounds games as a large group such as, finding objects in the classroom that start with /m/. It is worth noting that I did, however, have one new student who started in my class a month before the study began and who had had no introduction to phonemic awareness as far as I could tell. In retrospect, I should have used baseline data on phonemic awareness and identification (isolation of phonemes) without looking at the Sandpaper Letters. Finally, I did not take into consideration the history and background of the students' language development (speech; early/late talker, when they started speaking in sentences, or history of ear infections, premature birth etc.) which, as we know from the research on early intervention impacts literacy development.

Over the course of six weeks, I introduced ten different Sandpaper Letters and new works that would be helpful for the participants to use as seen in Table 3. At the beginning of the study, I assessed each child individually to get a baseline of their sound-symbol association knowledge (Appendix C). Also, throughout the six weeks, I did small group intensive lessons, which did not exceed four children at a time, on phonemic awareness at least four times a week (Appendix D). This group size was chosen based on research discussed above which identified four to five children as an optimal group size for small group instruction in preschool settings.

Throughout the study, I grouped the letters by weeks, used existing and new study tools (shelf works), conducted small group intensives, and employed several instruments to measure the outcomes as seen in Table 3.

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**Table 3***Research Design*

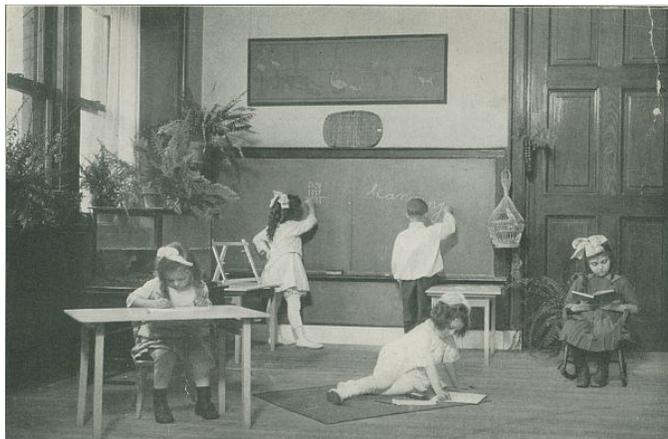
| Week | Letters Introduced | Existing Tools   | Tools Being Introduced | Small Group Lessons            | Study Instruments  |
|------|--------------------|--|------------------------|--------------------------------|--|
| 1    | a                  | Sandpaper Letters<br>Rainbow Letters<br>Crayon Rubbing<br>Letter | Wall Chalk Board       | Phonological Awareness Lessons | Letter Assessment<br>Frequency Chart<br>Small Group<br>Reflection<br>Observation |
|      | m                  |  |                        |                                |  |
| 2    | s                  | Sandpaper Letters<br>Rainbow Letters<br>Crayon Rubbing<br>Letter | Sand Tray              | Phonological Awareness Lessons | Letter Assessment<br>Frequency Chart<br>Small Group<br>Reflection<br>Observation |
|      | t                  | Wall Chalk Board   |                        |                                |  |
| 3    | b                  | Sandpaper Letters<br>Rainbow Letters<br>Crayon Rubbing<br>Letter | Memory Board           | Phonological Awareness Lessons | Frequency Chart<br>Observation<br>Small Group<br>Reflection                      |
|      | e                  | Wall Chalk Board<br>Sand Tray                                    |                        |                                |  |
| 4    | l                  | Sandpaper Letters<br>Rainbow Letters<br>Crayon Rubbing<br>Letter |                        | Phonological Awareness Lessons | Letter Assessment<br>Frequency Chart<br>Observation<br>Small Group<br>Reflection |
|      | f                  | Wall Chalk Board<br>Sand Tray<br>Memory Board                    |                        |                                |  |
| 5    | d                  | Sandpaper Letters<br>Rainbow Letters<br>Crayon Rubbing<br>Letter |                        | Phonological Awareness Lessons | Frequency Chart<br>Observation<br>Small Group<br>Reflection                      |
|      | k                  | Wall Chalk Board<br>Sand Tray<br>Memory Board                    |                        |                                |  |
| 6    |                    | Sandpaper Letters<br>Rainbow Letters<br>Crayon Rubbing<br>Letter |                        | Phonological Awareness Lessons | Letter Assessment<br>Frequency Chart<br>Observation<br>Small Group<br>Reflection |
|      |                    | Wall Chalk Board<br>Sand Tray<br>Memory Board                    |                        |                                |  |

Based on a conversation with my advisor and my understanding of Montessori education, we decided to create new tools that integrated gross motor movement and literacy activities. I

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chose three different activities to offer to the children which will be explained below and presented through images and descriptions.

**Figure 1**



I chose a standing chalk board to allow the child to write using large muscle movements of both the upper and lower body while reproducing the Sandpaper Letters on the board. While the chalk board was recommended to me as an instrument due to the proprioceptive input and gross motor skills employed during this activity, I later came across

this image of an early Montessori classroom from *Dr. Montessori's Own Handbook*. This image suggests that children are writing on a standing chalk board as one of their work choices while others have made different, independent work choices. This classroom has blackboards at a low level that surround the classroom so that the children are able to draw and write freely while standing. Figure 1 was a confirmation for me that the standing chalk board was a good fit for this study. Figure 5 shows the height of the chalkboard in my classroom as compared to the child; it is about four feet tall.

The second activity, the sand tray gave the child a further tactile experience in learning the sound-symbol association and in writing the Sandpaper Letters. Finally, the memory board, which was modeled after my advisor's Multisensory Instruction Memory Board that she received at her Montessori Applied to Children at Risk (MACAR) professional development training at the June Shelton School and Evaluation Center in Houston, TX with Joyce Pickering, and her

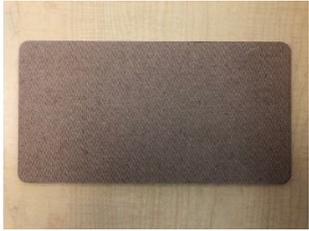
## WHAT THE SANDPAPER LETTERS TAUGHT ME

staff. I was able to make a several boards so that the children would work together yet each with their own board as seen in Table 4.

I chose to add a writing activity as means to learn the sound-symbol association even though this is not the usual progression of how we teach “ sounds.” Adding a writing activity increases motor activity (especially integrating the standing writing activity that I chose) which we have seen supports children with special needs because the kinesthetic sense is part of a multi-sensory approach. Likewise, as we saw in the research by Koziol et al. not only do movement and cognition coexist, but the specific semantic/declarative knowledge can be acquired through sensorimotor anticipation. In other words, standing at the chalk board and even only anticipating the movements to write the letter may also activate the sound of letter.

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**Table 4***Description of Tools for Study*

| Name of Tool and Image   | Description   |
|--|---|
| <p data-bbox="203 380 488 415">Standing Chalk Board</p>                       | <p data-bbox="841 436 1409 688">The large vertical surface allows the use of bigger arm movements which promote strength, flexibility, directionality sense and pressure control.</p>                               |
| <p data-bbox="203 785 337 821">Sand Tray</p>                                 | <p data-bbox="841 890 1409 1066">The sand tray is a tactile and motor activity. Here shown with dark sand, it encourages and develops prewriting skills.</p>  |
| <p data-bbox="203 1211 727 1247">Multisensory Instruction Memory Board</p>  | <p data-bbox="841 1234 1409 1486">Students use the index finger to write incorporating visual, auditory, tactile, and kinesthetic modalities. Yet, there is no trace so even more forgiving than the sand tray.</p> |

I used a combination of both qualitative and quantitative instruments to collect the data on the use of the study's tools outlined above. My primary qualitative instruments were my observation instrument (Appendix F) and my small group reflection (Appendix D). Each day at 12:30, I wrote down my reflections from the intensive small group lessons. I would record my

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observations when a child was engaged with the new works. My quantitative instruments included frequency charts for all three of the new tools/ works: wall chalk board, multi-sensory instruction memory board and sand tray (Appendix E). My qualitative measurements also included the assessment instrument that I gave as a pre- and post-study as well as bi-weekly measure throughout the study (Appendix C).

Based on the methodology used by Hatcher et al. in their study of literacy, in which small groups were used and scores improved, I chose to use the same model. Most days of the week, the small group sessions took place in various different areas of the classroom. Depending on the lesson, we would be either on a rug in the carpet area of the classroom for floor activities or at a table on the tile area for a different view of the materials. I would invite no more than four children at a time and the participants were initially randomly selected based on their availability to work with me as I was following the standard Montessori practice of not interrupting a child who is working. After the first few weeks, I was able to have a base line of their academic level and therefore, able to place them into four different groups based on their knowledge of sound and symbol association. This allowed the lessons to be

more individualized and personalized. Figure 2 shows a small group lesson done in the classroom during the morning work cycle.

**Figure 2**

*Small Group Lesson*



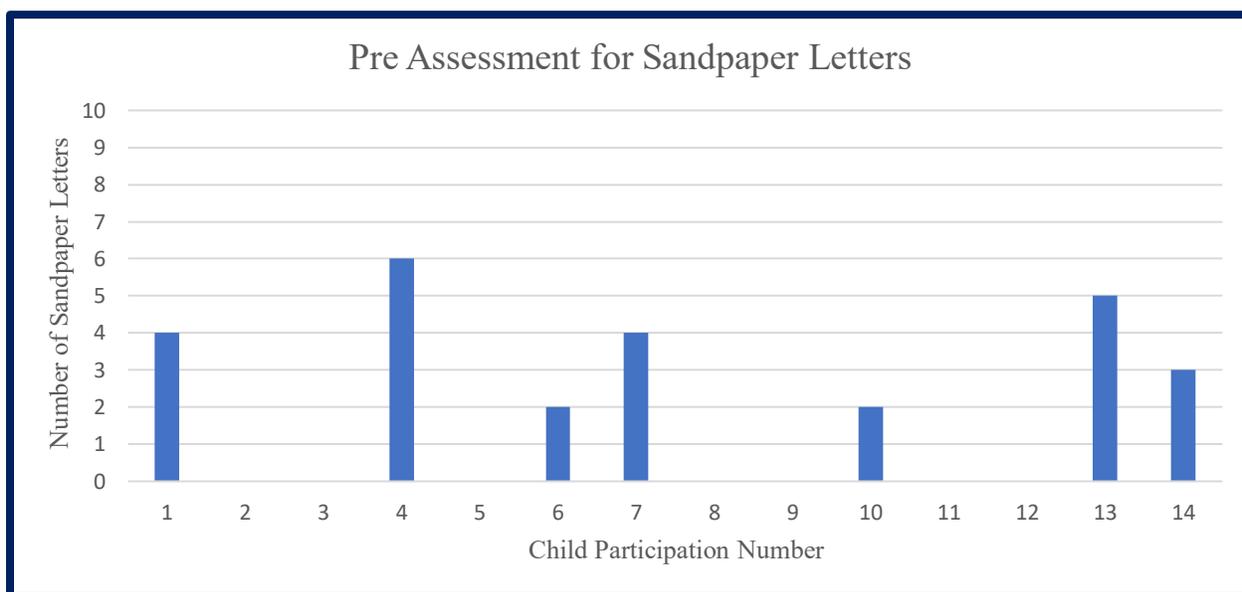
## Data Analysis and Results

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Figure 3 displays the results from the Pre-assessment Instrument of Sandpaper Letters administered on the first day of the study. Children were shown each of the ten Sandpaper Letters for three seconds and then, I documented their knowledge of that particular sound-symbol association such as, the sound of the symbol, a word association with the symbol or lack of ability to make a phonemic association with the symbol (Appendix G ). The results showed that 7 of the 14 children knew at least two, but no more than 6 of the 10 Sandpaper Letters. On average, their Sandpaper Letter knowledge was a little less than 20%. At the start of this study, seven children did not know any of the Sandpaper Letters which explains the missing data for those children in Figure 3. This Pre-assessment Instrument of Sandpaper Letters was re-administered bi-weekly throughout the study.

### Figure 3

#### *Pre-Assessment for Sandpaper Letters*



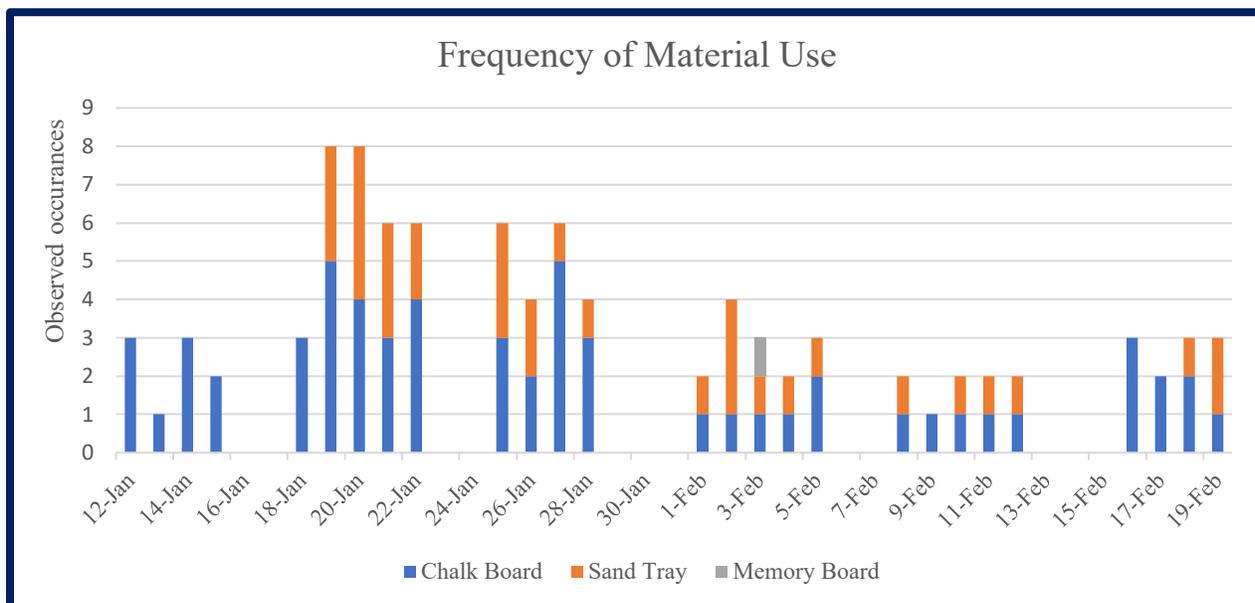
Throughout the study, the new materials were progressively introduced to the children.

They were introduced to the standing chalk board in the first week, the sand tray the second

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week, and the memory board the third week. Figure 4 shows the frequency of use for the six weeks of the study (Appendix I). In week one, the standing chalk board was introduced on the second day so there is no data for the first day. Week 2 shows that the new materials were being used the most frequently. During the first week, the study materials were taken out nine times while in the second week, when the sand tray was introduced, the materials were used more than three times as much. During the third week of the study the multisensory instruction memory board was introduced during the small group lessons. Figure 4 shows the children were not attracted to the new material during the week of introduction like the other new materials. Data also show that the multisensory instruction memory board was only used once throughout the study. The one time that the multisensory instruction memory board was used was when a teacher brought it to a lesson with Child 9 to work together with the Sandpaper Letters. During weeks four through six, the interest in the new materials decreased. In the first three weeks, the new materials were used on an average of four times a day while in the last three weeks of the study, they were only used a little over two times a day. This shows the children lost interest by nearly half the amount of time during the second half of the study.

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**Figure 4***Frequency of Material Use*

There is no data for a few days in the study because the classroom was unable to have a morning work cycle due to conflicting schedules and specialist visits.

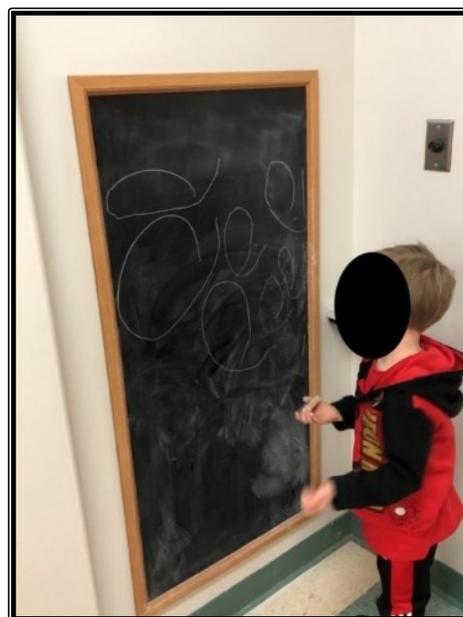
The data in Figure 4 and 5 show that the standing chalk board was a classroom favorite in the study. It was used at least once a day during the morning work cycle during the study for a total of 60 times. The sand tray was used a total of 33 times and the multi-sensory instruction memory board was only used once throughout the whole study. Even though the chalk board was introduced one week prior to the sand tray, data show that it was chosen more frequently than any other new material. The sand tray was a close second and was used almost every day in the study as well. The novelty of the new materials quickly died down in weeks four through six. The chalk board and the sand tray were still used by several children but less often than when the study first started. I believe the students lost interest in these new materials because after a few weeks they were not new. This is a frequent occurrence and we new present works, extensions,

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and variations to keep the children looking to the materials for interest and engagement. Child 11 was observed using the standing chalk board only once during the study, as shown in week 1 observations and was able to answer what letter he was working with the correct corresponding sound. This was the only time this particular child used any of the new materials yet, he had mastered the sound/ symbol association. Not all children chose to work with the new materials. According to the observations (Appendix J), children 3, 4, 6, and 8 did not engage in the new materials during the course of the study. In fact, eight children used the materials four times or less during the six weeks, which means, only six children - less than half - used the materials consistently throughout the study. However, Child 14 showed improved skills in both his writing and his understanding of learning letters by using the chalkboard. Figure 5 shows this child using the standing chalk board while working with the Sandpaper Letter e. It is worth noting that this low level of use of the tools by several children is a reminder to us that language development is unique to each child and not all children will learn in the same manner or at the same rate. It appears that the gains in sound / symbol association made by these children as seen in Figures 7 and 8 could be the result of vicarious learning or observation and not directly from the instruments, and finally, to a gr extent by the group lessons

### **Figure 5**

*Child 14 using the standing chalk board*



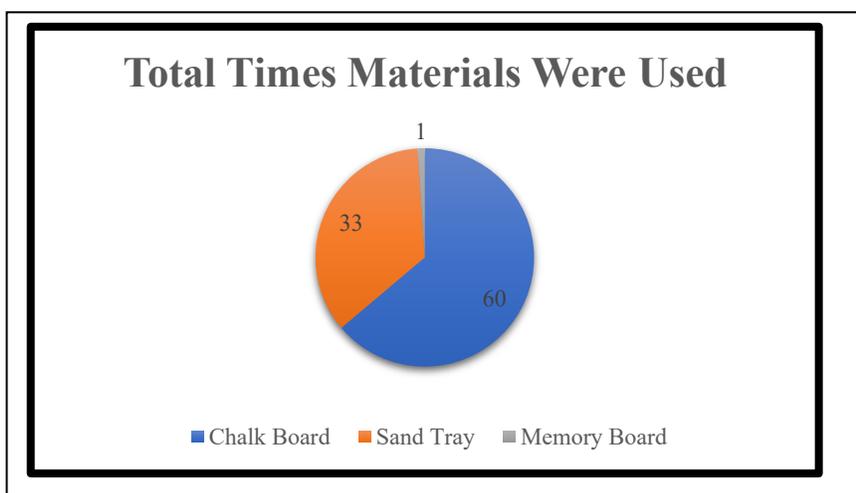
## WHAT THE SANDPAPER LETTERS TAUGHT ME

In Figure 6, we see that the standing chalk board was used 60 times. Although they did not use the standing chalk board in the way that I thought they would by writing many letters. Still, the fact remains that the standing chalk board turned into a literacy-based activity instead of an art-based activity and therefore, continued the persistence of learning the symbols and sounds. There was something about the standing chalk board that seemed to apparently solidify the letter sound information even if they were not officially drawing the letter. While I do not think I can say conclusively that the standing chalkboard was instrumental in the study, I do know that it was popular and attracted the children's attention even if they did not necessarily reproduce the letters. Referring to the observations made, Child 13 used the standing chalk board at least 13 times during the study. By the end of the study this child was able to recognize all 10 of the Sandpaper Letters. In week one, the child was able to draw the letter 'm' several times and was able to state the correct sound when asked. As the letters were added she was able to work with the new materials and answer questions about the Sandpaper Letters she was working with at different points of the study. In week 5, the child was working with the Sandpaper Letter 'd' and the chalk board, when the child was asked what letter she was working with, she stated /d/.

### Figure 6

*Total Times Materials*

*Were Used*

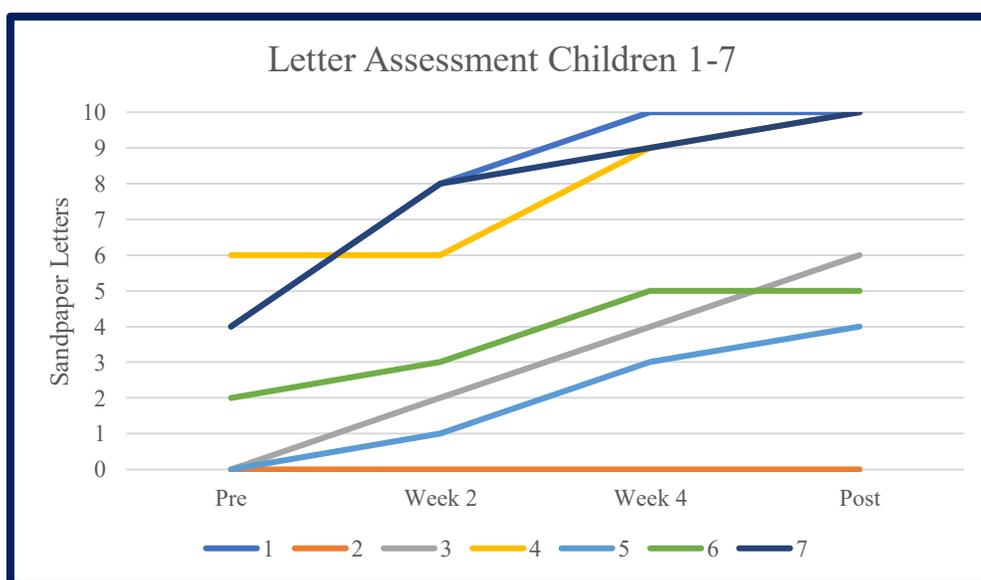


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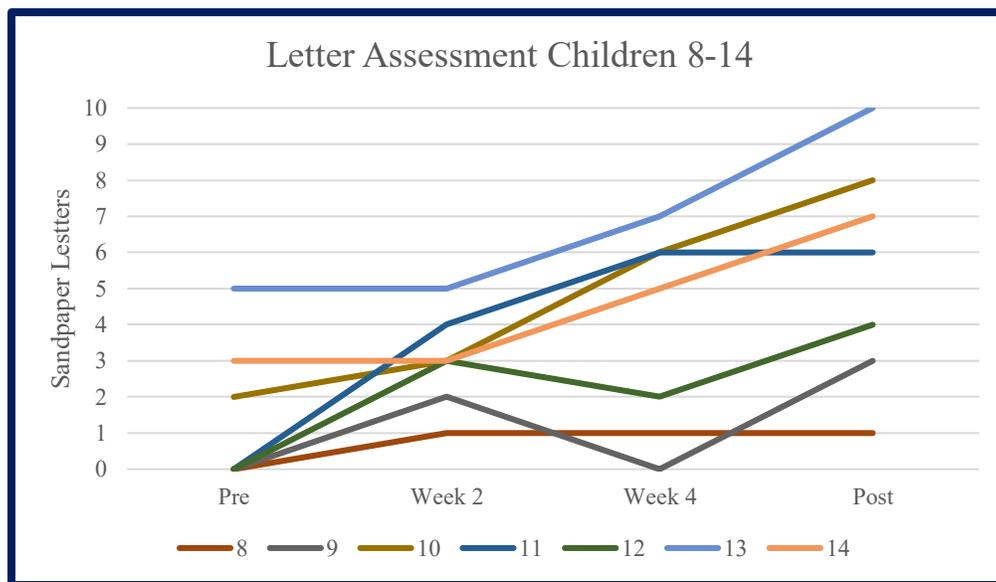
Letter assessments were given to each child individually during the morning work cycle. I would come to each child individually with all ten Sandpaper Letters. I would show the child one random Sandpaper Letter for three seconds and ask, “*What sound does this letter make?*” The child would respond, and the response was recorded (Appendix G). Figures 6 and 7 show the outcomes of each letter assessment. We can see that with the exception of Child 2, all the other participants made progress in their letter assessments. However, not all made continuous, gradual progress. Child 9 and 12 both regressed in week four. During the third and fourth week, Child 9 showed little to no interest in the small group lessons. Referencing the small group reflection (Appendix H), if he chose to participate in the lesson, in most cases, he was unable to follow the directions or do the lesson correctly. According to the new material observations (Appendix J), Child 12 took the materials off the shelf and only worked twice during the two week period and when asked what Sandpaper Letter he was working with, he was correct only once.

**Figure 7**

*Letter Assessment Children 1-7*



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**Figure 8***Letter Assessment Children 8-14*

Child 8 is a 3.5-year-old, part time student, and was rarely in class on his scheduled days. When he was present, he often arrived at the end of the morning work cycle, which means that he would only participate in the small group phonemic lesson and not have the opportunity to engage with any of the other materials. Child 8 did not make a lot of progress with the Sandpaper Letters. He knew two letters at the end of week two but was unable to retain knowledge of any more letters during the rest of the study. Other than two participants, all the others made progress with their letter/ sound association during weeks two and four. Figure 7 shows that Child 13 did not make any progress in the first two weeks. This is because the child already knew the first four letters that were introduced within the first two weeks. After the first two weeks, child 13 was introduced to new letters and made progress for the remainder of the study. Child 13 was very active with the chalk board and the sand tray during the duration of the study. We can clearly see that this child is in their Sensitive Period for language and Sandpaper Letters. Referring to the observations made with the new materials, they were focused when

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working with the chalk board for several minutes each time and concentrated on how to write the letter and making the sound of the letter. In Figure 7, the results show that Child 4 started the study already knowing six of the Sandpaper Letters. No new letters were introduced to that child during the first two weeks, but after week 2 the child was introduced to new Sandpaper Letters and was able to retain the letter/ sound recognition in a steady speed for the remainder of the study.

Child 11 is not quite 3 years old but was able to make progress throughout the first four weeks in the study. He came into the study with no knowledge of Sandpaper Letters because they have not been introduced to him yet; he just started in the Children's House in December. According to the observations made using the new materials (Appendix J), this particular child only used the new materials once throughout the whole study. He chose to use the standing chalk board for about five minutes during the first week and showed understanding of the use of the chalkboard. I had hoped that he would continue using the new materials during the study but instead, he never returned.

At the end of the study Children 1, 4, 7 and 13 had learned the sound/ symbol for all ten Sandpaper Letters. These children coming into the study knew at least four Sandpaper Letters. In fact, Child 1 had known all ten Sandpaper Letters by the end of week four.

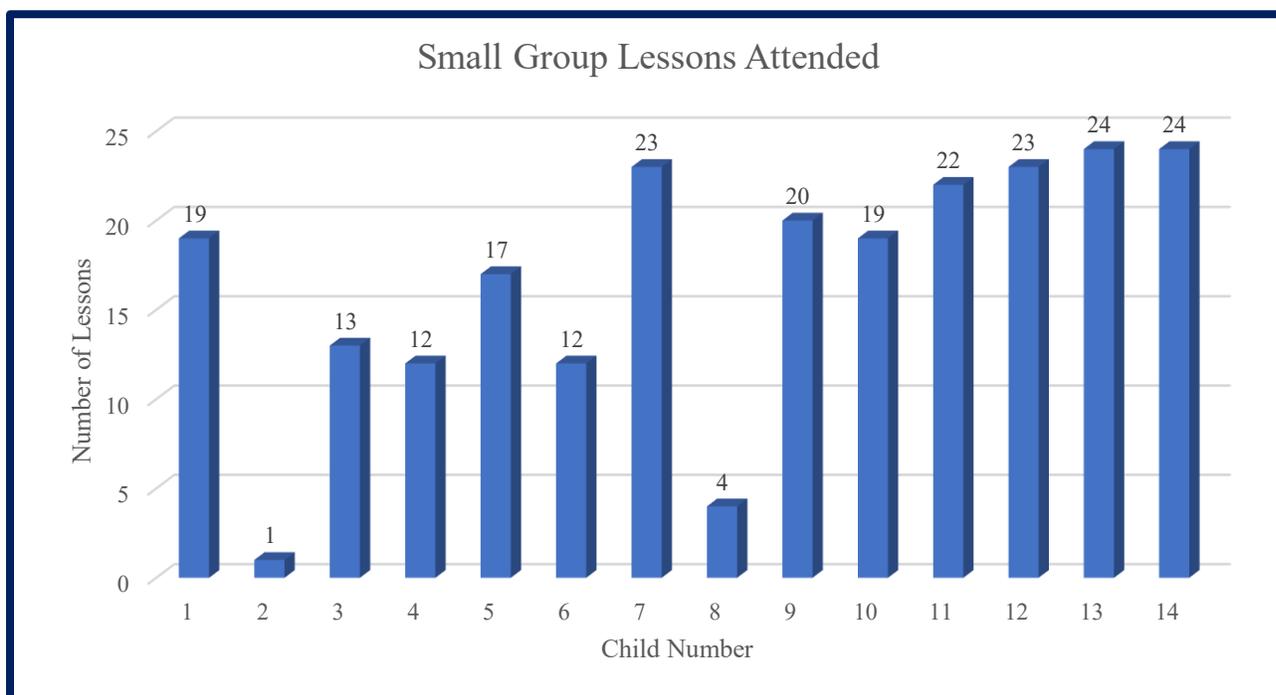
Small group lessons were popular and enjoyable for all children in the classroom, and not just the children in the study. I had several children who were not involved with the study but were nonetheless interested in the small group lessons. They would sit near the group by choice and watch a group lesson and then, ask to join the next group. According to the small group reflection observations, Child 1 relished the small group lessons. She was able to follow

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directions and participated every chance she could. Child 14 enjoyed working with the other children in the groups. He loved to help others if they were not able to find the correct answer.

Figure 9 shows the number of small group lessons attended. Data show that there is a wide range of attendance throughout the study; Child 2 only attended one lesson and children 13 and 14 attended all 24 lessons. The only lesson child 2 attended was the reading of a story in which I took a group of children out into the library. Child 8 only participated in 4 small group lessons. He is only scheduled to attend school twice a week. When he did attend, he arrived at the end of our work cycle and therefore, missed the opportunity to participate in the small group lessons. Or, he was absent. There were 24 lessons during the six weeks during which the children would learn about beginning sounds using words, story books, rhyming, syllables, games and more. For example, I would have five Sandpaper Letters and three pictures of objects that begin with those Sandpaper Letters. I would do it differently each time. Sometimes I would give them each 4 random cards for them to take turns placing under the corresponding Sandpaper Letter or I would line up the cards on the bottom of the rug and have the children choose which one they would like to place. Children 4, 6, and 8 are all the part-time students in the study. The rest of the children are fulltime but may have missed a lesson due to absences or, they may not have been interested in coming to the small group lesson that day.

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**Figure 9***Number of small group lessons attended*

The results show the children who were able to attend the majority of the lessons had the greatest impact in their letter/sound recognition. The children who attended more than 19 lessons were able to gain their knowledge of the Sandpaper Letters. These eight children learned at least three Sandpaper Letters, but Children 1, 7, 10, and 11 learned six Sandpaper Letters. Child 4 and Child 6 is only scheduled to attend three days a week and child 8 is scheduled only two days a week. Even though Child 4 only participated in 12 lessons, this child took out the Sandpaper Letters on his own in the afternoon and worked on beginning sounds with a teacher or another classmate. Looking at the observations made during the study, Child 12 did participate in 23 lessons but had shown little understanding of the lesson and struggled to answer questions correctly in the small group lessons. The data also show that Child 9 did attend 20 lessons but

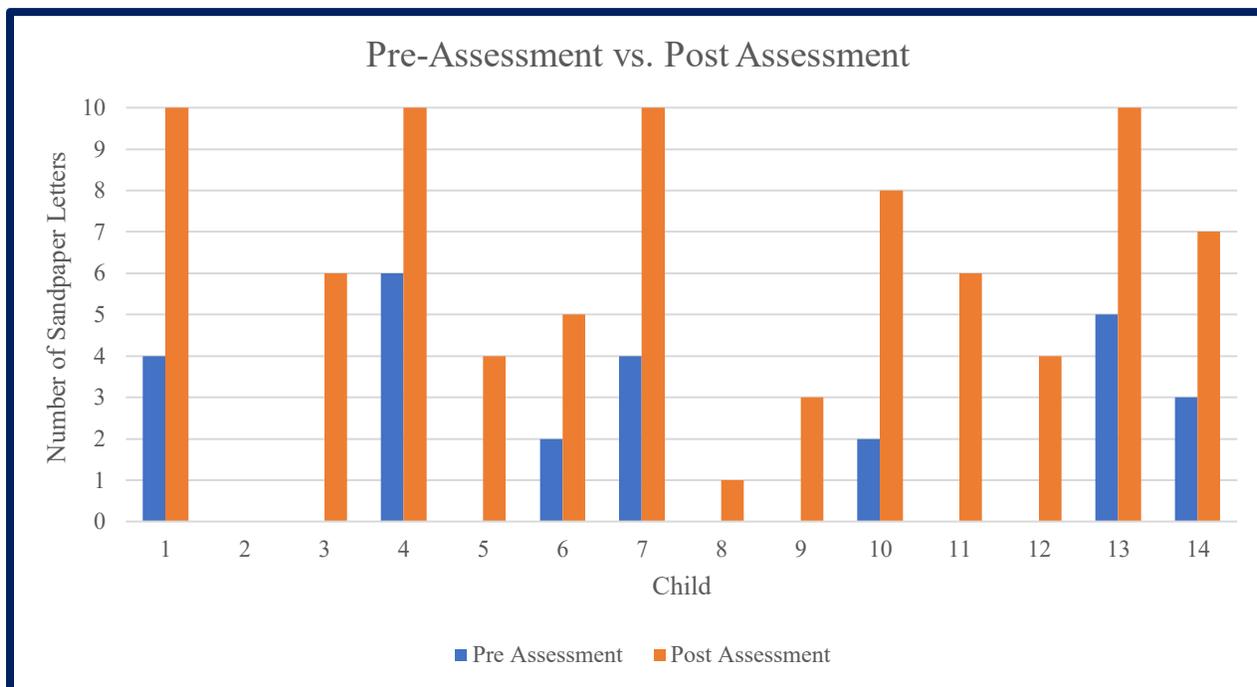
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looking at the small group reflections (Appendix H), he would start by coming to the small group lesson but would shortly leave after a minute or two. This is the youngest child in the study at almost three years old and shows little to no interest in small groups or large group times in the classroom. This child realized that the lesson is beyond their capacity, or not their interest at this moment. This is not the Sensitive Period for this child right now.

Figure 10 displays the results from the pre-assessment and the post-assessment. Data show that each child except for Child 2 made progress by the end of the study. Children 2, 3, 5, 8, 9, 11 and 12 have data of zero in Figure 9 because they did not have any letter/sound knowledge according to the pre-assessment. On average, the letter knowledge at the beginning of the study was a little less than 20% and, at the end of the study the average Sandpaper Letter knowledge was 60%. Therefore, based on the outcomes of the assessment instrument which was modeled after standard letter/ sound assessments, the data show that the study was a success - a 40% increase in letter/sound knowledge.

Children 1, 3, 7, 10 and 11 made the most progress with learning six new Sandpaper Letters during the study. At the end of the study, four children showed their knowledge of all ten of the Sandpaper Letters that were used in the study. Referencing the observations made, Child 3 made substantial progress as evidenced by learning six Sandpaper Letters by the end of the study, without ever taking out the new materials, but by only participating in the small group lessons.

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**Figure 10***Pre-Assessment vs. Post Assessment***Study Conclusions**

My original thought when choosing my study topic and designing my research project was to investigate why the students in my Montessori classroom were not learning their sounds/symbols. I assumed then, that the problem lay with the Sandpaper Letters since this is the Montessori material used to teach this phonemic association with symbols. As my study design and implementation progressed, I realized the answer was not so simple. Rather, I needed to realize that meaningful interaction<sup>5</sup> with the material, particularly with the Sandpaper Letters, meaningful practice by attending small group lessons and using the motor-based literacy

<sup>5</sup> NCMPS' term of "work as prop" is helpful to contrast here. I thought of 'prop' as using for example, the knobbed cylinders as airplanes, as a play prop. They were using the Sandpaper Letters and NOT as play props but they were not really deeply engaging with material either. It was a work prop not a play prop. It looked like "work" but there was no learning going on.

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materials allowed the students to progress in their knowledge of the Sandpaper Letters. Their delays had a lot more to do with my first year of teaching than with the Sandpaper Letters.

Other conclusions I took away from my study include:

- *The necessity to make language a daily occurrence for these children.* As I had witnessed in my colleague's teaching practices, I too, became intentional about language. The study included intensive small groups for the morning work cycle and the children both enjoyed this time and learned from one another. During the six weeks of the study, 24 small group lessons were presented. Using movement, adding standing activities, including language lessons in all areas of the classroom and finally, having constant short language lessons throughout the duration of the study made this project a success and made it a learning experience for me.
- *The impact of direct teaching with the small groups.* Most of the children thoroughly enjoyed participating in the small group lessons and being able to interact with others and learn from each other. Having different lessons planned each day kept the children engaged and created an overall inviting learning environment.
- *Incorporating motor activities into learning is both fun and effective.* The standing chalk board was a popular new material in the classroom that many children used it every day of the study. Even though I could not concretely measure how much they had internalized the association of the sound with the letter through specific motor movements, kinesthetic activities seem to have contributed to their learning success. It is important to note however, that even

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*without the use of any* motor activities, the small group lessons did positively affect at least some of the children's sound/ letter knowledge.

What did the Sandpaper Letters teach me? They taught me that as an educator becomes more experienced and intentional about the direct teaching of language, as an educator invests time for keen observation and regular assessments and finally, as an educator implements creative and fun solutions in response to a concern, we can only grow *along with* our students.

### **Reflection and Next Steps**

I learned a substantial amount during the study, which taught me that there are several practices I will continue to use and others that I will discontinue or improve in my classroom.

First, I plan on continuing to do small group lessons. They contributed the most to the success to this study. Small group time was attractive to the students who were not in the study. While I will continue with the practice of small group lessons, I will not do them as often as I did in the study. It was quite time consuming to meet with four different small groups every day during the morning work cycle. I believe a more reasonable compromise would be having one small group lesson per work cycle, which would allow two groups a day. One unintended but welcomed outcome of the small group lessons was an improvement in their social development. For example, working together and taking turns. This is one of the advantages noted by Wasik to having small groups. While I did not have a document to track this improvement, I am certain of their progress in a small setting.

Second, I would add more sensory materials and art opportunities in my classroom. After several weeks of observations, I concluded that a few students enjoyed just drawing on the chalk board or playing with the sand tray. I believe that alternative activities, for example a different

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sand work would meet a sensory or motor needs and keep the Montessori materials separate whose literacy objectives are different. It remains to be further observed in my classroom if a student first engages with a Montessori material in a sensory way (playing with the sand tray) and then transitions to use that same material for its academic purpose whether they will reap the same benefits.

Third, the process of gathering the information with my study instruments taught me that I need to assess my students more frequently and that it is a straightforward process such as the regular use of a checklist. We do full summative assessment twice a year at my school, but I now know the benefits of regular formative assessment. Having a better understanding where the children are in all the subjects will make my lesson planning more thorough.

Fourth, instead of thinking about the general Sensitive Period for language, I will pay attention to the specific aspects of the Sensitive Periods within language. I would like to notice the Sensitive Period for touching the Sandpaper Letters, for writing and building words. I know I need to be thorough with oral, phonological awareness activities before the children are introduced to the Sandpaper Letters. When they are introduced to the Sandpaper Letters, I will use a small letter booklet to record mastery. I will make them with pages shaped from rectangular strips of paper folded in half and held in place by a rubber band. This Sound and Letter booklet which will always be on the shelf and stay at school serves both as a record for sound/ letter mastery and allows them to practice and read their “first book.”

Fifth, I will be on the lookout for children who are not yet ready to use their hand(s) in the early literacy process. For example, some children might need oral language games only for an extended period of time and may not be ready for tracing the letters. My awareness to not

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being ready for writing or using their hand might direct my attention to their readiness for more gross motor or kinesthetic activities connected to language.

Finally, while my assistant was very supportive in gathering observation data during the study, now, I would like to see her transition into a small group leader role under my mentorship. This would offer her opportunities to work directly with some students, allow the students to have daily small group times and not compromise my time to give other lessons.

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## WHAT THE SANDPAPER LETTERS TAUGHT ME

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## WHAT THE SANDPAPER LETTERS TAUGHT ME

## Appendix A

*IRB Approval Document*

Date: 2-22-2021

IRB #: IRB-FY2020-161

Title: Phonemic Awareness- Hubbard

Creation Date: 10-30-2020

End Date:

Status: **Approved**

Principal Investigator: Kateri Carver

Review Board: UW Institutional Review Board

Sponsor:

## Study History

|                 |         |             |        |          |               |
|-----------------|---------|-------------|--------|----------|---------------|
| Submission Type | Initial | Review Type | Exempt | Decision | <b>Exempt</b> |
|-----------------|---------|-------------|--------|----------|---------------|

## Key Study Contacts

|        |               |      |                        |         |                        |
|--------|---------------|------|------------------------|---------|------------------------|
| Member | Kateri Carver | Role | Principal Investigator | Contact | kateri.carver@uwrf.edu |
|--------|---------------|------|------------------------|---------|------------------------|

|        |                  |      |                 |         |                              |
|--------|------------------|------|-----------------|---------|------------------------------|
| Member | Margaret Hubbard | Role | Primary Contact | Contact | margaret.hubbard@my.uwrf.edu |
|--------|------------------|------|-----------------|---------|------------------------------|

## WHAT THE SANDPAPER LETTERS TAUGHT ME

## Appendix B

*Consent Form Sent to Parents Pg. 1*
**UNIVERSITY OF  
WISCONSIN**
**River Falls**

GLOBAL. INNOVATIVE. EXCELLENT.

**Informed Consent for Research Participation**

IRB # FY2020-161 \_\_\_\_\_

IRB Approval Date: 1/04/2021 \_\_\_\_\_

Study Title: Phonemic Awareness in the Classroom

| Researcher Name     | Department | Contact Information |
|---------------------|------------|---------------------|
| 1. Margaret Hubbard | TED        |                     |
| 2. Kateri Carver    | TED        |                     |

We are asking your child to participate in our research study. Participation is voluntary and you may stop at any time, including requesting that your child not participate in the research project for any reason. If you choose not to participate or stop participating, there will be no negative consequences to you or your child. Participating will not change anything about your relationship with the researchers.

**Overview of the Research**

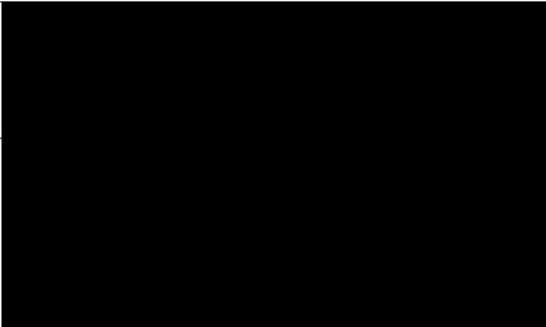
|  |  |
|--|--|
| <b>Purpose of the Study</b>  | To determine the extent and efficacy of integrating small group intensive phonological awareness practices and motor activities for increased sound - symbol learning?   |
| <b>What will your child be asked to do</b>                           | At the beginning of the study, participants' parents will be asked to sign a consent form. Since this study is designed to measure children's knowledge of phonological awareness, participants will be asked to participate in a small group time for approximately 5-7 minutes once a day. If the participant already demonstrates mastery of the learning objective, then they will not be asked to participate in the small group <u>lessons</u> but they may join if they choose. The group time will consist of games, customized lessons and other sound-symbol activities using hands on materials. Further, participants will be assessed bi-weekly using a 2-3-minute checklist done one-on-one with the teacher. Participants will have access to the full array of works in their Montessori classroom as well as three additional phonological motor activities available by choice throughout the duration of the study. |
| <b>Amount of time it will take your child to participate</b>         | Participants will be engaged in this study for approximately 2.5 hours of the morning school day for a total of 6 weeks.   |
| <b>Risks to your child if you choose to participate</b>              | This study as very minimal risks. It is possible, but not expected that children could participate in some movement exercises that could make them tired. Participants may become distracted by the new materials introduced to the Montessori classroom.  |
| <b>What we will do to reduce the risks</b>                           | Participants who are distracted will be redirected when necessary.   |
| <b>Benefits to your child or others if you choose to participate</b> | It is anticipated that these new materials will both provide more opportunities for participation in small group lessons and enhance student learning and engagement related to phonological awareness.  |
| <b>Compensation offered to your child for participating</b>          | None.  |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

*Consent Form Sent to Parents Pg. 2***Confidentiality and Data Protection**

|  |   |
|--|---|
| <b>Who will see my answers/information?</b>                  | Information gathered from observations and assessments will be compiled into charts and graphs and submitted to the University of Wisconsin-River Falls.  |
| <b>Where will my answers/information be stored?</b>          | Answers and information will be stored in a locked filing cabinet in the classroom of Step by Step Montessori.  |
| <b>How will my child's answers/information be protected?</b> | No names, identifying pictures or videos of participants will be used for the presentation of data. Data collected will be confidential as I will know the participants who are in the class, but the data and identifying information will not be kept together. |
| <b>Mandated Reporting Requirements</b>                       | We are mandated reporters and if we suspect a child or vulnerable adult is being abused or neglected, we are required by law to report this information to local child protection or adult protection agencies or to the police.                                  |

**Protection of Human Research Subjects**

|   |   |
|---|---|
| <b>If I have questions about this research I should contact:</b>  |  |
| <b>If I have questions or want to complain about my rights or how I was treated as a research participant I should contact:</b> |   |

**Signatures:**

\_\_\_\_\_ I agree to participate in this study and understand I may quit at any time.

\_\_\_\_\_ I do not wish to participate

\_\_\_\_\_  
Printed Name of Participant

If participant is a minor or requires a Legally Authorized Representative:

\_\_\_\_\_  
Printed Name of Parent, Guardian or Legally Authorized Representative

\_\_\_\_\_  
Signature of Parent, Guardian or Legally Authorized Representative

\_\_\_\_\_  
Date

**Appendix C**

*Letter Assessment*

Directions:

1. Adult shows Sandpaper Letter to child.
2. Adult asks what sound does this letter make?
3. Adult listens to child’s response within the first 3 seconds
4. Adult’s records response in the following manner.

- A: a checkmark for 100% accurate
- b: circle for a phonemic association
- c: X for incorrect or no response

| Participates Number |   | Notes |
|---------------------|---|-------|---|-------|---|-------|---|-------|---|-------|
| 1                   | a |       | s |       | b |       | l |       | d |       |
|                     | m |       | t |       | e |       | f |       | k |       |
| 2                   | a |       | s |       | b |       | l |       | d |       |
|                     | m |       | t |       | e |       | f |       | k |       |

## Appendix D

### *Small Group Reflection*

#### **Instructions for using Study Instruments:**

1. Start a new Reflection tool sheet each week and date the sheet
2. Complete the reflection tool each day after the phonemic lesson was presented.

**Week:** \_\_\_\_\_

Consider the following items when reflecting the participants' understanding and engagement in the phonemic awareness lesson.

1. State the phonemic lesson that was presented.
2. Child's interest (engaged in the lesson, participating)
3. Child's understanding of the lesson given.
4. Other reflections noted

| Lesson Given | Reflections: |
|--------------|--------------|
|              |              |
|              |              |
|              |              |
|              |              |



## WHAT THE SANDPAPER LETTERS TAUGHT ME

**Appendix F***New Material Observation***Directions for using Study Instrument:**

1. Start a new OBS tool sheet each week and date the sheet
2. Complete the OBS tool

**Week:** \_\_\_\_\_

Consider the following items when reflecting on the participants' use of each tool

**Standing Chalk Board [SC] ( Tool #1)**

1. Child 's interest (demonstrated by alternating writing implement and length of time used)
2. Drawing versus writing
3. Other observations about tool (from child's language, adult interactions, response to questions)

**Sand Tray [ST] (Tool #2)**

1. Child 's interest (demonstrated by alternating contents and length of time used)
2. Drawing tool versus sensory tool (need for redirection to sensory work)
3. Graphic association with phoneme (from child's language, adult interactions, response to questions)
4. Other observations about tool

**Memory Board [MB] (Tool #3)**

1. Child 's interest (demonstrated by focus and length of time used)
2. Portability of the tool
3. Graphic association with phoneme (from child's language, adult interactions, response to questions)
4. Other observations about tool

## WHAT THE SANDPAPER LETTERS TAUGHT ME

**Standing Chalk Board [SCB] ( Tool #1) Comments and observations**

( Expand as needed)

**Sand Tray [ST] ( Tool #2) Comments and observations**

( Expand as needed)

**Memory Board [MB] ( Tool #3) Comments and observations**

( Expand as needed)

Appendix G

Letter Assessment Raw Data P. 1

Pre Letter Assessment

| Date: |   | Notes |
|-------|---|-------|---|-------|---|-------|---|-------|---|-------|
| 1     | a | √     | s | √     | b | X     | l | X     | d | X     |
|       | m | √     | t | √     | e | X     | f | X     | k | X     |
| 2     | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 3     | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 4     | a | √     | s | X     | b | √     | l | √     | d | √     |
|       | m | √     | t | √     | e | X     | f | X     | k | X     |
| 5     | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 6     | a | O     | s | X     | b | √     | l | X     | d | X     |
|       | m | O     | t | √     | e | O     | f | X     | k | X     |
| 7     | a | √     | s | √     | b | X     | l | X     | d | X     |
|       | m | √     | t | √     | e | X     | f | X     | k | X     |
| 8     | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 9     | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 10    | a | √     | s | X     | b | X     | l | X     | d | X     |
|       | m | √     | t | X     | e | X     | f | X     | k | X     |
| 11    | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 12    | a | X     | s | X     | b | X     | l | X     | d | X     |
|       | m | X     | t | X     | e | X     | f | X     | k | X     |
| 13    | a | √     | s | √     | b | √     | l | X     | d | X     |
|       | m | √     | t | √     | e | X     | f | X     | k | X     |
| 14    | a | √     | s | X     | b | X     | l | √     | d | X     |
|       | m | √     | t | X     | e | X     | f | X     | k | X     |

End of Week Two Letter Assessment

|    |   | Notes |
|----|---|-------|---|-------|---|-------|---|-------|---|-------|
| 1  | a | √     | s | √     | b | X     | l | √     | d | √     |
|    | m | √     | t | √     | e | √     | f | X     | k | √     |
| 2  | a | X     | s | X     | b | X     | l | X     | d | X     |
|    | m | X     | t | X     | e | X     | f | X     | k | X     |
| 3  | a | √     | s | √     | b | X     | l | X     | d | X     |
|    | m | X     | t | X     | e | X     | f | X     | k | X     |
| 4  | a | √     | s | √     | b | √     | l | X     | d | √     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 5  | a | X     | s | X     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 6  | a | √     | s | X     | b | X     | l | X     | d | √     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 7  | a | √     | s | √     | b | X     | l | X     | d | √     |
|    | m | √     | t | √     | e | √     | f | √     | k | √     |
| 8  | a | X     | s | X     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 9  | a | X     | s | √     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 10 | a | √     | s | √     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 11 | a | √     | s | √     | b | X     | l | X     | d | X     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 12 | a | √     | s | X     | b | X     | l | X     | d | X     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 13 | a | √     | s | √     | b | X     | l | √     | d | X     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 14 | a | √     | s | X     | b | X     | l | X     | d | X     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |

WHAT THE SANDPAPER LETTERS TAUGHT ME

Letter Assessment Raw Data P. 2

End of Week Four Letter Assessment

|    |   | Notes |
|----|---|-------|---|-------|---|-------|---|-------|---|-------|
| 1  | a | √     | s | √     | b | √     | l | √     | d | √     |
|    | m | √     | t | √     | e | √     | f | √     | k | √     |
| 2  | a | X     | s | X     | b | X     | l | X     | d | X     |
|    | m | X     | t | X     | e | X     | f | X     | k | X     |
| 3  | a | √     | s | √     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | √     | f | X     | k | X     |
| 4  | a | √     | s | √     | b | √     | l | √     | d | √     |
|    | m | √     | t | √     | e | X     | f | √     | k | √     |
| 5  | a | √     | s | √     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 6  | a | √     | s | √     | b | √     | l | X     | d | X     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 7  | a | √     | s | √     | b | √     | l | X     | d | √     |
|    | m | √     | t | √     | e | √     | f | √     | k | √     |
| 8  | a | X     | s | X     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 9  | a | X     | s | X     | b | X     | l | X     | d | X     |
|    | m | X     | t | X     | e | X     | f | X     | k | X     |
| 10 | a | √     | s | √     | b | √     | l | X     | d | X     |
|    | m | √     | t | √     | e | √     | f | X     | k | X     |
| 11 | a | √     | s | √     | b | √     | l | X     | d | X     |
|    | m | √     | t | √     | e | √     | f | X     | k | X     |
| 12 | a | X     | s | √     | b | X     | l | X     | d | X     |
|    | m | √     | t | X     | e | X     | f | X     | k | X     |
| 13 | a | √     | s | √     | b | √     | l | √     | d | √     |
|    | m | √     | t | √     | e | X     | f | X     | k | X     |
| 14 | a | √     | s | √     | b | √     | l | X     | d | X     |
|    | m | √     | t | X     | e | √     | f | X     | k | X     |

Post Letter Assessment

| post assessment |   | Notes |
|-----------------|---|-------|---|-------|---|-------|---|-------|---|-------|
| 1               | a | √     | s | √     | b | √     | l | √     | d | √     |
|                 | m | √     | t | √     | e | √     | f | √     | k | √     |
| 2               | a | X     | s | X     | b | X     | l | X     | d | X     |
|                 | m | X     | t | X     | e | X     | f | X     | k | X     |
| 3               | a | √     | s | √     | b | √     | l | √     | d | X     |
|                 | m | √     | t | √     | e | X     | f | X     | k | X     |
| 4               | a | √     | s | √     | b | √     | l | √     | d | √     |
|                 | m | √     | t | √     | e | √     | f | √     | k | √     |
| 5               | a | √     | s | √     | b | √     | l | √     | d | X     |
|                 | m | √     | t | X     | e | X     | f | X     | k | X     |
| 6               | a | √     | s | √     | b | √     | l | √     | d | √     |
|                 | m | √     | t | √     | e | √     | f | X     | k | √     |
| 7               | a | √     | s | √     | b | √     | l | √     | d | √     |
|                 | m | √     | t | √     | e | √     | f | √     | k | √     |
| 8               | a | X     | s | X     | b | X     | l | X     | d | X     |
|                 | m | √     | t | X     | e | X     | f | X     | k | X     |
| 9               | a | √     | s | √     | b | X     | l | X     | d | X     |
|                 | m | √     | t | X     | e | X     | f | X     | k | X     |
| 10              | a | √     | s | √     | b | √     | l | X     | d | √     |
|                 | m | √     | t | √     | e | √     | f | X     | k | √     |
| 11              | a | √     | s | √     | b | √     | l | X     | d | X     |
|                 | m | √     | t | √     | e | X     | f | X     | k | √     |
| 12              | a | X     | s | √     | b | X     | l | X     | d | X     |
|                 | m | √     | t | √     | e | X     | f | X     | k | X     |
| 13              | a | √     | s | √     | b | √     | l | √     | d | √     |
|                 | m | √     | t | √     | e | √     | f | √     | k | √     |
| 14              | a | √     | s | √     | b | √     | l | √     | d | X     |
|                 | m | √     | t | X     | e | √     | f | √     | k | X     |

## Appendix H

### *Small Group Reflection Raw Data P. 1-4*

| Lesson Given   | Reflections:  |
|--|---|
| Week 1: Words that start with /m/                                    | <ul style="list-style-type: none"> <li>• Children 1, 4, 7 were able to give me examples of different words that start with letter /m/.</li> <li>• Child 2 refused to come to participate in small group time.</li> <li>• 5, 6, 9, 10, 11, 12, 13 and 14 were engaged in the lesson but was unable to give examples correctly</li> </ul>   |
| Week 1: Showed standing chalk board with /a/m/                       | <ul style="list-style-type: none"> <li>• Child 9 was unable to write either letter but was able to say the sound while trying to write in the chalk board.</li> <li>• Child 14 was eager to try the chalk board.</li> <li>• Child 3 was excited to try and work with the letter m and was stating some words that start with the letter.</li> <li>• Child 2 did not participate</li> </ul>  |
| Week 1: I Spy with /a/m/ objects                                     | <ul style="list-style-type: none"> <li>• Child 12 copied a friend each time.</li> <li>• Child 11 watched what others pointed to</li> <li>• Children 1, 4, and 7 were able to participate by correctly identifying objects.</li> <li>• Child 2 did not participate.</li> </ul>   |
| Week 1: Sorting beginning sounds                                     | <ul style="list-style-type: none"> <li>• Child 1 did well and got all the objects sorted.</li> <li>• Child 3 guessed a lot of the objects.</li> <li>• All children were engaged in the lesson.</li> <li>• Child 2 did not participate.</li> </ul>   |
| Week 2: Lesson on sand tray and introduced /s/ and /t/               | <ul style="list-style-type: none"> <li>• Child 13 refused to touch the sand tray but was able to make the sounds of the new letters.</li> <li>• Child 10 refused to touch the sand tray and looked away.</li> <li>• All other participates seemed to understand the lesson but 5, 9, 11, and 12 had not made the letters but was able to make the sounds.</li> <li>• Child 9 left half way through the lesson</li> <li>• Child 2 did not participate</li> </ul> |
| Week 2: Beginning sounds with cards and Sandpaper Letters a, m, s, t | <ul style="list-style-type: none"> <li>• Participates were able to take turns and understood where the placements of the cards go.</li> <li>• Child 1, 5, 7, 10 and 13 was able to do /a/ and /m/</li> <li>• Child 2 refused to come to small group lesson.</li> </ul>  |
| Week 2: Rhyming  | <ul style="list-style-type: none"> <li>• All children were participating except 2, 9 and 12.</li> <li>• Children 1, 4, 7, and 10 were able to match all the rhymes.</li> </ul>  |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

|   |  |
|---|--|
| <p>Week 2: Beginning sounds and objects<br/>/a/m/s/t/</p>                                     | <ul style="list-style-type: none"> <li>• 9 walked away ½ way through</li> <li>• 14 didn't understand the s and t</li> <li>• 1, 3, 5, 7, 10, 11, 13 did great during the lesson and was able to sort the objects to the correct letter</li> <li>• Child 2 did not participate in the group time.</li> </ul>   |
| <p>Week 2:<br/>Assessments and<br/><i>Chicka Chicka Boom Boom</i> By:<br/>Bill Martin Jr.</p> | <ul style="list-style-type: none"> <li>• 2 never came to group time.</li> <li>• 8, 9, 10, 3, and 5 was not interested in looking at the book</li> <li>• The rest of the group sat and listened.</li> <li>• Children 1 and 7 found the letters we were working on.</li> </ul>   |
| <p>Week 3: showed the memory board introduced /b/ and /e/</p>                                 | <ul style="list-style-type: none"> <li>• Each child was interested in the lesson except 2, 9, 10 (they refused)</li> <li>• Children 1, 5, 13 and 14 really liked running their hands over the memory board.</li> <li>• Children 1, 4, 7, and 13 seemed familiar with "b"</li> </ul>  |
| <p>Week 3: Beginning sound picture sorting.</p>   | <ul style="list-style-type: none"> <li>• Child 5 observed what others did before answering.</li> <li>• Child 3 confused with "t" and "s" "e" and "b".</li> <li>• Child 7 understood most except 'e'</li> <li>• Child 11 guessed instead of following directions.</li> <li>• Child 14 matched all except 'e'</li> <li>• Child 9 was not interested in the lesson.</li> <li>• Child 2 did not participate</li> </ul> |
| <p>Week 3: I spy around the classroom.</p>  | <ul style="list-style-type: none"> <li>• Children 1, and 14 did a great job guessing phonemic matching objects.</li> <li>• Children 3, 5, 9, 10, 12, and 13 guessed whichever they saw but did not understand.</li> <li>• Child 2 did not participate</li> </ul>   |
| <p>Week 3: review on memory board</p>   | <ul style="list-style-type: none"> <li>• I noticed no one took out the memory board so we reviewed all Sandpaper Letters as a group.</li> <li>• All were able to attempt to write the letter and repeat the phonemic sounds.</li> <li>• Child 9 was not interested in the lesson and left almost immediately.</li> <li>• Child 2 did not participate</li> </ul>  |
| <p>Week 4: Step 2 of the Montessori Lesson with the Sandpaper Letters</p>                     | <ul style="list-style-type: none"> <li>• Children 1, 4, 6, 7, and 14 did a great job showing the correct letter when I stated the sound.</li> <li>• Child 9, 10, and 11, was fumbling with all the different Sandpaper Letters and unable to answer questions correctly.</li> <li>• Child 2 refused to participate</li> </ul>  |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

|   |   |
|---|---|
| Week 4: Beginning sound sorting.                                    | <ul style="list-style-type: none"> <li>• Children 1, 4, 7, and 5 did a great job understanding the new letters they participated the whole time and engaged when it was not their turn.</li> <li>• Child 9 walked away halfway through the lesson.</li> <li>• Child 14 has shown a lot more understanding of the recognizing the letters.</li> <li>• Child 2 refused to come to group time</li> </ul>   |
| Week 4: <i>Frog on a Log</i> By: Kes Gray and Jim Field Read Aloud. | <ul style="list-style-type: none"> <li>• Children 1 and 4 were engaged for the whole book</li> <li>• Child 2, 3, 5, 6, 9, 10, 11, 12, 13, and 14 rarely responded to questions about the rhymes or answered incorrectly.</li> </ul>   |
| Week 5: Sandpaper Letters Knock Knock                               | <ul style="list-style-type: none"> <li>• Children 1, 7, 13, 14, and 4 were engaged in the game the whole lesson and seemed excited to work with a peer.</li> <li>• Child 2 and 9 refused to come to the group time</li> <li>• Child 5, 11, 12 understood the concept but not a lot of the letter sounds</li> </ul>  |
| Week 5: I spy Books   | <ul style="list-style-type: none"> <li>• Children 1, 13, 14, and 7 were engaged and pointing to pictures that begin with most of the letters.</li> <li>• Children 11, and 3 were able to find objects when asked if door starts with “d”</li> <li>• Child 9 walked away and was not interested in the lesson</li> <li>• Child 5 and 2 refused to participate in group time.</li> </ul>  |
| Week 5: Beginning Letters Sounds                                    | <ul style="list-style-type: none"> <li>• 1, 13, 14, and 7 were engaged the whole time and were able to work together to get all of the objects sorted</li> <li>• Child 11 was able to know m, a, b objects</li> <li>• Child 12 and 3 was observing the other children in the lesson. When asked question they both just watched me.</li> <li>• Child 9 walked away about 1 minute into the lesson.</li> <li>• Child 2 refused to come to group</li> </ul> |
| Week 5: I Spy Objects (Pre-Selected)                                | <ul style="list-style-type: none"> <li>• Children 1, 4, 6,7, 13, and 14 were all engaged and understood the lesson and finding the correct objects.</li> <li>• Child 2 refused to come to group</li> </ul>  |
| Week 6: Shaving Cream Writing                                       | <ul style="list-style-type: none"> <li>• All children participated except child 2. They were engaged the whole lesson.</li> <li>• Child 9 was more in the lesson for the sensory experience.</li> <li>• Child 7 was able to make some of the letters and all of the sounds.</li> <li>• Child 10 was able to repeat the sounds and recognized a few of the letters</li> </ul>  |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

|   |  |
|---|--|
| Week 6: Read a book <i>Falling for Rapunzel</i> | <ul style="list-style-type: none"> <li>• All children participated in the read aloud except child 2.</li> <li>• They were engaged with the story and sat the whole time.</li> </ul>  |
| Week 6: Rhyming                                 | <ul style="list-style-type: none"> <li>• Child 1 was able to match most of the rhyming cards.</li> <li>• Child 9 pointed to several cards and guessed at each one.</li> <li>• Children 13 and 14 were engaged and was able to get more than half of the rhyming matches.</li> <li>• Child 2 refused to come to the lesson.</li> </ul>  |
| Week 6: Clapping Syllables                      | <ul style="list-style-type: none"> <li>• Children 13, 14, and 7 were clapping the correct number of syllables.</li> <li>• Child 9 was clapping along with others are clapping just to clap.</li> <li>• Child 8 was watching the activity but not participating.</li> <li>• Child 3 was able to understand the lesson and by the end of the lesson was able to get most of the syllables.</li> <li>• Child 2 refused to come to group.</li> </ul> |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

## Appendix I

*Frequency Chart Raw Data*

| Date      | Standing Chalk Board | Sand Tray | Memory Board |
|-----------|----------------------|-----------|--------------|
| 1/12/2021 |                      |           |              |
| 1/13/2021 |                      |           |              |
| 1/14/2021 |                      |           |              |
| 1/15/2021 |                      |           |              |
| 1/18/2021 |                      |           |              |
| 1/19/2021 |                      |           |              |
| 1/20/2021 |                      |           |              |
| 1/21/2021 |                      |           |              |
| 1/22/2021 |                      |           |              |
| 1/25/2021 |                      |           |              |
| 1/26/2021 |                      |           |              |
| 1/27/2021 |                      |           |              |
| 1/28/2021 |                      |           |              |
| 1/29/2021 |                      |           |              |
| 2/1/2021  |                      |           |              |
| 2/2/2021  |                      |           |              |
| 2/3/2021  |                      |           |              |
| 2/4/2021  |                      |           |              |
| 2/5/2021  |                      |           |              |
| 2/8/2021  |                      |           |              |
| 2/9/2021  |                      |           |              |
| 2/10/2021 |                      |           |              |
| 2/11/2021 |                      |           |              |
| 2/12/2021 |                      |           |              |
| 2/15/2021 |                      |           |              |
| 2/16/2021 |                      |           |              |
| 2/17/2021 |                      |           |              |
| 2/18/2021 |                      |           |              |
| 2/19/2021 |                      |           |              |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

## Appendix J

*Observation Raw Data p. 1-6*

| <b>Standing Chalk Board [SCB] ( Tool #1) Comments and observations</b>  |
|---|
| <p>Week 1</p> <ul style="list-style-type: none"> <li>• Child 9 used the chalk board for about 5 minutes by drawing lines and circles</li> <li>• Child 13 Drew letter m several times stating the correct sound.</li> <li>• An adult redirect child 5 to the box of Sandpaper Letters, when she was drawing without having a Sandpaper Letter or stating a sound or the letters</li> <li>• Child 14 took out letter a and wrote a few on the chalk board and walked away after a minute.</li> <li>• Child 9 used the chalk board drawing lines up and down but did not have a Sandpaper Letter near and was not representing the sound.</li> <li>• Child 14 took out the Sandpaper Letter m and drew in on the board for about 2 minutes</li> <li>• Child 11 used the chalk board for about 5 minutes with the Sandpaper Letter a and was making zig zag line on the board. When asked what letter he was writing he stated /a/.</li> <li>• Child 2 stood in front of the chalk board several minutes before writing anything on it. She was asked to get a Sandpaper Letter from the box nearby to be working with.</li> <li>• Child 5 was working on the chalk board for a few minutes with the Sandpaper Letter m when she asked what letter she was working with she said, “I don’t know”.</li> </ul> <p>Week 2</p> <ul style="list-style-type: none"> <li>• Child 5 took out the chalk and drew circles. They did not have the Sandpaper Letters with them</li> <li>• Child 9 drew lines on the chalk board but did not have any Sandpaper Letters to look at and reference</li> <li>• Child 10 took out /m and wrote them very well on the chalk board and stated the sounds.</li> <li>• Child 14 took out Sandpaper Letter s and tried drawing it on the board for a minute but was not making the sounds. I asked what sound that letter make and he stated /s/</li> <li>• Child 9 was giving the Sandpaper Letter m and walked over to the chalk board. He started to write lines on the chalk board and was singing his ABC’s</li> <li>• Child 2 took out Sandpaper Letter m and was making lines on the chalk board but not referencing any sound.</li> <li>• Child 13 took out the Sandpaper Letter s and was concentrating trying to write it correctly erasing every</li> <li>• Child 13 took out the Sandpaper Letter a and was drawing on the chalk board, she was looking at the letter and moved slowly writing to make it look like the letter a.</li> <li>• Child 10 took out the letter m and wrote them on the chalk board one connected to the other in a zig zag order. When asked what letter he had he stated /m/</li> </ul> |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

- Child 9 grabbed the chalk and the letter a and was drawing lines on the chalk board going up and down. When asked what letter he was working on he said /m/
- Child 12 spent a few minutes drawing the letter s on the chalk board and when asked what letter they were working with she responded with /s/
- Child 9 took out the Sandpaper Letter m and was drawing on the board going left and right. When asked what letter he was working with he responded with “I don’t know”
- Child 13 was drawing the letter m on the chalk board without the Sandpaper Letter.
- Child 2 took out the Sandpaper Letter m and started to draw lines randomly on the chalk board. When asked what letter she had there was no response.
- Child 12 took out the Sandpaper Letter a and started to draw circles on the chalk board. When asked what letter they had they responded with a /a/
- Child 9 took out the Sandpaper Letter m and was making lines on the board. When asked what letter he was working with he responded with ABC’s
- Child 13 was tracing the Sandpaper Letter m and was doing their best drawing on the chalk board. When asked what letter they had they responded with /m/

## Week 3

- Child 13 spent about three minutes drawing the letter e. When asked what letter she was working with she responded /e/
- Child 12 spent 2 minutes drawing lines all the way up and down on the chalk board. HE did have the Sandpaper Letter e and when asked what letter or sound he was working with he stated /a/
- Child 13 spent about 5 minutes drawing the letter a. When asked what letter she was writing she stated /b/. I traced the Sandpaper Letter and said /a/
- Child 5 took out the Sandpaper Letter m and started tracing it with her finger and started making lines on the chalkboard and saying /m/
- Child 14 took out the letter s and was drawing carefully on the chalk board while singing “Money monkey”
- Child 9 took the chalk and started drawing circles on the chalk board. Erasing every minute or so without even looking at the Sandpaper Letter that he had next to him.
- Child 2 took out the Sandpaper Letter m and brought it over to the chalk board. She took the chalk and started making random lines on the chalk board she was not saying any sounds and when asked that letter she was working on she looked away and refused to answer.

## Week 4

- Child 13 uses as a drawing tool only used for two minutes and did not have a Sandpaper Letter with them
- Child 12 used the Sandpaper Letter /e/ and tried writing but was unable to write it but did say the sound.

## WHAT THE SANDPAPER LETTERS TAUGHT ME

- Child 1 worked at the chalk board for 5 minutes. She took out a and m back to back and was drawing them on the board legibly. She was not saying any sounds when writing them.
- Child 9 was at the chalk board with the letter m and started singing his ABC's. He was making random marks with the chalk.
- Child 2 choose to take out the Sandpaper Letter m. When drawing on the chalk board she was making lines up and down on the hall board and was not referencing the Sandpaper at all.
- Child 13 was drawing the letter e on the chalkboard without the Sandpaper Letter and when he was asked what letter he was drawing he said /e/

## Week 5

- Child 1 used a few minutes drawing /e/ and saying the sound
- Child 10 used for three minutes and is drawing straight line up
- Child 14 used for a few minutes writing the letter l and when he was asked about the letter he was writing, and he stated /l/.
- Child 13 was writing the letter t and was looking back and forth from the Sandpaper Letter to the chalk board to see what the letter looked like.
- Child 13 wrote on the chalkboard the letter d and was asked what letter he had he stated /d/

## Week 6

- Child 13 worked on drawing /m/ for a few minutes kept looking back to his Sandpaper Letter.
- Child 10 took out the Sandpaper d and was placing marks on the chalkboard that did not resemble the letter. When asked what letter he was working with he shrugged his shoulders. I traced the letter and said /d/
- Child 9 took out the chalk to started to draw on the chalkboard. He did not use it with the Sandpaper Letter and just used it as drawing tool.
- Child 2 took out the Sandpaper Letter m and was drawing them on the board for a few minutes. Erasing after each attempt.
- Child 5 Was at the chalk board for about 5 minutes drawing the letter e. When asked what letter they were working with they just pointed to the Sandpaper Letter and said nothing
- Child 13 took out the Sandpaper Letter m and was tracing with their fingers before picking up the chalk and drew the letter m on the chalk board several times.
- Child 2 took out the Sandpaper Letter m and drew marks on the chalk board placing lines up and down on the board. When asked what letter she was working with the shrugged her shoulders.
- Child 9 took out the Sandpaper Letter m and was drawing lines up and down the chalk board when asked what letter he was working with he stated /m/

## WHAT THE SANDPAPER LETTERS TAUGHT ME

| <b>Sand Tray [ST] ( Tool #2) Comments and observations</b>  |
|---|
| <p>Week 1</p> <ul style="list-style-type: none"> <li>• Not Introduced Yet</li> </ul> <p>Week 2</p> <ul style="list-style-type: none"> <li>• Child 9 used the sand tray as a sensory tool. They also had a Sandpaper Letter and was placing it in the sand</li> <li>• Child 5 was working on the /m/ for a few minutes and was able to answer what sounds the letter made when asked</li> <li>• Child 5 used the sand tray as a sensory tool. They did not have any Sandpaper Letter in front for their work.</li> <li>• Child 13 took out the sand tray and placed the letter m in front of the tray. She started to make lines in the tray going round and round and when asked what letter she had she stated</li> <li>• Child 10 took out the Sandpaper Letter s and was drawing circles in the tray for a few minutes when asked what sound the letter makes he shrugged his shoulders and looked away.</li> <li>• Child 2 took out the sand tray and was drawing the letter t for a minute and then started using the material as a sensory and started piling the sand in the middle.</li> <li>• Child 5 took out the Sandpaper Letter m and started making marks in the sand tray but was not saying any sounds but after about 30 seconds she walked away from the material.</li> <li>• Child 10 took out the sand tray and was using the Sandpaper Letter m and starting to trace the letter into the sand and was said m when asked what letter they were working with.</li> <li>• Child 5 used the and tray as a sensory tool. They took out the Sandpaper Letter a but never referenced it and was piling the sand into the middle of the tray.</li> <li>• Child 7 was working with the sand tray and several letters at a time. They were not making the sounds the letter made but was trying to write the correctly in the sand.</li> </ul> <p>Week 3</p> <ul style="list-style-type: none"> <li>• Child 2 used as a sensory tool. Took the Sandpaper Letter m and was piling the sand into the middle.</li> <li>• Child 10 used for about 5 minutes trying to write m.</li> <li>• Child 13 took out the Sandpaper Letter t and was writing in the sand tray.</li> <li>• Child 2 took out the sand tray and the Sandpaper Letter t and was tracing it in the sand when asked what letter she was working on she would look away and not answer.</li> <li>• Child 9 took out the sand tray. After a few minutes and using it at a sensory material and ended up dumping all the sand onto the table.</li> </ul> |

## WHAT THE SANDPAPER LETTERS TAUGHT ME

- Child 14 used for a few minutes but did not have any Sandpaper Letters with the work until a teacher assisted them in finding one. Even then they were not drawing the letters in the sand or making the sounds of the letters.
- Child 9 took out the sand tray and the Sandpaper Letter a . He drew circle in the sand saying nothing and then started to take handful of sand and place them on the rim of the sand tray.

## Week 4

- Child 9 took out the sand tray and started to use the sand tray as a sensory tool. He was piling the sand into the middle and then onto the side of the tray lip.
- Child 7 worked for 6 minutes with several different letters, very engaged with the materials.
- Child 14 took out the letter m and started to draw the letter in the sand. He worked for a little while and then started putting the sand on the table and started to trace on the table
- Child 10 took out the Sandpaper Letter s and started to take the sand tray to a table he started to trace the Sandpaper Letter and then writing it in the sand.
- Child 13 took out the sand tray and placed it on the table and walked and got the Sandpaper Letter e. They traced the Sandpaper Letter and then wrote it in the sand to the best of their ability.
- Child 9 took out the sand tray with a teacher and started drawing lines and tracing the Sandpaper Letter f. They were able to make some round marks in the sand and worked with the teacher stating the sound /f/.
- Child 2 took out the sand tray and was given the Sandpaper Letter a from a teacher. The teacher gave her the sound and showed the child how to trace the /a/ in the sand. The teacher walked away, and the child started to trace lines in the sand but never made a sound while working with the sand tray.

## Week 5

- Child 9 was using as a sensory tool and ended up turning it upside down spilling it all over the table.
- Child 14 used for a few minutes drawing the letter m but not saying the sound
- Child 5 took out the sand tray and the Sandpaper Letter s and was tracing the Sandpaper but when asked what letter they were working with they did not respond. The child drew circles in the sand.
- Child 9 took out the sand tray and the Sandpaper Letter a. She traced the Sandpaper Letter and made marks in the sand. When asked what letter sound that letter makes she became silent.

## Week 6

- Child 2 took out the sand tray and the Sandpaper Letter m and was making lines up and down in the sand she was not making any sounds while working with the materials. She put it away after about 5 minutes.

## WHAT THE SANDPAPER LETTERS TAUGHT ME

- Child 9 took out the sand tray and the Sandpaper Letter m. He brought them to the table and started to move the sand from one side to the other side of the tray and then shook it vigorously to make it flat. When he was asked what letter sound that letter made he stated /m/.
- Child 14 took out the sand tray and the letter a. He worked for a few minutes tracing the letter and then making lines in the sand. When asked what letter he had he stated /a/.

**Memory Board [MB] ( Tool #3) Comments and observations**

Week 1:

- Not Introduced Yet

Week 2:

- Not Introduced Yet

Week 3:

- No Observations

Week 4

- I worked with child 9 with the memory board. We took out 5 sandpapers letters and started to trace the letters and then writing them on the memory board. He was more interested as a sensory tool rather than with sounds.

Week 5

- No Observation

Week 6

- No Observation