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Cultivating Toddler Emergent Literacy Behaviors Using the Montessori Sandpaper Letters

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Cultivating Toddler Emergent Literacy Behaviors Using the Montessori Sandpaper Letters

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in fulfillment of final requirements for the MAED degree

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Abstract

The Montessori Sandpaper Letters are a powerful, multi-sensory tool which can cultivate emergent literacy behaviors. A half-day Montessori classroom of 17 students between the ages of 2.4 years old and 3.5 years old in a private, accredited, suburban Montessori school participated in this action research study. Participants completed a four-week intervention that implemented daily use of the Sandpaper Letters. Data was collected through daily observations, tally charts, individual lesson logs, and a modified pre- and post-assessment of the ability to identify letter sounds. Thirteen out of 17 participants, or 76%, showed an increase in letter sound identification. In addition there was a significant increase in the number of child-initiated Sandpaper Letter lessons (as opposed to adult-initiated lessons). Also seen was an advancement of the children's language skills from concrete to symbolic. This included the advent of writing, and the spontaneous appearance of activities demonstrating both phonological and phonemic awareness. These activities related directly to the Sandpaper Letters and demonstrated new and significant emergent literacy behaviors.

Keywords: Montessori, sandpaper letters, emergent literacy, toddlers, interest, choice

It is not nature alone, but nature and environment together, that give us the miracle of the little child, the miracle of the little child that speaks.

(Montessori, 2012, p. 65)

Human development is extraordinary. The first three years of a child's life set the foundation for life-long learning. It is during this time the child creates his spoken language as he effortlessly absorbs from the environment. Learning new vocabulary of people, objects, and places helps create a linguistic foundation. Moreover from the moment he is born the infant begins vocalizing as he watches and imitates the mouth movements and sounds of adults around him. These tiny beginnings are the roots of literacy when the child will eventually learn to map a sound to a symbol. This is a journey that is not linear, but one that develops spirally through ever-widening emergent literacy experiences.

In 1939, Maria Montessori, by then an educator for over 30 years, traveled to India on the invitation of the Theosophical Society to give a three-month lecture and training tour. The timing could not have been worse. Hitler invaded Poland in August of that year, WWII broke out, and, as an Italian national, she was interned.

Up to that point in her career Montessori had focused her lens exclusively on the child ages three-to-six. Finding herself free of teaching obligations she had an opportunity to turn her attention to the infant, age birth-to-three. Not since her early years at her original school in San Lorenzo had she been able to return to her roots of observation and experimentation. It was during this period in India that she made the critical discovery that infants learned language (and other skills) by absorbing it from their environment without any instruction (Montessori, 1949/2007/2010). From this discovery she coined the phrase, "*the absorbent mind*", and in 1949

published the results of her research, along with her written collaboration with Adele Costa Gnocchi, in a book of the same name.

A second seminal discovery involved what Montessori called “Sensitive Periods” (Lillard, 2005; Montessori, 1998/2007; Montessori, 2007; Montessori, 2012). She observed that children appeared to have unique times in their development where they learned certain concepts or skills more easily. While she hypothesized some Sensitive Periods might be extremely short in duration, she observed infancy had Sensitive Periods which spanned many years. These included, among others, the development of the senses, refinement of movement, and the acquisition of language.

My initial Montessori certification was as an early childhood educator so I was quite familiar with the Language materials, specifically the Sandpaper Letters. Once certified as a Montessori infant/toddler educator and practicing for three years, I became aware of the advancing skills of the children in the area of language and literacy. In particular, I found they showed an interest in sounds, could identify individual phonemes and, in some cases, could build words using small manipulative letters. As I watched them master concrete, foundational language activities and then representational work, the next logical step was to introduce symbols. In Montessori, the material for the letter symbols, or alphabet, is the Sandpaper Letters, but it is usually not introduced until early childhood. My idea was to regularly introduce the Sandpaper Letters into the toddler community and observe not just whether the children learned sounds, but how the Letter activities influenced other Language work in the class environment.¹

¹ In Montessori, children age 15 to 26 months are referred to as “toddlers”. There also may be a separation of “young” and “older” toddlers into different classes because of licensing.

I was aware that using an early childhood material in a toddler environment was controversial. However, like all Montessori educators, I had been trained to observe, analyze and respond to the needs of each child. The essence of observation is approaching your subject (i.e. the child) without prejudice. Since I had observed readiness for a certain experience, I was obliged to consider it, putting aside preconceived notions. Therefore, as an educator concerned with best practice, I wanted to be sure the capabilities of the youngest children were being met with appropriate, responsive Montessori practice – particularly when emergent literacy had been brought to the forefront by their own interests.

Problem Statement

We speak our mother tongue well because we carry the order of the words
and their sounds with us. This is achieved in the first year of our lives.

It all happens when the child is unconscious and then nearly conscious.

(Montessori, 2012, p. 62)

Montessori expected her educators to be the cultivators of the child's environment (Montessori, 2012); cultivators who nurtured children's movement, language, and independence; cultivators guided by observation and knowledge of child development. Over the last four years, I navigated through the entire 0 – 3 developmental span as a program coordinator and teacher at a private, suburban, Montessori school accredited by the American Montessori Society (AMS), serving children from infants to 6th grade. The 2019-2020 enrollment for the Infant and Toddler program totaled 58 students. My class was comprised of 17 children ages 24 to 36 months who attended a half-day program.

Language in a Montessori Toddler program is taught in a holistic way and includes spoken language, vocabulary, classifying logical groups, print awareness and an oral introduction

to both phonological and phonemic awareness. Materials for Language are either concrete (objects) or representational (pictures). However, pre-literacy experiences generally stop there, the introduction of symbolic learning (alphabet letters) being reserved for preschool.

In my classroom I kept a set of early childhood Montessori Sandpaper Letters which I presented to individual children who signaled readiness. Many were already three or were fast approaching that age; many already exhibited emergent literacy skills such as rhyming, oral phonemic awareness, oral syllable segmenting, and print awareness. Nevertheless, swayed by traditional Montessori practice, I kept the Letters in isolation on a shelf as a teacher-directed activity but not available to the community. Then I postulated, what would happen if the entire class *were* given access and lessons? If the broader, foundational language experiences remained intact, symbols would be the next step, and having them available to choose instead of being taught solely at the discretion of the educator would be in alignment with Montessori's best practice.

Coincidentally, a couple of months later I recorded the following while observing, as I always did, during the work period:

A child gazed intently at a book. He paused at the picture of a blue jay. He grabbed the blue jay object from the bird object basket and placed it on top of the book picture. Next, he went to a basket of matching cards depicting "backyard birds", pulled out the picture of the blue jay and dropped it next to the book. Finally, he reached up onto a shelf where I kept the Sandpaper Letters, found the /b/ and put it on the book along with all the other items he had collected. He exclaimed, "/B/, /b/, /b/; blue jay!" An enormous grin spread across his face, then he carefully returned each item to its proper location.

While considering all of this, on the one hand I was acutely aware of years of teaching practice that discouraged the use of early childhood materials in a Montessori toddler class. On the other hand, Montessori herself had been criticized in her day for introducing education to children ages three to six. She commented, "They say that children under five are incapable of benefitting from education because they do not understand enough" (2012, p. 65). However, like Montessori, I believed, and I had seen that each child was unique, that interests and skills could develop at different times, and waiting too long ran the risk of missing a critical period when learning might be easiest for the child.

Research Question

As an AMS credentialed Infant-Toddler and Early Childhood teacher, I became interested in exploring ways to adapt part of the *preschool* Montessori Language curriculum to meet the emergent literacy needs of *toddlers* (children between the ages of 24-36 months). This took the form of adding Montessori's Sandpaper Letters, as a lesson and/or as a choice, to the existing toddler Language curriculum, a material which teaches the alphabet letter symbols and sounds. My action research project will consider: How does the use of the Montessori Sandpaper Letters in a community of two and three-year old children affect behaviors of emergent literacy?

Theoretical Framework

In 1966, Marie Clay invented the term *emergent literacy* to refer to the behaviors of young children before they became readers and writers in the conventional sense (Haebig, Rhyner & West, 2009). Twenty years later, William Teale and Elizabeth Sulzby published, *Emergent Literacy: Writing and Reading*. This work provided an expansive picture of what many parents and educators already knew: literacy achievements began much earlier in childhood (Justice, 2006; van Kleeck & Schuele, 2010). Clay's definition expanded to assert the

combination of reading and writing together constructed *literacy*. The term *emergent* is used to recognize children are in the process of becoming literate (Haebig et. al., 2009; Justice, 2006).

Previously, the ‘reading readiness’ perspective had prevailed to limit the possibility of literacy development to conventional formal instruction. An emphasis was placed on the maturational development of oral language and that implicit instruction was needed for children to obtain reading and writing capacities (Haebig et. al., 2009; Justice, 2006).

Development on a Continuum

Emergent literacy theory offers a different perspective. The theory supports the concept of a continuum of development through the age of five-years old and includes the following:

1. Literacy development begins early in life and long before formal literacy instruction in elementary school.
2. There is an interrelationship between oral language skills (listening and speaking) and written language skills (reading and writing) such that the skills develop concurrently and interrelatedly, rather than in some sequence (e.g., oral language development preceding written language development, etc.). In addition, children’s cognitive development during early childhood is important to their literacy development.
3. The functions of literacy (e.g., ordering a meal from a menu at a restaurant, obtaining information on an event, inviting friends to a birthday party) are as important as the forms of literacy (e.g., letters, words, sentences) to the children’s literacy development in early childhood.
4. Children’s active exploration of print within their environment and their social interactions with adults (particularly their parents) within reading and writing contexts (e.g., reading books together, making a sign to show support for a favorite football team,

following a cookie recipe) provide important opportunities for adults to model literacy behaviors for children to learn.

5. There is variability for typically developing children in the age and sequence of acquisition of emergent literacy knowledge and skills across the continuum of literacy development (Haebig et. al., 2009), pp. 8 -9).

As with other areas of child development *stage* verbiage is used to delineate literacy milestones. The term stages allows a scaffolding of skills as well as a projection of where children can be along the continuum of development (Justice, 2006). *Emergent, early, and conventional* literacy approximates a continuum from preschool through elementary school.

Traditional teaching practice assigned the preschool and kindergarten years for developing the beginning skills for reading and writing. More recent research has identified early language and emergent literacy beginning at birth (Honig, 2007; Justice, 2006; Montessori, 2007/2010). Justice (2006) cited research observations of her own 18-month-old child as evidence of emergent literacy behaviors. The observed behaviors documented are familiar to parents and early child care providers: knowledge of some alphabetic symbols, shared book reading for pleasure, the use of multiple writing implements to scribble and draw, an understanding of the book conventions of page turning and orientation, and an awareness of environmental signage (Justice, 2006).

Emergent Literacy Frameworks

Emergent literacy theory is divided into three main frameworks: developmental, components, and child and environmental influences (Haebig et. al., 2009; Justice, 2006). Each domain within the emergent literacy framework has a primary approach. However, many of the viewpoints overlap. Thus, the absence of a specific, consistent approach contributes to the confusion of parents and to educators (Haebig et. al., 2009).

Developmental framework. In the developmental domain, the children's grasp of literary knowledge and skills follows a generalized progression. Skills include, among others, an understanding of print awareness, print form and print meaning. Goodman (1986) and Strommen and Mates (2000) emphasized print awareness and the function of symbols in the reading development progression (Haebig et. al., 2009). McCormick and Mason (1986) and van Kleeck (1998), however, focused on the development of print-form and print-meaning (Haebig et. al., 2009; van Kleeck & Schuele, 2010).

Components framework. A components' domain moves from the generalized, developmental perspective and focuses instead on *categories* of knowledge and skills required to demonstrate during the emergent literacy stage. Storch and Whitehurst (2002) as well as van Kleeck (1998, 2003) contributed categories with similar components (e.g., conventions of print, phonological awareness, syntax, and narrative discourse). However, as Haebig et. al. (2009) observed, van Kleeck provided more specificity to the individual categories (e.g. phonological processor) and the components (e.g., phonological awareness, syllable segmenting, rhyming, and phoneme segmenting).

Child and environmental influences framework. This domain maintains that parent and child attributes, the home literacy environment, and the parent-child relationship are

interconnected, and contribute to emergent literacy skills, knowledge, and progress. McNaughton (1995) emphasized literacy modeling within the family, whereas Wasik and Hendrickson (2004) concentrated on the dynamic of the family (Novick, R. 2000; Haebig et. al., 2009;).

McNaughton, Wasik and Hendrickson were aligned on the influence of the social, cultural and dynamic effects of children's literacy environments (Haebig et. al., 2009).

Together these three frameworks combine to create a multidimensional approach to the emergent literacy viewpoint. Thus, emergent literacy theory provides the foundation for a continuum of literacy development upon which successive achievements are constructed.

Review of Literature

A review of literature provided a foundation for the suitability of introducing Montessori Sandpaper Letters into a toddler community. The review included information on emergent literacy practices, metaphonological awareness, learning by moving, and the impact of the home literacy environment. In addition, literature was reviewed on relevant Montessori concepts such as “sensitive periods” and the importance of experiences in the environment on learning. Existing literature on potential measurement tools was also examined.

Emergent Literacy Practices

As early as 1998, the National Association for the Education of Young Children (NAEYC) stated the infant, toddler and early preschool years were the period during which the youngest children took their “first steps towards learning to read and write”(National Association for the Education of Young Children [NAEYC], 1998, p. 32). The research established that the birth to preschool years built the foundation for developing the essentials for literacy (Nel, 2000; Novick, 1999/2000; van Kleeck & Schuele, 2010; Whitehurst & Lonigan, 1998). However, there was “a lack of agreement on the exact set of knowledge and skills that characterize

emergent literacy skills” (Haebig et. al., 2009, p.7). Additionally, research pointed to the age of the child (typically 6.5 years) as the determinant factor for literacy readiness and specified what should be taught (Elkind, 2012; van Kleeck & Schuele, 2010; Whitehurst & Lonigan, 1998).

Research coalesced around providing learning opportunities for young children in which the emergent literacy skills being taught were relevant, contextual to their daily lives, and connected to purposeful experiences. (Elkind, 2012; Nel, 2000; van Kleeck & Schuele, 2010). Specifically, identified strategies to teach literacy included: songs, nursery rhymes, book reading and sharing, wordplay, and rich vocabulary development (Hester & Hodson, 2009; Nel, 2000; Novick, 1999/2000; ; van Kleeck & Schuele, 2010; Whitehurst & Lonigan, 1998). These findings were consistent with the Montessori approach to language for the youngest children. In this approach vocabulary was developed by naming materials while, at the same time, matching, sorting, and classifying them. Montessori practice also offered materials on a developmental continuum progressing from concrete (real objects), to representational (objects to pictures), and eventually to abstract (pictures to pictures). Montessori also emphasized the importance of conversations as well as exposure to oral reading by the teacher. These activities were woven into daily routines or were provided in response to the children’s developing interests. Language was viewed as a process, and the context for skill building was embedded (Hester & Hodson, 2009; Novick, 2000; Soundy, 2003).

Home Literacy Environment (HLE)

Early childhood researchers agree on the importance of a robust home literacy environment inclusive of books, story-telling, and reading to children (van Kleeck & Schuele, 2010; van Kleeck, A., Vander Veen, E., & Vander Woude, J., 2009; Terrell & Watson, 2018; Whitehurst & Lonigan, 1998). Much of the research focused on home shared book reading, the

impact of print awareness, and the potential for later decoding skills (van Kleeck et. al., 2009); Whitehurst & Lonigan, 1998).

However, Kim, Im, and Kwon (2015) investigated HLE focusing in particular on the impact of vocabulary in toddlerhood on later decoding skills. The findings suggested "the cumulative effect of HLE during the first three years of life [had] more influence on early literacy skills than the later parent-child interactions do during preschool or afterward" (p. 848).

Researchers Hart and Risley (1995) unveiled seminal research labeled the 30 million word gap that put a spotlight on the importance of abundant vocabulary usage in the home. Romeo et al. (2018) found "that young children's real-world language exposure, and specifically the amount of adult-child conversation, [should] capitalize on the early neural plasticity underlying cognitive development" (p. 7876). Likewise, Montanaro (1991/2003) noted that children need to learn words and also to hear them in the context of real-life as this is the social-emotional side of language.

Experience and Sensitive Periods in Development

Elkind (2012), Nels (2000), Kim et al. (2015), Romeo et al. (2018), and Soundy (2003) agreed that experience in language-rich and print-rich environments developed the underpinnings of emergent literacy practices. Montessori (1949/2007/2010) observed, "we have to adjust our minds to doing a work of collaboration with nature, to being obedient to one of her laws, the law which decrees that development comes from environmental experience" (p. 81).

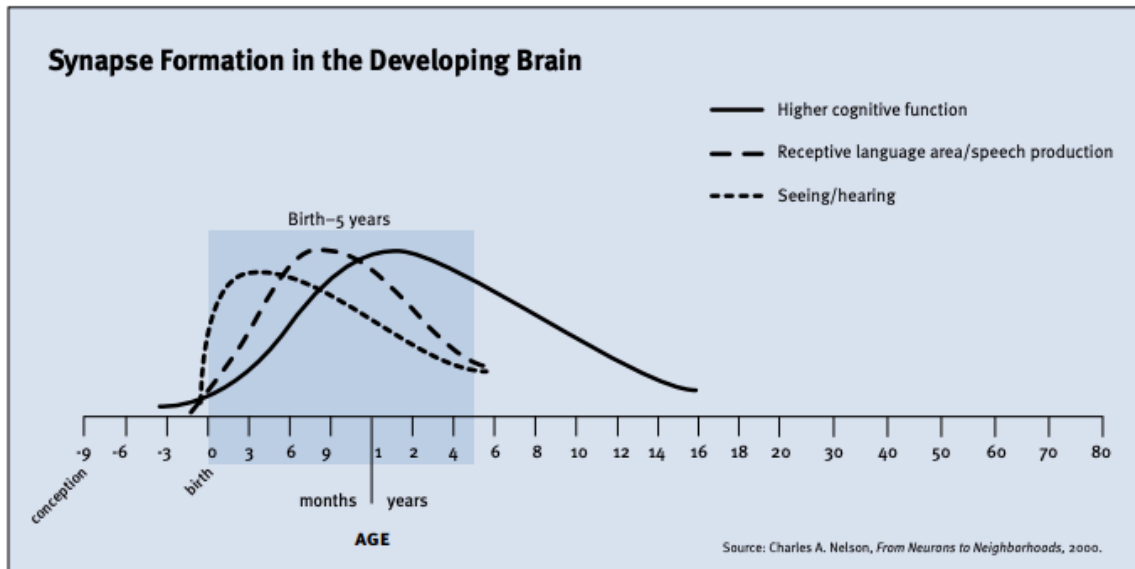


Figure 1. Graph of synapse formation in the developing brain. Adapted from ‘*The Timing and Quality of Early Experiences Combine to Shape Brain Architecture*’ by The National Scientific Council on the Developing Child, 2007, p. 3. Copyright 2007.

The National Scientific Council on the Developing Child (2007) identified special periods of development in the child’s brain when he was most sensitive to environment and experience (pp. 2-4). Figure 1 shows the sensitive periods which are consistent with the findings and the specific language used by Montessori labeled “sensitive periods” (The National Scientific Council on the Developing Child, 2007, p. 3). The research suggested stronger neural circuits were created when young children were provided high-quality and stimulating experiences at different ages. In turn, stronger neural circuits led to optimal brain development. According to Renninger and Hidi (2011), child interest, combined with sensitive moments in brain development and the right environments, are the foundational framework needed to develop emergent literacy.

Metaphonological Awareness

Elkind (2012), van Kleeck and Schuele (2010), and Whitehurst and Lonigan (1998) shared concerns regarding an academic focus in early childhood education. While none directly referenced toddlers, the implied inferences were understood. To introduce formal academic instruction would stand in opposition to the age-appropriateness of practice for the developing toddler. However, a 2-year-old is able to discriminate between giving a *pat* versus handing a *hat* (Dodd & McIntosh, 2010). In fact, researchers Hester and Hodson (2009) challenged that in order to eventually use written language, one must play with the sounds of language. Such play was also needed to map the sounds onto symbols (Dodd & McIntosh, 2010). Oral language, when layered with other emergent literacy experiences, helps the child develop an interest in sound and symbol.

Awareness is an understanding or knowledge that something is happening or exists (Merriam-Webster, 2019). At the outset, a hyper-aware infant's attentional focus is floating. But the older 2-year old, in a language-rich environment, is wholly aware and exhibiting phonological sensitivity (Dodd & McIntosh, 2010; Hester & Hobson, 2009; Kenner, Terry, Friehling & Namy, 2017). Metaphonological awareness is defined as "the sensitivity to the speech-sound structure of a language in order to analyze, store, and manipulate it when acquiring lexicon or mapping it to written symbols" (Hester & Hobson, 2009, p. 80). An analytic quality was implied, as can be evidenced by toddlers' interest in repetition, alliteration, and nonsense language (Dodd & McIntosh, 2010).

The National Institutes of Health (2010) and the National Reading Panel (2009) declared a crisis of illiteracy and identified avenues to rectification as cited by Kenner, Terry, Friehling, and Namy (2017). General knowledge regarding the process of learning to read recognized that

the development of literacy skills was not natural and needed support. Phonemic awareness was identified as a critical element to the process of decoding ((Dodd & McIntosh, 2010; Fennell & Werker, 2003; Kenner et al., 2017; Lonigan & Shanahan, 2009; Moats, 1999; Olson, Evans, & Keckler, 2006; Rhyner, 2009; Troia, Roth & Graham, 1998; Whitehurst & Lonigan, 1998).

Phonemic awareness is the ability to segment words into individual sounds. Kenner et al. (2017) focused on studying the phonemic awareness of children 2.5 through 3.5 years old. The authors utilized the Representational Redescription (RR) model to understand the explicit and implicit development of spoken to print language. Kenner et al. (2017) hypothesized that the younger children's abilities were being underestimated, and their results affirmed their hypothesis. In particular, Kenner et al. (2017) stated "present evidence for the emergence of fine-grained {minimal pair} phonemic awareness and discrimination developed as early as 2.5-years" (p.1590). Such findings were congruent with the sensitive periods as identified previously in the literature (Hester & Hobson, 2009; Montessori, 2007/2010; National Scientific Council on the Developing Child, 2007; van Kleeck & Schuele, 2010).

Learning by Moving

A growing body of research contributed to the connection between language and motor development (Bara, Gentaz, Colé, & Sprenger-Charolles, 2004; Ginns, Hu, Byrne, & Bobis, 2016; Hald, de Nooijer & Bekkering, 2016; Iverson, 2010; Minogue & Jones, 2006; Moody, 2006; Pouw, van Gog, & Paas, 2014). One study examined the connection between visual-haptic (visual and tactile sense) and haptic (tactile) exploration of letters with five-year-olds (Bara et al., 2004; Hald, et. al., 2016; Pouw et, al., 2014). The results concluded that tracing the shape of the orthographic letter while saying the sound, helped children retain the association of a symbol (the alphabet letter) with a phonetic sound (Bara et al., 2004).

Iverson (2010) focused on the development of the body and language in the first eighteen months of life. Earlier work by Bara et al. (2004) informed Iverson's (2010) and Hald et al. (2016) later research by describing how the infant's motor skills provided opportunities to practice new movements. As the infant responded within the environment vocalization was encouraged and motivated communication.

Ginns et al. (2016) explored the differences between natural learning versus what needed to be directly taught in their research. While Ginns et al. (2016) focused on a mathematical tracing experiment, their work cited the Montessori practice of tracing the Sandpaper Letters precisely as they are written and verbalized as evidence for learning by moving in agreement with Bara et al. (2004) as well as Iverson, 2010.

Assessment Tools

Assessment tools specific for an intervention focused on the toddler years was limited. In general, a research reliance on parental reporting scales were the best practice for children below the age of six years old. A longitudinal study of seventy-six children examined the MacArthur Communicative Developmental Inventories (CDIs) short form to measure the parent's inventory of expressive toddler language (Can, Ginsburg-Block, Golinkoff, & Hirsh-Pasek, 2013). The 2013 study compared assessments at 2.5-years, and again at kindergarten, determining toddler vocabulary was a predictor for later language outcomes (Can et al., 822 – 824).

Murray, Daost and Chen (2019) focused their research on the development of tools to measure Montessori early childhood and elementary teaching practices. Whereas, Volkman (2017) developed a modification of a Letter-Sound Short Form (LSSF) that utilized the Montessori moveable alphabet to assess preschool (early childhood) children's early literacy. An area identified for further consideration was the use of the Montessori three-period lesson as an

assessment tool (Dwyer, 2004; Montessori, 1967/1972). A systematic approach to progress monitoring was required as well as measurement tools (Piasta, Farley, Phillips, Anthony and Bowels (2017). A tool developed from Seguin's work with developmentally challenged children inspired Montessori. The classical Montessori Three Period lesson has been used for the youngest children to assess the internalization of an object with the specific vocabulary name (Dwyer, 2004; Montessori, 1936/1967/1972). Generally, the research review determined a lack of appropriate tools for measuring or assessing toddlers' emergent literacy within the class setting.

In conclusion, the literature pointed to the significance of the learning opportunities for young children in which emergent literacy behaviors were guided by teaching practice that was relevant, connected to daily life, and inclusive of intentional movement. Montessori concepts such as "sensitive periods" and the importance of experiences in the learning environment synced with research particularly around children's interest. Specific assessment tools were scant and informed the possibility of teacher-made tools. Thus, the literature provided an underlying base for an action research project focused on an intervention studying how the use of the Montessori Sandpaper Letters in a community of two- and three-year old children affect behaviors of emergent literacy.

Methodology

The teacher's first duty is to watch over the environment, and this takes precedence over all the rest. Its influence is indirect, but unless it is well done there will be no effective and permanent results of any kind, physical, intellectual or spiritual.

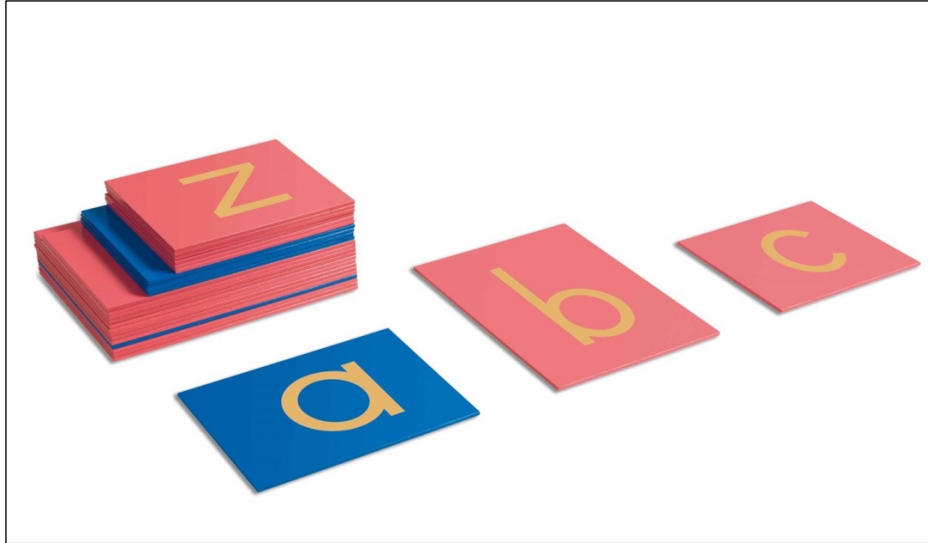
(Montessori, 1949/2007/2010, p. 253)

Montessori best practice required that materials were child-sized, functional in every detail, and visually as well as tactilely attractive to encourage selection, exploration, concentration and repetition by the children. A successful classroom layout or material design was determined by whether the child could work with the material independent of the adult (Lillard, 2005/2007). Additionally, consideration must be given to methods of display. Containers must be suitable for a child to carry, functional, attractive, and most important, at appropriate heights so children can access a material on their own. The suitability of both materials and methods of display were determined by observation (Montessori, 1936/1967/1972; Montessori, 2012). Therefore, before I began the intervention I had to examine my materials and their display with a critical eye.

Preparation of Materials and Their Display

I had considered using the *early childhood* Montessori Sandpaper Letters for the intervention. However, observation showed the toddlers were not attracted to them and would not choose them on their own. I noted difficulty for some children remembering where to place their finger when starting to trace a letter, an essential part of the Sandpaper Letter lesson. I also noticed the size of the letters was too large. When the children traced the early childhood material the whole arm moved (from the shoulder) instead of the wrist, hand and fingers.

There were additional considerations. Montessori's descriptions of her first Sandpaper Letters described a strong contrast between the background and the letters (Montessori, 1936/1967/1972).



Photograph 1. *Early childhood Montessori sandpaper letters.* A commercial set of Montessori Sandpaper Letters in the early childhood classroom coded the vowels (blue) and the consonants (pink) affixed on a baseline.

As shown in Photograph 1, the early childhood Montessori Sandpaper Letter material used two different sized cards depending on the size of the letter. Each card required repositioning dependent upon the letterform. (<https://www.heutink.com/int/en/sandpaper-letters-international-print/product/1144/>). A toddler sandpaper letter set needed to have a consistent card size, one orientation (vertical), as well as a baseline alignment.

In addition to the Sandpaper Letters the children needed a separate set of movable letters to match. These would be loose and could be used to match the Sandpaper Letters or in conjunction with other emergent literacy activities. The “movable” letters needed to be sturdy, invite touch, and identical to the sandpaper letters. After researching available commercial Sandpaper Letters and movable alphabets, I noticed an additional inconsistency detail: the colors of the Sandpaper Letter cards and the corresponding movable letters did not match (see Photograph 1 and 2).



Photograph 2. *Early childhood Montessori movable alphabet letter and storage.*

Left; A commercial set of the wooden Montessori movable alphabet letters in print (<https://www.heutink.com/int/en/writing-3-6/page/2585/?CPI=5>); Right; Two wooden storage boxes with lids organized the individual letters (<https://www.heutink.com/int/en/large-movable-alphabet-box/product/3398/>).

As seen in Photograph 1 the commercial Sandpaper Letter cards used a blue background for vowels and pink for consonants. The commercial movable alphabet letters kept the vowels blue but used red for the consonants. Another complication for the small child was the use of large wooden lidded boxes to organize and store the activity. The size and quantity of storage boxes combined with the closed lid negated exploration.

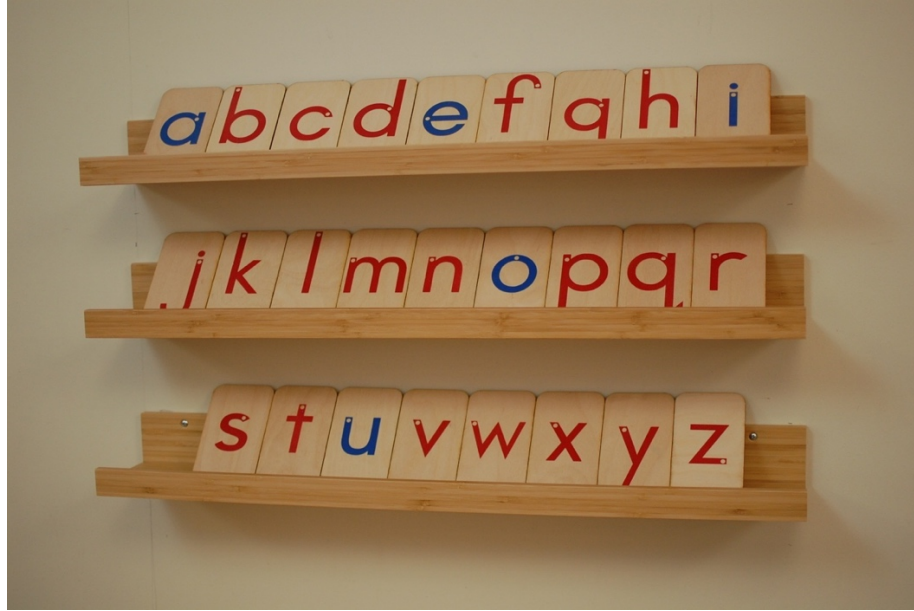
Sandpaper Letters' Design and Construction

I commissioned an Etsy artisan who created a toddler version of the Sandpaper Letters (<https://www.etsy.com/shop/polliwog77>). The set retained two features of the early childhood Sandpaper letters: contrasting colors for vowels and consonants and the use of fine sandpaper for the letters themselves at 150 weight. All other specifics were changed.



Photograph 3. *Sandpaper Letters for the toddler community*. A detail of the Sandpaper Letter consonants (red) and vowels (blue). Each card was 3 inches by 5 inches.

As established, Sandpaper Letters were usually color-coded by their background; a blue background for vowels, red (or pink) for consonants. Typically, the letters themselves were tan (the color of most sandpaper). Instead the commissioned set made the background neutral and each card the same size. Montessori described her original Sandpaper Letters as grouped by similarity of form (Montessori, 1936/1967/1972). In contrast, the artisan set had a consistent size and vertical orientation. They also used a neutral background and *red and blue sandpaper* (red for vowels, blue for consonants). The effect was a greater contrast especially when displayed. This is what Montessori (1936/1967/1972) had intended with her original design of “polished white wood, and the sandpaper black” (p. 210).



Photograph 4. *Sandpaper Letters displayed in the toddler community.* The artisan Sandpaper Setters emphasized the letter forms in high contrast blue and red sandpaper and were organized in alphabetical order.

In addition, each letter included a small, raised ‘dot’ that showed the child where to place his finger when he started tracing the letter (see Photograph 3). I selected a “print” style (versus cursive or D’Nealian) because that was being used in my school’s early childhood program. The finishing touch was rounded edges of the birch wood boards. Two sets of Sandpaper Letters were made by the artisan.

Matching Movable Felt Letters

The artisan made the matching movable alphabet letters out of thick felt. In contrast to the early childhood wooden or more commonly plastic movable alphabet, the felt invited touch and was stiff enough to stand up to use. The felt letters matched the Sandpaper Letters in every way including the little dot (see Photograph 5). Both the early childhood and the toddler designed movable alphabet letters had a control of error but a different design. Most Montessori

materials have been designed for the child's receipt of immediate feedback about her progress as she works. A control of error allowed the child to recognize, self-correct, and learn from an error without adult assistance. The early childhood movable alphabet used the reverse-side of the letter to cue a child to the correct orientation of a specific letter; whereas the perforated dot synced with the toddlers' attention to order and detail (Lillard, & Jessen, 2003/2008).



Photograph 5. *Felt letters*: Left; a view into the felt letter basket. Right; a child positioning a felt letter precisely over its corresponding Sandpaper Letter.

Sandpaper and felt letter display. There are two ways to house Montessori Sandpaper Letters in a classroom. Some educators line them up alphabetically on wall ledges; others put the entire set of letters in a basket. I chose to do both. Having one set on the wall had the added advantage of the letters staying highly visible at all times.



Photograph 6. *Sandpaper Letter wall display and basket storage.* Two different ways I used to house the Sandpaper Letters.

I continued the use of natural materials with the selection of IKEA's bamboo ledges for the wall display and installed them at child-height. The little matching felt letters (see Photograph 5) and second Sandpaper Letter set (see Photograph 6) were kept in wicker baskets on a low shelf in the Language area. All the intervention materials were always available for the child to choose and use on his own.

Mini-sandpaper letters. The final material created was a set of mini-sandpaper letters for assessing the children's letter sounds pre-and post-intervention. As young children learned concretely I did not want to point to letters on a page (Lillard, & Jessen, 2003/2008; Montessori, 1949/2007/2010). I required a manipulatable material that encouraged toddler curiosity. I decided on letters that were small enough to separate into sets and place in bags. Since the mini-letter design was based on the Sandpaper Letters they provided a nice connection to the classroom.



Photograph 7. *Sandpaper Letters and mini-sandpaper letters.* A side-by-side comparison showing the similarities between the classroom Sandpaper Letters and the mini-letters.

Once again, I turned to my Etsy artisan. The mini-sandpaper letters were cut to 1¼” x 3” and identical to the 3” x 5” Sandpaper Letters in every way except for size (see Photograph 7). Two sets of twenty-six letters were made, one for every letter of the alphabet.

Preparation of Data Tools

In order to record the observations and other data collected throughout the intervention I needed appropriate data tools. I designed a set of four tools to meet my needs. Each tool was assembled and I organized them in a binder for recording throughout the intervention.

Pre-intervention baseline and post-intervention letter sound assessment. Ahead of the intervention I established a baseline assessment of each child’s knowledge of letter sounds. I created a modified, informal, letter sound assessment tool (see Appendix A). I divided the

assessment mini-sandpaper letters from the artisan into three groups and placed them in small, attractive, zippered bags. The bags contained the 26 letters of the alphabet in the following groups:

Letter Bag One. /e/, /s/, /p/, /j/, /q/, /n/, /o/, /t/ Total: 8 letters

Letter Bag Two. /d/, /m/, /a/, /h/, /v/, /c/, /b/, /y/, /f/, /x/ Total: 10 letters

Letter Bag Three. /k/, /u/, /r/, /i/, /w/, /l/, /g/, /z/ Total: 8 letters”

Total. 26 letters

Before beginning the formal assessment tool I asked the children to identify letter sounds beginning with a “practice bag” (see Photograph 8).



Photograph 8. *The practice bag and the order of letter introduction: left to right, top to bottom: “First /m/”, then, /s/, then /b/ and finally /f/.*

If a child could not engage with the practice bag or could not identify and letter sounds or names, I ended the experience stopped and I entered a score of zero. Children who could identify one or more sounds continued to Letter Bag One, followed by Letter Bag Two, and so on until they finished all four.

As I showed a child each “mini-sandpaper letter” I asked him to identify the letter sound. I recorded each correct *sound* with a checkmark. If the child said the letter *name* instead of the sound, I wrote down an "N". Both a checkmark and an "N" were worth “one” point. Any error received a score of “zero”. The total scores were tallied for each child. The post-intervention assessment was given, scored, and recorded in the same way.

Sandpaper letter presentation log, by child. Throughout the intervention I recorded each classic Sandpaper Letter lesson in a log (see Appendix B). I considered a single lesson to be comprised of the total time the child and adult spent working together with the Sandpaper Letters, regardless of how many letters were shown. For each lesson I recorded the date, the lesson's beginning and ending time, and whether or not the presentation had been adult- or child-initiated. I noted the letter pair being shown and circled it if this were the first time the pair had been introduced. Subsequent presentations of the letter pair I noted with a tally mark. I also wrote down whether the letter pair being shown was chosen by the child or by the adult.

Once the child retained both letter sounds I highlighted them in green. I also observed and recorded the child's hand/body position and letter pronunciation. Finally, I documented the

three-period lesson and mentioned whether or not one of the three “periods” was extended or eliminated.²

Measuring sound symbol interest. I created a data tool to record how often the Sandpaper Letters were chosen each day and whether or not the activity was initiated by the adult, by the child, or independently explored without a lesson by a child. I totaled the tallies at the end of each day and week (see Appendix C).

Daily observation/field notes. I recorded the observations in real time. For each activity I wrote down the date, time of activity, and number of children present. I also noted whether the child was exploring *with an adult* or *with another child*, the name of the Language activity, how it was being used, and how many children worked with the activity during the observation timeframe. The Language activities included those with and without the use of the Sandpaper Letters (see Appendix D).

Using the Sandpaper Letters

Number of sandpaper letter lessons given, by child. Each day I gave lessons on the Sandpaper Letters to children who accepted my invitation. I always offered lessons individually, never to a group. Sometimes I invited a child, other times a child asked for a lesson. I utilized the same presentation method each time.³ I also always seated the child receiving the lesson on my subdominant side so he could better see my hands. This is a standard Montessori technique. When I invited a child to a lesson we sat at the table near the wall ledges (see Photograph 6).

² A child needing more repetition to retain a letter sound might have Period 1 or 2 repeated.

Period 3 would be eliminated if the child needed more repetition or support with Periods 1 or 2.

³ In Montessori a lesson is formally referred to as a “presentation”.

Lessons the child initiated sometimes took place at this table, a floor table, and occasionally at the child's work mat – whatever seemed most natural.

During the intervention my *aim* was to give a minimum of one Sandpaper Letter lesson to each child per week. However, my *expectation* was that I would show between one and five. I believed the lesson frequency would vary depending on several factors; attendance, time limits, but mostly because of the response of the child. Children were free to request a lesson whenever they wished and were always accommodated. Therefore the children's choices helped drive the numbers of letters presented within a lesson.

Order of sandpaper letters shown. I planned to present the Sandpaper Letters in pairs of contrasting sounds (a modification of the Montessori Applied to Children at Risk, MACAR, sequence). The MACAR (2009) letter pairings by Barnett & Pickering offered a sequential, systematic approach (p. 97). The MACAR sequence included /sh/ and /th/: I added /chr/. Digraphs are combinations of two or more letters which make one sound, such as “sh”. In Montessori practice digraphs are referred to generically as “phonograms” (Seton Montessori Institute, 2008). The letter pairings were as follows: ⁴

a, t	p, h	c, n	l, b	f, s
g, m	j, v	i, k	w, z	u, e
y, q	o, x	sh	th	chr

⁴ The chart was taken directly from the MACAR course handbook. It contains an error because it does not include the letters /d/ and /r/. When I showed the Sandpaper Letters I corrected for this and did teach those sounds.

Description of sandpaper letter presentation: I selected two letters from the MACAR sequence. I turned up one Sandpaper Letter and placed it in front of myself. Then, starting on the letter ‘dot’, I traced it slowly with two fingers mimicking the way one would write. I did this three times, silently. Next, I moved the Letter in front of the child and invited him to trace it three times silently as well. Then I took the Letter back and traced it three times again, but this time said the sound while I was tracing. Finally, I encouraged the child to repeat what I had done, tracing the letter while saying the sound three times. I turned over the Sandpaper Letter, selected the second of the pair, and repeated the entire process.

At the end of the presentation of each letter pair I followed up by giving the child a classic Montessori “three-period lesson”. This is standard Montessori practice after a Sandpaper Letter lesson (Dwyer, 2004; Montessori, 1967/1972). I gave the lesson as follows:

1st period, receiving the sound. I pointed to each Sandpaper Letter in turn and said the sound at the same time, "This says /a/. This says /t/."

2nd period, processing the sound and responding to command. I asked the child to “Show me /t/,” then, after the child responded, “Show me /a/.”

3rd period, identifying the sound. I pointed to each Sandpaper Letter one at a time and asked, "What's this sound?"

When the child responded I recorded the results. Typically, in Montessori toddler methodology, we only offer the third period if the child demonstrates competency with the second period: if not, the third period is eliminated (Seton Montessori Institute, 2016). I adhered to this practice. At this point the lesson would end unless the child was eager to learn more letters, in which case we continued the experience.

Sandpaper letter extensions. Once a child had learned and retained a minimum of three letter sounds I planned to introduce him to additional “extension” lessons using the Sandpaper Letters.⁵ As the first two extensions involved matching, knowledge of a minimum of three to five phonetic sounds would give the child a chance to repeat within the body of the lesson. I designed the first two lessons to reinforce the letter symbols and sounds.

Unexpectedly, however, before I had the chance to start showing the first two extensions, I watched in surprise as the children “discovered”, on their own, the same activities I had planned to show. Although the children were always free to select and use the Language materials this was still an unexpected development. In my years as a Montessori preschool educator I had never seen this happen without a lesson. In the first instance the children matched a Sandpaper Letter from one set to the same letter in the other set. In the second they matched a felt letter to an identical Sandpaper Letter.

Although I had identified pre-requisites for these two activities, once the children initiated their use I simply observed to confirm they were, indeed, matching, tracing the letters, and saying the sounds (in fact, they traced and said the sounds of both letters). Since they were, and since this happened throughout the intervention, I never needed to formally present the extensions.

The third extension involved initial sounds. I had planned to show the children how to select an object, name it, and then pair it with a felt letter representing the first sound. However, once again, I looked up one day to see a child had “discovered” this activity as well. Soon other

⁵ These follow-up activities are similar to those used in Montessori preschool after a child has had Sandpaper Letter presentations.

children began to follow suit. Consequently, I never needed to present this extension either. The three extension lessons, as planned, have been written out in Appendix E.

Timeline and Description of Intervention

Prior to the intervention, I sent assent letters to every family who had a child enrolled in my class (see Appendix F). All the families opted for their child to participate in the intervention which eventually consisted of 17 children; ten girls and seven boys. I assigned each student a number to preserve confidentiality. The children ranged in age from two years, four months to three years, four months.⁶ Four of the children were non-native English speakers

During the two days before the intervention was set to begin I gave the baseline assessment. I worked with one child at a time at a table in a quiet space located just outside the classroom. I followed the same procedure and script for each assessment (see Appendix A). My clipboard with the recording tool I kept to one side. I wanted to keep the child focused only on the letters. I also wanted the assessment to simply seem like just another new lesson “Ms. Beth” was showing.

When the four-week period began we had a fairly simple routine (see Appendix G). At 9:00 a.m. I did the first of my two daily fifteen-minute observations concentrating on the use of the Language materials. When observing a child, the focus of the observations varied and generally included (but was not limited to) which Language activity was being used, the level of interest in the activity, how the activity was used, signs of development, and indications the child was ready for a more advanced experience. In addition, I wrote down anomalies such as

⁶ The intervention took place in the latter part of the school year when a number of the children had already started to turn three.

absences, a snow day or other unforeseen circumstances. I also documented any spontaneous, unexpected use of a Language activity that occurred. I recorded all information in real time.

At 9:15 a.m. following the end of first observation I would generally move to the table by the display of Sandpaper Letters and begin giving and recording lessons and assisting in the environment (see Appendices B, and C). I did the second fifteen-minute observation at 10:00 a.m. At 10:15 a.m. I returned to the Sandpaper Letter lessons or interacted with the children in other ways as needed, culminating in our sharing of a community snack, followed by dismissal.

At the end of each week I went through both the Sandpaper Letter lesson log and the observations and tallied how many times the Sandpaper Letters had been in use and whether the activity was initiated by the child or by the educator (see Appendix B and C).

This routine was followed throughout the intervention. At the end I gave each child another letter sound assessment identical to the first. As with the pre-intervention, these took place over two days. All that remained was to tally and analyze the data.

Analysis of Data

Over a period of four weeks, seventeen 2-and 3-year old children, representing the total number of children in a Montessori half-day toddler program, were given letter sound lessons with Montessori Sandpaper Letters. The intention was to observe how the intervention of this material affected emergent literacy behaviors. Information about each child was gathered from the following data.⁷

⁷ [\[1\]](#) For the purpose of this study each child was referred to by the letter “C” followed by a numeral.

An assessment was given before and after the intervention (see Appendix A). During the assessment, data was collected on the children's knowledge of letter names and letter sounds. Children were shown mini-sandpaper letters and asked to identify the corresponding phonetic sounds. Each correctly identified letter sound received a score of "one": an error in identification received a "zero". If the child offered a letter name instead of a sound this was also scored as "one" with the addition of an "N" for "name". The scores from each child's pre- and post-intervention assessments were then tabulated and compared.

Information was also documented during daily observations of the children's Language work (see Appendix D). The goal of the observations was to get the clearest picture of how the Language materials were being used and to note any changes in emergent literacy behavior. The recorded activities were coded for the purpose of analysis (see Appendix I).

The study also used a tally chart to record whether the intervention of the Sandpaper Letters resulted in any change in the children's interest in letter sounds. Each tally indicated whether a Sandpaper Letter lesson was adult-initiated or child-initiated (see Appendix C).

In addition, the number of Sandpaper Letter lessons given per child was tracked along with whether the child *asked* for a Sandpaper Lesson or whether a lesson had been offered by the adult (see Appendix B). Finally, all data was compared to recorded changes in letter sound knowledge as well as to any changes in emergent literacy behaviors observed over the four-week period.

Analysis of Letter Sound Knowledge, Only

In the pre- and post-intervention assessment tool, information was collected on the child's responses whether they applied to letter *names* or letter *sounds*.⁸ This was done even though the assessor only asked for the letter sound, not the name. However, for the purposes of data analysis only letter *sound* knowledge was included. This was done because it was decided that letter *name* knowledge was not relevant.

In Montessori, only the letter *sound* is taught with the Sandpaper Letters and this method was followed during the intervention. Because only sounds were taught any change seen in letter name knowledge could not be the result of the Sandpaper Letter lessons and was therefore incidental to this study.

⁸ The information on knowledge of both letter names and sounds pre- and post-intervention can be seen in the raw data (see Appendix H).

Table 1.

Pre and Post-Intervention Letter Sound Knowledge and the Number of Sandpaper Letter Lessons Provided

Child	Pre-Assessment (Sounds Known)	Post-Assessment (Sounds Known)	Change	Number of Sandpaper Letter Presentations
C1	12/46%	25/96%	+13	3
C2	12/46%	13/50%	+1	6
C3	0/0%	7/27%	+7	4
C4	8 /31%	8/31%	0	2
C5	0/0%	4/15%	+4	6
C6	0/0%	8/31%	+8	5
C7	0/0%	9/35%	+9	3
C8	14 /54%	7/27%	-7	7
C9	17/65%	24/92%	+7	12
C10	0/0%	2/7%	+2	4
C11	0/0%	2/7%	+2	2
C12	0/0%	0/0%	0	5
C13	0/0%	13/50%	+13	10
C14	5/19%	17/46%	+12	4
C15	8/31%	0/0%	-8	2
C16	0/0%	11/42%	+11	8
C17	0/0%	3/12%	+3	0

Note: Positive gains are in bold in the 'change' column and also marked with a plus sign.

Percentages represent the proportion of letters known out of the 26 alphabet letter sounds.

Prior to the intervention seven out of 17 children demonstrated varying levels of letter sound knowledge (see Table 1). By the end of the four-week period this had increased to 15. Thirteen out of 17 children, or 76%, showed an increase in letter sound identification; two children (C4, C12) showed no change over the study; two children (C8, C15) had a decrease in net sounds known. Ten children whose scores increased began the study at “zero sounds known”. The highest individual increase was C13 who went from 0 sounds known to 13. The lowest increase was shown by C2 who went from 12 sounds known to 13 (see Table 1).

Comparison of Sound Knowledge to Number of Lessons Given

Information was collected to eliminate concerns that children who had a large number of Sandpaper Letter lessons might have skewed the overall data. However, Table 1 showed there was no consistent correlation between the two. For example C9, who had the most lessons (13), went from 17 sounds known to 24. However, C13, who had only eight lessons over the same period, showed the highest increase, starting the intervention at “zero sounds known” and ending with 13. C17 had no direct Sandpaper Letter lessons at all preferring to observe the presentations of others. In addition, even without lessons C17 went from “zero sounds known” at the start of the study to “three sounds known” by the end. C17 was also the youngest of the 17 children at 2 years and 4 months.

Daily Observations

Daily scheduled observation. Observation is the foundation of the Montessori educational approach. Therefore, over the course of the four-week intervention forty 15-minute scheduled observations were made that coincided with the daily classroom work period (see Appendix D). The observations focused on the Language area which included vocabulary

development (concrete, representational, and abstract); books; art; and ‘other’ language activities (see Photograph 9).



Photograph 9. *Toddler language activities*. Top, left; Concrete (Asian fruit); Top, right; Representational (Community helper figures and matching card); Bottom, left; Abstract (Matching picture sets); and bottom, right; Other (Sequencing with a book).

During the first week of the intervention the representational vocabulary activities comprised 25% of Language materials used. By the fourth week this had dropped to 9%. The abstract activities, however, went up from 9% to 12% (see Figure 2).

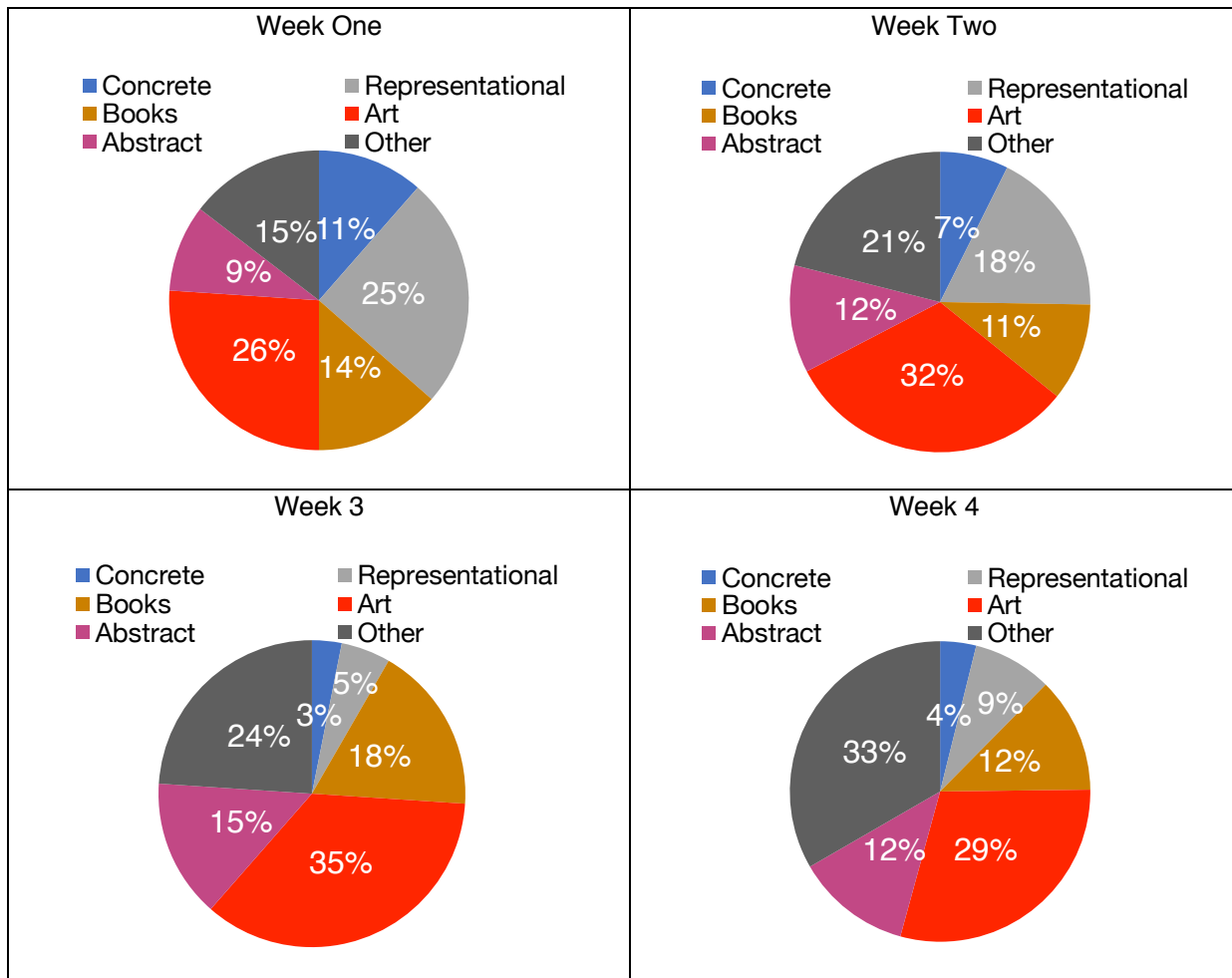


Figure 2. A four-week comparison of the utilization of the classroom Language activities.

The Language activities could be explored with a teacher, another child, or independently throughout the morning classroom period.

‘Other’ Language activities showed a gain of 18 percentage points (see Figure 2). ‘Other’ included sequencing; the farm with printed labels; classification with printed labels: plant/animal and land/air/water; classification of language concepts such as Rhyming, Things that Go Together, Opposites; and the “I Spy” game for beginning/ending sound activities. Analysis of the classroom Language activities over the four weeks revealed an expanding culture of emergent literacy awareness.

Narrative field note documentation. Typical Montessori toddler teacher practice included guidance (as needed) to the children and observation when support was unnecessary. The study’s observation tool included field notes labeled ‘Spontaneous moments’ (see Appendix D). Seventeen narrative observations were recorded (see Appendix I). Each narrative was coded and tallied for emergent literacy behaviors over the four-week intervention (see Table 2).

Table 2.

Emergent Literacy Behaviors Observed Over Four-Week Intervention, Divided by Category⁹

Category of Emergent Literacy Behavior	Number of times observed
1. VOCABULARY DEVELOPMENT	
1a. Concrete vocabulary (object-to-object; classifying real objects)	3
1b. Representational vocabulary (object-to-picture)	0
1c. Abstract vocabulary (picture-to-picture; classifying pictures)	2
2. SEQUENCING	
2a. Oral story-telling	0
2b. Sequence cards	0
2c. Organization of the activity (i.e. left to right, top to bottom, work has a beginning, middle, and end)	21
3. PRINT AWARENESS	

⁹ In this Table 2 “emergent literacy behaviors” referred to the children’s correct use of a specific Language material each of which represented a particular emergent literacy skill.

3a. Books, street and school signs, logos in everyday situations (i.e. in our Montessori classroom, school campus)	0
3b. Book exploring; turning pages, telling the story out loud, reading to another child or with an adult	1
3c. Letter symbol awareness (matching in different forms)	8
3d. Tracing & writing letters (i.e. number of fingers, palmar or pincer)	11
3e. Becoming aware of correct orientation of letters (top-to-bottom, left-to-right) and are placed side-by-side, left-to-right, when building a word	4
4. PHONOLOGICAL AWARENESS	
4a. Rhyming songs, games and chants, and objects/pictures (e.g., "cat-hat")	2
4b. Alliteration (i.e., "big bears bounce on beds")	0
4c. Work with syllables in spoken words; the ability to hear, identify, and manipulate the individual phonemes in spoken words)	1
5. PHONEMIC AWARENESS	
5a. Saying letter names.	2
5b. Saying letter sounds.	8
5c. "I Spy" game, isolating sounds (i.e. "/f/ is the first sound in the word fish").	5
5d. Orally recognizing words are comprised of separate sounds, for example, that the word cat is composed three phonemes: /c/, /a/, /t/	2
5e. "Mapping" sounds using printed letters - printed letter with an object or picture for a beginning sound	1

5f. “Mapping” sounds using printed letters with an object or picture for word building	2
6. CHILD OBSERVING OTHERS’ USE OF LANGUAGE ACTIVITIES	
6a. Child observing	12
6b. Child observing leading to work	11
7. CHILD-INITIATED WORK	
	10

Note. Positive gains are in bold.

A concurrent decrease in the use of vocabulary materials was identified in the analysis of the daily scheduled and narrative observations, particularly the concrete activities (see Figure 2 and Table 2). However, during the second week of the intervention, the use of the familiar vocabulary materials as well as the ‘Other’ Language activities increased along with an overall advancement in skills (see Table 2). The narrative example revealed a familiar classroom vocabulary activity (concrete) utilized by a participant C9 to match and name the real fruits (see Table 3). However, C9 initiated the connection between a fruit’s name, the beginning sound, and a sandpaper letter. The emergent literacy skills C9 demonstrated illuminated the awareness that increased across the culture of this toddler community as detailed in Figure 2.

Table 3.

Example of a Narrative Record Coded for Emergent Literacy Behavior

February 4, 2020. Observation began at 9:30 a.m.	Researcher notes and codes
C9 is at a floor mat. C9 has selected a basket of real, exotic fruits. C13 is observing. C9 takes out each fruit, places one at a time on the rug. “Dragon fruit.” C9 puts the other fruit beside it. “Rambutan,” C9 says. “This is	<u>1a</u> Naming objects <u>5c</u> Isolating initial sound with familiar object

fuzzy. Dragon fruit has scales.” C13 hands the other fruit to C9. Continues until has matched all the fruits. Looking at the fruit. C9 gets up and walks to the Sandpaper Letter ledger shelf. C9 selects /r/. Places the Sandpaper Letter on the rug and traces it. C9 places /r/ next to rambutan. C9 walks back to the ledger shelf, and C13 follows. “This is /s/.” C9 puts /s/ on the rug, traces, and places beside starfruit. She proceeds with /d/ for dragon fruit, /m/ mango. C9 directs C13 to put the fruit away. C9 puts the letters back onto the Sandpaper Letter ledger shelf. Observation ended 9:58 a.m.	8 Child idea. Not a previously given classroom presentation. 3d One finger trace. <u>7b</u> Peer begins by watching and is included in the process. 2c Work cycle has a beginning, middle and end. Child is directing another child.
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Observations also revealed new emergent literacy behaviors such as letters appearing in children’s art. Simultaneously there was a rise in phonological awareness evidenced by the spontaneous matching of Sandpaper Letter and felt letter sets; again, *the teacher did not show this connection*. Data also marked an unexpected increase in the number of children watching *others* who were using Language work (see Table 3).

Week two also saw the advent of phonemic awareness, an emergent literacy behavior where children demonstrated an understanding that words were comprised of individual phonemes. The first indication was spontaneous matching of objects to letters with the same beginning sound (see Photograph 10). New activities in the third week included a child who took a Sandpaper Letter to the chalkboard and began writing. Near the end of the fourth week a

number of children were able to break down words into phonemes and “build” them using the Sandpaper Letters, another emergent literacy skill.¹⁰



Photograph 10. *Montessori Sandpaper Letters used for phonemic awareness. Top, left; Matching Sandpaper Letter sets; Top, right; Matching the felt letters with a Sandpaper Letter; Bottom; Use of the Sandpaper Letters to build a word.*

¹⁰ In Montessori the term “word building” is used for this early phonetic form of spelling.

The documented increase in the use of Language activities along with the display of emergent literacy behaviors coincided with a rising demand from children for Sandpaper Letter lessons. The increases also coincided with their spontaneous extension of Sandpaper Letters and felt letters into other activities (see Appendix E).

Number of Sandpaper Letter Lessons Given

The initial intention was to give Sandpaper Letter lessons one to five times a week, per child, or an average of 2.5 a week. The expectation was that the number of lessons each week would vary depending on child response. The final average number of lessons given resulted in 5.05 per week, double the anticipated mean (see Table 4).

Table 4

Number of Total Sandpaper Letter Lessons Over Intervention, Both Child- and Adult-Initiated

Child	Week 1	Week 2	Week 3	Week 4	Total
C1	0	1	2	1	4
C2	1	2	0	3	6
C3	2	0	1	1	4
C4	1	0	1	1	3
C5	0	0	3	3	6
C6	0	1	2	2	5
C7	1	0	1	1	3
C8	1	0	3	3	7
C9	4	3	3	3	13
C10	1	1	0	2	4
C11	1	0	0	1	2

C12	1	2	1	1	5
C13	3	2	1	4	10
C14	1	1	1	1	4
C15	0	0	1	1	2
C16	1	1	2	4	8
C17	0	0	0	0	0
<hr/>					
TOTALS	18	14	22	32	86

Comparison of Child - Versus Adult-Initiated Sandpaper Letter Lessons

Sandpaper Letter lessons were either offered by the adult or given in response to a child's request (see Appendix B). When data were analyzed there was a demonstrated 140% *increase* in child-initiated lessons over the four weeks compared to a simultaneous 50% *decrease* in adult-guided lessons. Specifically, at the start of the study children initiated 56% of Sandpaper Letter lessons. By the end of the study, 86% of the Sandpaper letters were child-initiated while 14% were adult-guided (see Figure 3).

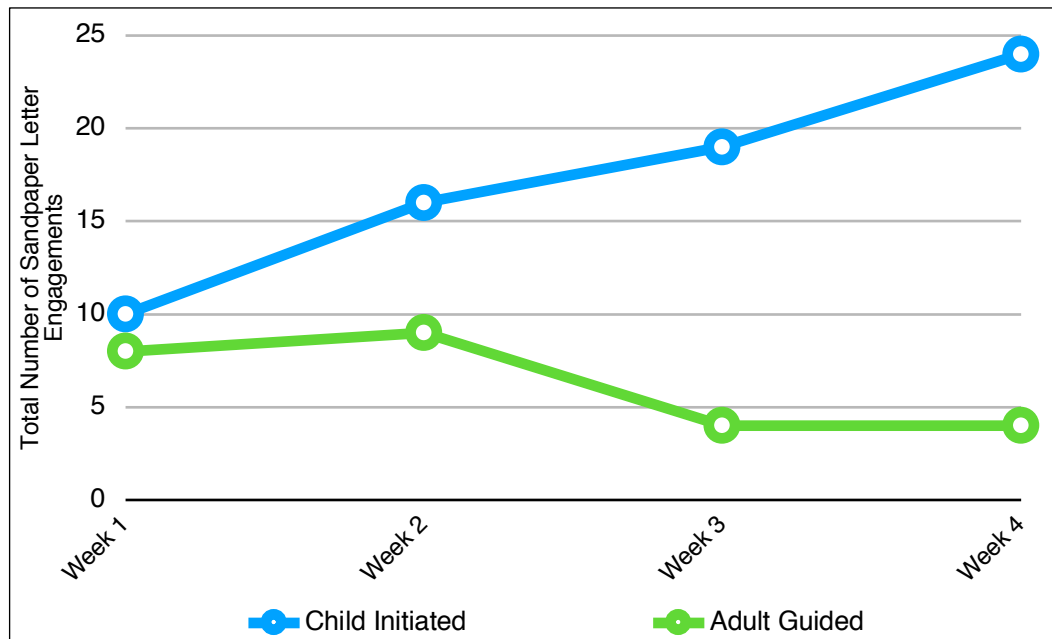


Figure 3. *Child-initiated Sandpaper Letter lessons versus adult-guided.* A comparison of the number of Sandpaper Letter engagements and the development of interest in Sandpaper Letter lessons over the four-week intervention.

Comparison of Child- Versus Adult-Initiated *Letter Pairs* Introduced

The intervention necessitated a pre-established sequence of letters pairs to show each child. To this end a modification of the Montessori Applied to Children at Risk sequence was used (MACAR, 2009). All Sandpaper Letter lessons began with MACAR pairings.

During each lesson a child might ask to learn specific letters in addition to those already shown by the educator. For example, participants C5, C6, C7, C9, C13, and C17 always indicated a preference for a particular letter at the start of each lesson. Some children showed a preference for the letter/s representing the first sound of their name. Children also showed interest in letters representing first sounds of their sibling's name, pet, mother or father (see Appendix E).

Requests were recorded as “child-initiated”. Data revealed that children’s requests accounted for the overall increase seen in the number of *letter pairs* shown during a single lesson. Data was as follows:

Week One. 18 lessons were given to 13 participants representing a total of 32 letter pairs.

Week Two. 14 lessons were given to 9 participants for a total of 30 letter pairs.

Week Three. 22 lessons were given to 12 participants for a total of 48 letter pairs.

Week Four. 32 lessons were given to 15 participants for a total of 103 letter pairs.

The largest increases were seen during weeks three and four. Though there was a slight drop in letters shown between weeks one and two, week three had a 60% increase compared to week two. Week four had a 115% increase compared to week three. Overall there was a 222% total increase in letters shown the first week compared to letters shown in week four. When the data was broken down out by child the number of letter pairs shown varied from child to child and lesson to lesson.

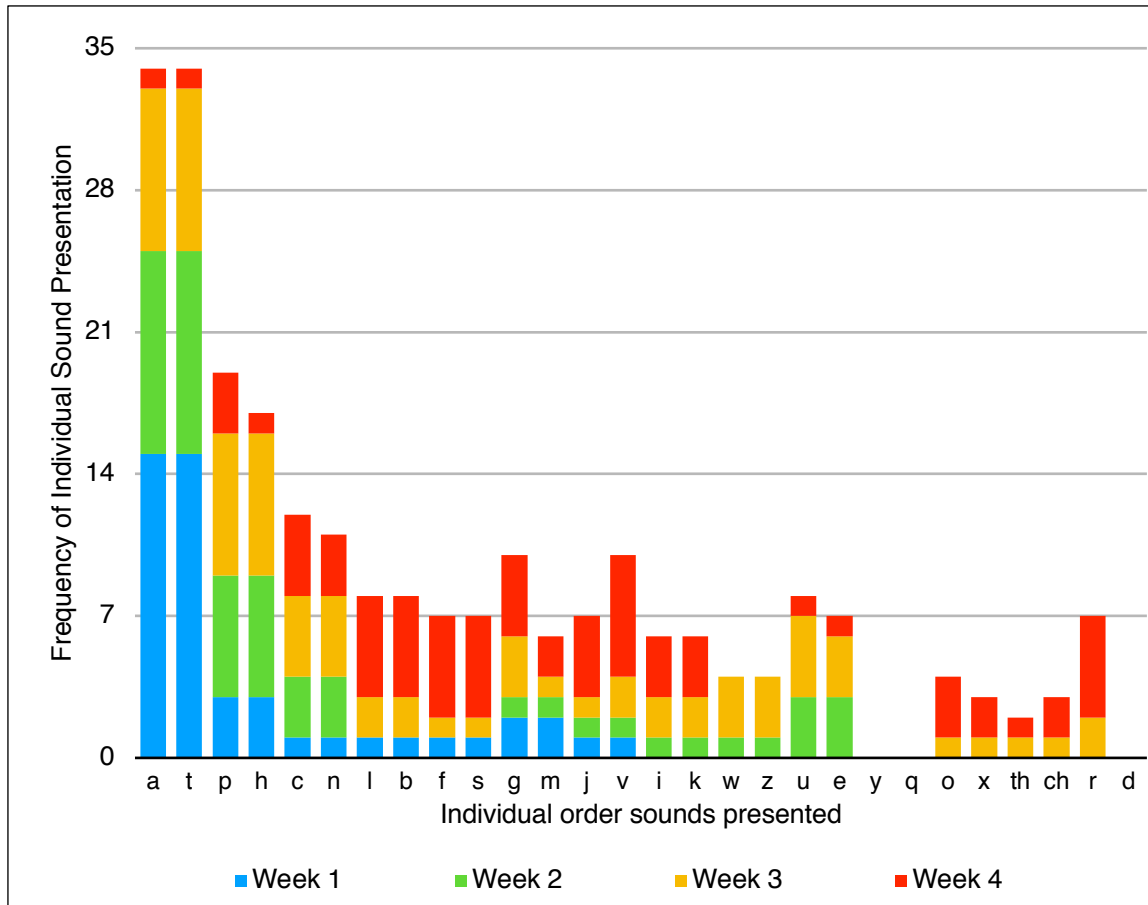


Figure 4. Lesson frequency of each alphabet letter, week by week; illustrates sequence of letter sounds presented and their frequency over four-week intervention.

Comparison of Sandpaper Letter Lessons Shown By Alphabet Letter

The comparison clarified whether some letters had been shown more than others. Data revealed that /a, t/ were shown most frequently, reflecting the first of the MACAR pairings. Letters /l/, /b/, /s/, /v/ and /r/ were shown more often as well. However, these were not MACAR driven but instead reflected first letters of children’s names. By the final week, alphabet letter presentations were fairly well distributed while the original /a/t/ MACAR letter pair lesson had dropped significantly in number (see Figure 4).

Discussion

During a four-week intervention I introduced the Montessori Sandpaper Letters to a 2- and 3-year old toddler community. The lessons on the Sandpaper Letters were in addition to the Montessori Language activities that already existed in the classroom (see Appendix J). Based on the data collected over this period of time, the children showed an increase in their use of the Language materials as well as an increase in the number and complexity of their emergent literacy behaviors. They also showed an overall increase in the number of letter sounds known.

Increase In Language Activities and Emergent Literacy Behaviors

While it might be difficult to draw a line from the Sandpaper Letters to the observed increase in the use of books or sequencing activities, for example, the advancement of the children's language skills from concrete to symbolic included the advent of writing, as well as phonological and phonemic awareness. These activities related directly to the Sandpaper Letters and demonstrated new and significant emergent literacy behaviors.

Some *phonological* awareness activities (matching of symbols) and *phonemic* awareness (matching beginning sound symbols to objects) were particularly striking because the children were not shown how to do them. These activities happened spontaneously when the children discovered the connection between oral sounds and letter symbols. At the end of the study several children were also able to build words by individual phonemes.

Data also showed an increase in the children's requests for Sandpaper Letter lessons over the course of the intervention. there was a 140% increase in Sandpaper Letter lessons *initiated by the child* while at the same time the number of lessons guided by the adult dropped by 50% (See Figure 3). There was also a 222% increase in the number of letters shown during a lesson that were *asked* for by the child.

These unexpected results were significant to me for two reasons. First, from the start of this research I was concerned that my own enthusiasm for the Language area would skew the children's interest in the Sandpaper Letters. However, the fact that it was the children's choice, not my lessons, which ultimately drove the use of the Letters seemed to belie this concern. Second, the importance of a child's choice in learning aligned with the Montessori approach. Montessori's own observations underscored how essential it was to support the child's choices as they not only informed best practice but allowed the child to direct his own learning. (Montessori, 1936/1966/1972; Montessori, 1949/2007/2010; Montessori, 1918/2007; Montessori, 1948/2008).

A particularly germane example was the increase seen in the number of children who observed others using Language activities and the impact this had on their behavior. The more the children watched, the more often they accepted invitations to join, and the more often they chose the same activity later on their own.

A final result seen in the data was that, by the end of the study, overall letter sound knowledge had increased. Specifically, thirteen of the seventeen participants (76%) increased their letter sound identification. Interestingly, the data also revealed that there was not always a correlation between the number of lessons given to a child and the number of sounds he identified.

Significance of Research on Student Learning

Connecting Sandpaper Letters to child's experience. The intervention data showed a clear increase in the children's requests for Sandpaper Letter lessons and for certain letters to be taught. One reason this may have occurred is that I adjusted the lessons so they connected with the children's lives and experiences. The children showed a much greater enthusiasm for letter

sounds when they reflected their own names or names of family members. This was consistent with research affirming the connection between relevant learning and a child's interest level which is consistent with previous research (Elkind, 2012; Nel, 2000; van Kleeck & Schuele, 2010).

Observation of movement when matching Sandpaper Letters. While observing the toddlers match the Sandpaper Letters I noticed that they engaged differently with them than Montessori preschoolers performing the same activity: the toddlers used more movement. Preschool children typically traced and/or matched letters using their fingers and hands. The toddler participants in this study also traced the letters using a finger. However, when they began to match sets of letters they held them over their heads, manipulated them, and even rolled while holding them before intentionally placing them side-by-side. This raised the question as to whether movement was helpful or required in order to better process what they were learning, and, if so, this made sense considering the neural forest the toddler was navigating (Eliot, 2009).

Impact of the Study on the Conducting Researcher

Design of Sandpaper Letters, felt letters, and their display. For the purpose of the study I commissioned a variation of the early childhood Sandpaper Letters to be made. After observing them in use I concluded that most of the characteristics of the new letters were a good fit for the toddler child. However, I found that the size of the letter card was a bit small. If I were to have them made again I would increase both the width and height by $\frac{1}{2}$ inch (to 3.5" x 5.5"). This would make the cards a bit easier to hold.

The felt letters also proved effective. Every feature matched the Sandpaper Letters so exactly that their connection was immediately obvious. The tiny "starting dots" were present on both Sandpaper Letters and felt letters. The children were so aware of the dots that when they

matched a felt letter to a Sandpaper Letter, they not only made sure the letter itself aligned but that the dot precisely aligned as well. This was consistent with Montessori's observations about the young child's need for exactness and order (Montessori, 1936/1966/1972; Montessori 1936/1967/1972; Montessori, 1949/2007/2010; Montessori, 2012). The Sandpaper Letter wall display at child height meant the letters were always visible and accessible to the child, as were the other letter materials, making the possibility of spontaneous matching and other work more likely.

Spontaneous learning. I described how the children, without being taught, thought to match Sandpaper Letters sets, matched felt letters to Sandpaper Letters, and even placed a letter next to an object to indicate its first sound, all without being shown. I believe there are a number of explanations why this occurred.

First, this built on existing skills of matching already practiced in the class: matching of objects, objects to pictures, or pictures to pictures. In addition, I believe both the design and accessibility of the Sandpaper Letter materials played a part in the children's spontaneous learning. In a Montessori early childhood classroom, matching the Sandpaper Letters to a movable letter is 'taught'. I had not seen preschool children making this connection on their own. One reason might be that in many preschool environments these materials were not an exact match. Designing the letter materials to be identical in size and color emphasized their relationship and made it more likely the children would notice the connections on their own. The children also could not have matched Sandpaper Letters had there not been two sets, and had the children not been free to choose both materials.

The spontaneous discovery of matching letters to objects with the same beginning sound was an activity which built on existing knowledge (Elkind, 2012; Nels, 2000; Kim et al., 2015;

Lillard, 2005/2007; Romeo et al., 2018, Soundy, 2003). Since the start of the school year we had played oral games such as “I Spy” focused on beginning sounds. I do not believe the connection from sound to symbol would have been made had this foundation not already been in place.

All of these; building a strong foundation in the Language curriculum, a successful material design (determined by observation), accessibility of materials, and free choice seemed necessary to the spontaneous learning I witnessed (Lillard, 2005/2007; Montanaro, 1991/2003; Montessori, 1936/1967/1972; Montessori, 1949/2007/2010; Montessori, 2012; Soundy, 2003). The child-initiated learning I observed also seemed to highlight the correlation between self-directed learning and positive learning objectives as part of a total developmental environment.

Presentation of phonograms. Digraphs are combinations of two or more letters which make one sound, such as “sh”. In Montessori they are referred to generically as “phonograms” (Seton Montessori Institute, 2016). I did not intend to include the presentation of phonograms during the intervention. However, the MACAR letter pairings system included two phonograms. In addition, some of the children asked for digraph sounds to be shown.

In one of the oral beginning sound games we routinely played I would invite all the children whose names began with the sound /c/ (for example) to go wash their hands before community snack. Some of the children's names began with /th/ and /chr/. During the intervention these children asked for a lesson on the first sound of their name. Since I did not have a phonogram material I simply put the relevant letters side-by-side. The children were delighted that their name used more than one letter. I only presented phonograms to the children who asked. However, the other children, particularly those actively listening, would have been able to absorb them. C9, for example, was able, to give the beginning sound for /chr/ without a lesson.

Montessori applied to children at risk (MACAR) Sandpaper Letter pairs.

Throughout the study I used MACAR guidelines for the sequence of Sandpaper Letter lessons (Barnett & Pickering, 2009). While presenting them I discovered a number of the pairs had visual but not auditory differences: both were important for optimal learning. For example, the pairing /p/ and /h/ were visually different but the sounds were not distinct enough from each other for a very young learner. Going forward I plan to develop my own letter combinations with both visual and auditory differences. As with the original MACAR pairs I will begin lessons with my own letter selections but then adapt to align with each a child's interests.

Vocabulary materials. During the study there was a reduction in the use of some of the vocabulary materials, particularly the concrete and the representational items. One possible explanation may be that I refrained from altering the environment during the four-week intervention. The decrease seen was a reminder to find other ways to enhance a child's vocabulary as part of a best practice pre-literacy curriculum (Rhyner, 2009; Romero et al., 2018; Whitehurst & Lonigan, 1998). This would include selecting books with more advanced vocabulary and making sure all adults were using the environment itself, indoors and outdoors, to enhance vocabulary and nomenclature.

Daily observation schedule. In order to achieve consistency the study was designed with scheduled observations at pre-arranged times. While this method was appropriate for the intervention it was very restrictive and I will not continue it going forward. Typical Montessori toddler teacher practice included guidance as needed to the children and observation when support was unnecessary (Lillard, 2005/2007; Montessori, 1936/1966/1972; Montessori, 1949/2007/2010; Montessori, 2012).

Design of letter name and letter sound data assessment tool: I designed an assessment tool which established a baseline for both letter name knowledge and letter sound knowledge. However, because we do not teach letter names with the Montessori Sandpaper Letters I would recommend anyone duplicating this study revise the assessment tool to reflect letter sounds only.

Limitations of the Study

Since all the members of the chosen toddler classroom participated in this study no selection bias can be claimed. Repetitions of the study could be done to rule out coincidental bias such as variations in cognitive skills or existing letter awareness stemming from the home environment.

The toddlers in this Montessori community were between 24 and 36 months of age. I did not perform a breakdown comparison between those children who learned more sounds and their corresponding ages because the intervention was so small. Additional studies would be necessary to provide large enough samplings for such data to be relevant.

A confirmation bias might be present as regards the child's choice and how it affected their Sandpaper Letter lessons. A significant finding of Montessori's own research was that children engaged and learned best when, among other factors, they were given the freedom to choose (Montessori, 1936/1966/1972; Montessori, 1918/2007; Montessori, 1949/2007/2010; Montessori, 1948/2008). The results reflected in Figure 3 reflected these findings. Results might differ if the Sandpaper Letters were given in a setting where all the lessons were adult-guided. However, in a Montessori classroom, this would be antithetical to our approach.

Finally, the research study began in January, six months into the school year. During this period the children were immersed in many Language activities from aural to print awareness, and from concrete to representational. One could argue that the introduction of symbolic work

came at just the perfect time in their learning. Other studies could be done which included the Sandpaper Letters from the first week. Regardless, I would not introduce such a symbolic activity to a child without being sure the underlying foundation of oral vocabulary development was solid (Dwyer, 2004; Montessori, 1949/2007/2010; Soundy, 2003). On the other hand one has to wonder how much more progress would have been seen had the intervention continued beyond the assigned four weeks.

Avenues for Future Research

Since this teacher-action research took place in a single Montessori toddler classroom the sampling was unavoidably small. To confirm my results additional studies would have to be carried out in numerous classroom settings. Variations of the research could include studying full-day children (all participants in my study were half-day) to measure levels of growth or even children spanning 18 to 36 months of age.

Another avenue for related research might include analyzing letter sound acquisition comparing lessons that connect children's real-life experiences versus those that do not. During the study I also found the need for more specific and effective toddler assessment tools. Future studies could work on developing appropriate options.

A final question I had in mind is whether we, as Montessori educators, had become overly concerned with blurring the lines between Montessori class levels (in this case toddler-preschool) at the expense of the individual child whose developing emergent literacy behaviors required an outlet and support. Montessori (2012) said, "What we advocate is not just an ideal. What we advocate is the right environment and the right psychic treatment"(pg. 114). While acknowledging the differences in development between toddler and preschool, the Montessori

approach has always been to observe and respond to each child, foregoing the prejudice of preconceived ideas, so as to best meet individual needs.

References

- Bara, F., Gentaz, E., Colé, P., & Sprenger-Charolles, L. (2004). The visuo-haptic and haptic exploration of letters increases the kindergarten-children's understanding of the alphabetic principle. *Cognitive development, 19*(3), pgs. 433-449. Retrieved from: <https://doi.org/10.1016/j.cogdev.2004.05.003>
- Barnett, C. & Pickering, J. (2009). *Montessori applied to children at risk oral and written language curriculum teacher manual*, pgs. 97-98. Dallas, TX: The Shelton Way.
- Can, D. D., Ginsburg-Block, M., Golinkoff, R. M., & Hirsh-Pasek, K. (2013). A long-term predictive validity study: Can the CDI short form be used to predict language and early literacy skills four years later? *Journal of Child Language, 40*(4), 821-835. Retrieved from: doi:<http://dx.doi.org.pearl.stkate.edu/10.1017/S030500091200030X>
- Dodd, B., & McIntosh, B. (2010). Two-year-old phonology: Impact of input, motor and cognitive abilities on development. *Journal of Child Language, 37*(5), 1027-46. Retrieved from: doi:<http://dx.doi.org.pearl.stkate.edu/10.1017/S0305000909990171>
- Dwyer, M. I. (2004). A path for the exploration of any language leading to writing and reading. *North American Montessori Teachers' Association (NAMTA) Journal, 29*(3), pgs. 9-14.
- Eliot, L. (2009). Language and the Developing Brain. *North American Montessori Teachers' Association (NAMTA) Journal, 34*(1), pgs. 57-77.
- Elkind, D. (2012). Knowing is not understanding: Fallacies and risks of early academic instruction. *YC Young Children, 67*(1), 84-87. Retrieved from: <http://pearl.stkate.edu/login?url=https://search-proquest-com.pearl.stkate.edu/docview/927664925?accountid=26879>

- Fennell, C. T., & Werker, J. F. (2003). Early word learners' ability to access phonetic detail in well-known words*. *Language and Speech*, 46, 245-64. Retrieved from: doi:<http://dx.doi.org.pearl.stkate.edu/10.1177/00238309030460020901>
- Ginns, P., Hu, F., Byrne, E., & Bobis, J. (2016). Learning By Tracing Worked Examples. *Applied Cognitive Psychology*, 30(2), 160. Retrieved from: <https://doi.org/10.1002/acp.3171>
- Haebig, E. K., Rhyner, P. M., & West, K. M. (2009). Understanding frameworks for the emergent literacy stage. In Paula M. Rhyner (eds.), *Emergent literacy and language development, Promoting learning in early childhood*, (pg. 5 – 35). New York, NY: Guilford Press.
- Hald, L. A., de Nooijer, J., van Gog, T., & Bekkering, H. (2016). Optimizing word learning via links to perceptual and motoric experience. *Educational Psychology Review*, 28(3), 495-522 Retrieved from: . doi:<http://dx.doi.org.pearl.stkate.edu/10.1007/s10648-015-9334-2>
- Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD, US: Paul H Brookes Publishing.
- Hester, E. & Hodson, B. W. (2009). Metaphonological awareness, Enhancing literacy skills. In Paula M. Rhyner (Eds.), *Emergent literacy and language development, Promoting learning in early childhood*, (pg. 78 - 103). New York, NY: Guilford Press.
- Iverson J. M. (2010). Developing language in a developing body: the relationship between motor development and language development. *Journal of child language*, 37(2), 229–261. Retrieved from: doi:10.1017/S0305000909990432

- Justice, L. M. (2006). Emergent literacy: Development, domains, and intervention approaches. In Laura M. Justice, (Eds.), *Clinical approaches to emergent literacy intervention, 1*, (pgs. 3 – 27). San Diego, CA: Plural Publishing.
- Kenner, B. B., Terry, N. P., Friehling, A. H., & Namy, L. L. (2017). Phonemic awareness development in 2.5- and 3.5-year-old children: An examination of emergent, receptive, knowledge and skills. *Reading and Writing, 30*(7), 1575-1594.
doi:<http://dx.doi.org.pearl.stkate.edu/10.1007>
- Kim, S., Im, H., & Kwon, K. (2015). The role of home literacy environment in toddlerhood in development of vocabulary and decoding skills. *Child & Youth Care Forum, 44*(6), 835-852. Retrieved from: doi:<http://dx.doi.org.pearl.stkate.edu/10.1007/s10566-015-9309-y>
- Lillard, A. S. (2005/2007). *Montessori: The science behind the genius*. New York, NY: Oxford University Press.
- Lillard, P. P., & Jessen, L. L. (2003). *Montessori from the start: the child at home, from birth to age three*. New York, NY: Schocken Books.
- Lonigan, C. J., & Shanahan, T. (2009). Developing early literacy: Report of the National Early Literacy Panel. Executive summary. A Scientific synthesis of early literacy development and implications for intervention. *National Institute for Literacy*. Retrieved from: <http://www.nifl.gov>
- Minogue, J., & Jones, M. G. (2006). Haptics in education: Exploring an untapped sensory modality. *Review of Educational Research, 76*(3), 317-348. Retrieved from <http://pearl.stkate.edu/login?url=https://search-proquest-com.pearl.stkate.edu/docview/214115027?accountid=26879>

- Moats, L. (1999). *Teaching reading is rocket science*. Washington, DC: American Federation of Teachers.
- Moody, A.K. (2006). Using assistive technology to support literacy development in young children with disabilities. In Laura M. Justice, Ph.D. (Eds.), *Clinical approaches to emergent literacy intervention*, A volume in the emergent and early literacy series, (pgs. 73-78). San Diego, CA: Plural Publishing.
- Montanaro, S. Q. (1991/2003). *Understanding the human being: The importance of the first three years of life*. Mountain View CA: Nienhuis Montessori USA. (Originally published 1987 Un Essere Umano, Rome, Italy, Cooperativa Editrice IL VENTAGLIO).
- Montessori, M. (1966/1972). In M. J. Costello, (Trans.), *The secret of childhood*. New York, NY: The Random House Publishing Group. Toronto, Canada: Random House of Canada, Limited. (Original work published 1936)
- Montessori, M. (1967/1972). In M. J. Costello, (Trans.), *The discovery of the child*. New York, NY: The Random House Publishing Group. The Random House Publishing Group. Toronto, Canada: Random House of Canada, Limited. (Original work published 1936)
- Montessori, M. (2007). *The advanced Montessori method: Volume I*. Thiruvanniyur, Madras: Kalakshetra Publications. (Original work published 1918)
- Montessori, M. (1998/2007). In R. Ramachandran (Eds.), *Creative development in the child, The Montessori approach*, (Vol. 1-2). Thiruvanniyur, Madras: Kalakshetra Publications.
- Montessori, M. (2007/2010). In C. C. Claremont (Trans.), *The absorbent mind*. Amsterdam, The Netherlands: Montessori-Pierson Publishing Company. (Original work published 1949)
- Montessori, M. (2008). *From childhood to adolescence*. Thiruvanniyur, Chennai: Kalakshetra Publications. (Original work published 1948)

Montessori, M. (2008). *The Montessori method*. Radford, VA: Wilder Publications. (Original work published 1909)

Montessori, M. (2012). The 1946 London lectures. (A. Haines, Ed.). Amsterdam, the Netherlands: Montessori-Pierson Publishing.

Murray, A.K., Daoust, C. J., & Chen, J. (2019). Developing instruments to measure Montessori instructional practices. *Journal of Montessori Research*, 5(1), pg. 50 – 74.

National Association for the Education of Young Children. (1998). Learning to read and write: Developmentally appropriate practice for young children; A joint position statement of the International Reading Association and the National Association for the Education of Young Children. *Young Children*, 53(4), pgs. 30 – 46. Retrieved from:

<https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/PSREAD98.PDF>

National Institute of Child Health and Human Development, NIH, DHHS. (2010). Developing early literacy: Report of the National Early Literacy Panel (NA). Washington, DC: U.S. Government Printing Office.

National Scientific Council on the Developing Child (2007). The Timing and Quality of Early Experiences Combine to Shape Brain Architecture: Working Paper #5. 1-10. Retrieved from: <http://www.developingchild.net>

Nel, E. M. (2000). Academics, literacy, and young children. *Childhood Education*, 76(3), 136-141. Retrieved from: <http://pearl.stkate.edu/login?url=https://search-proquest-com.pearl.stkate.edu/docview/210380005?accountid=26879>

Novick, R. (2000). Supporting early literacy development: Doing things with words in the real world. *Childhood Education*, 76(2), 70-75. Retrieved from:

- <http://pearl.stkate.edu/login?url=https://search-proquest-com.pearl.stkate.edu/docview/210400626?accountid=26879>
- Olson, L. A., Evans, J. R., & Keckler, W. T. (2006). Precocious readers: Past, present, and future. *Journal for the Education of the Gifted*, 30(2), 205-235,281-283. Retrieved from <http://pearl.stkate.edu/login?url=https://search-proquest-com.pearl.stkate.edu/docview/222349490?accountid=26879>
- Piasta, S. B., & Wagner, R. K. (2010). Developing Early Literacy Skills: A Meta-Analysis of Alphabet Learning and Instruction. *Reading research quarterly*, 45(1), 8–38. <https://doi.org/10.1598/RRQ.45.1.2>
- Pouw, W. T., J., L., van Gog, T., & Paas, F. (2014). An embedded and embodied cognition review of instructional manipulatives. *Educational Psychology Review*, 26(1), 51-72. Retrieved from: doi:<http://dx.doi.org.pearl.stkate.edu/10.1007/s10648-014-9255-5>
- Renninger, K. A., & Hidi, S. (2011). Revisiting the conceptualization, measurement, and generation of interest. *Educational Psychologist*, 46(3), 168-184. Retrieved from: DOI: 10.1080/00461520.2011.587723
- Rhyner, P. M. (Ed.) (2009). *Emergent literacy and language development, Promoting learning in early childhood*. New York, NY: Guilford Press.
- Romeo, R. R., Segaran, J., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., ... & Gabrieli, J. D. (2018). Language exposure relates to structural neural connectivity in childhood. *Journal of Neuroscience*, 38(36), 7870-7877. Retrieved from: DOI: <https://doi.org/10.1523/JNEUROSCI.0484-18.2018>
- Seton Montessori Institute (2008). *Early Childhood Language Album*. Chicago, IL: Seton Montessori Institute.

- Seton Montessori Institute (2016). *Activities Album 18 – 36 months*. Chicago, IL: Seton Montessori Institute.
- Soundy, C. S. (2003). Portraits of exemplary montessori practice for all literacy teachers. *Early Childhood Education Journal, 31*(2), 127-131.
doi:<http://dx.doi.org.pearl.stkate.edu/10.1023/B:ECEJ.0000005312.48974.0a>
- Terrell, P., & Watson, M. (2018). Laying a firm foundation: Embedding evidence-based emergent literacy practices into early intervention and preschool environments. *Language, Speech & Hearing Services in Schools (Online), 49*(2), 148-164. doi:http://dx.doi.org.pearl.stkate.edu/10.1044/2017_LSHSS-17-0053
- Troia, G. A., Roth, F. P., & Graham, S. (1998). An educator's guide to phonological awareness: Assessment measures and intervention activities for children. *Focus on Exceptional Children, 31*(3), 1-12. Retrieved from <http://pearl.stkate.edu/login?url=https://search-proquest-com.pearl.stkate.edu/docview/224045192?accountid=26879>
- van Kleeck, A. (1998). Preliteracy domains and stages: Laying the foundations for beginning reading. *Journal of Children's Communication Development, 20*(1), pp. 33-51. Retrieved from: <https://doi.org/10.1177/152574019802000105>
- van Kleeck, A., Vander Veen, E., & Vander Woude, J. (2009). Book sharing and the development of meaning. In Paula M. Rhyner (eds.), *Emergent literacy and language development, Promoting learning in early childhood*, (pg. 36-77). New York, NY: Guilford Press.
- van Kleeck, A., & Schuele, C. M. (2010). Historical perspectives on literacy in early childhood. *American Journal of Speech - Language Pathology (Online), 19*(4), 341-355A. doi:[http://dx.doi.org.pearl.stkate.edu/10.1044/1058-0360\(2010/09-0038\)](http://dx.doi.org.pearl.stkate.edu/10.1044/1058-0360(2010/09-0038))

Volkman, J. (2018). *Scaffolds and Spelling in Preschool: Using a Movable Alphabet to Measure Early Literacy* (Doctoral dissertation). Retrieved from:

<https://dash.harvard.edu/handle/1/37736756>

Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child development*, 69(3), 848-872. Retrieved from: [https://doi.org/10.1111/j.1467-](https://doi.org/10.1111/j.1467-8624.1998.tb06247.x)

[8624.1998.tb06247.x](https://doi.org/10.1111/j.1467-8624.1998.tb06247.x)

Appendix A

Pre-intervention Baseline and Post-Intervention Letter Sound Assessment

Student Identifier (Initials):	Date:
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The assessment is done one-on-one, in a quiet space located outside the classroom, and the teacher-researcher performed the pre-and post intervention assessments. The teacher-made assessment is a modification from:

https://www.readingrockets.org/pdfs/assessment_letter_sound.pdf.

Practice Bag: /m/, /s/, /b/, /f/

Letter Bag One. /e/, /s/, /p/, /j/, /q/, /n/, /o/, /t/ Total: 8 letters

Letter Bag Two.: /d/, /m/, /a/, /h/, /v/, /c/, /b/, /y/, /f/, /x/ Total: 10 letters

Letter Bag Three. /k/, /u/, /r/, /i/, /w/, /l/, /g/, /z/ Total: 8 letters”

Total. 26 letters

Pre- and Post-Intervention Assessment Process

Begin by offering a child the “practice bag” containing the four high frequency mini-sandpaper letters. Say, “I have some letters,” and invite the child to unzip the bag. Take out one letter and offered it to the child by placing it in front of her/him saying, “Tell me the sound of this letter.” If s/he provided either the sound or the name, offer the next letter, and the procedure was repeated. If a child could not engage with the practice bag or could not identify any letter sounds or names, the experience stopped and a score of zero should be entered. Children who could identify one or more sounds continued to Letter Bag One followed by Letter Bag Two and so on until they finished all four. Mini-letters are shown to the child one at a time. If the child

was unable to respond to the direction requested, discontinue the experience. If a child could identify one or more sounds or letter names, continue to Letter Bag One.

As introduced Letter Bag One say, "Let's say the sounds of some more letters." Then invite the child to unzip the case and the teacher removes a mini-sandpaper letter. Place the letter in front of the child and ask, "Can you tell me the sound this letter makes?" Pause for an answer, record the response, then turn that letter face down, select another, and repeat the process.

Each time a new Letter Bag is introduced invite the child to unzip the bag and then repeat the entire procedure until all 26 letters had been shown.

Pre- and Post-Intervention Assessment Scoring

Letter Bag One: /e/ ___ /s/ ___ /p/ ___ /j/ ___ /q/ ___ /n/ ___ /o/ ___ /t/ ___ Total: ___/8

Letter Bag Two: /d/ ___ /m/ ___ /a/ ___ /h/ ___ /v/ ___ /c/ ___ /b/ ___ /y/ ___ /f/ ___ /x/ ___

Total: ___/10

Letter Bag Three: /k/ ___ /u/ ___ /r/ ___ /i/ ___ /w/ ___ /l/ ___ /g/ ___ /z/ ___ Total: ___/8

Sum Total: ___/26

Record each correct *sound* with a checkmark. If the child said the letter *name* instead of the sound, write down an "N". Both a checkmark and an "N" were worth "one" point. Any error received a score of "zero".

Appendix B

Sandpaper Letter Presentation Log, by Child

Each child will be identified by initials; each will be recorded for their presentation when a classical sandpaper letter lesson is presented. Letters presented in pairs of contrasting sounds (modification of MACAR sequence).

Student identifier (Initials):	Date presented:
Time lesson started:	Time lesson ended:
Adult initiated (check box): <input type="checkbox"/>	Child initiated (check box): <input type="checkbox"/>

Presentation Annotation

When a presentation was provided I would circle the letter pair (sounds); subsequent presentations = a tally mark. Confident of internalization = box filled green.

a, t	p, h	c, n	l, b	f, s
g, m	j, v	i, k	w, z	u, e
v, g	o, x	sh	th	chr

(Barnett, C. & Pickering, J. S., 2009, p. 97).

Hand position:
Body position:
Pronunciation:

Three period Lesson :	Notes:
Step One – Name (This says /a/. This says /t/.	
Step Two – Show me. (Point to /a/. Point to /t/. Give me /t/. Give me /a/. Put /a/ on the table. Put /t/ on the table.	
Step Three – Confirmation. (Pointing to the letter say: What’s this? Child says sound. Repeat with second sound.	

Appendix C

Measuring Sound-Symbol Interest

How often are the Montessori sandpaper letters chosen? Place a tally / / / in appropriate box each time the sandpaper letters are chosen, per category, each day of the intervention. Tallies totaled daily. Notes should be provided regarding any anomalies for the day.

Date:	# of children:	Number of total daily tallies:
Adult-guided presentation		
Child-initiated presentation		
Independent child exploration		

Notes:

Appendix D

Daily Observation/Field Note

Daily Focus Question

How are the children exploring the Montessori toddler language activities on the classroom shelves?

Observation Process

I will observe from fifteen minutes seated on my classroom observation stool at 9:00 am and 10:00 am using the above daily focus question. This is normal classroom practice for me as I spend much of my time observing my students. For the purposes of this intervention, I will simply be adding in the use of this observation form. The language activity will be listed under the appropriate heading, and tallies will be placed next to it for each time the activity is selected.

Date:	# of children:	Time start:	Time end:
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Language Activity	Exploring with adult	Exploring independently or with another child
Concrete: Object to object (List material/s chosen):		
Representational: Object to picture (List material/s chosen):		
Abstract: Picture to picture (List material/s chosen):		
Other language activity (list):		

Books – how do they engage?		
Art – letters appearing in paint, drawing, chalk, cutting		
Spontaneous moments:		

Other notes:

Appendix E

Sandpaper Letter Extension Presentations



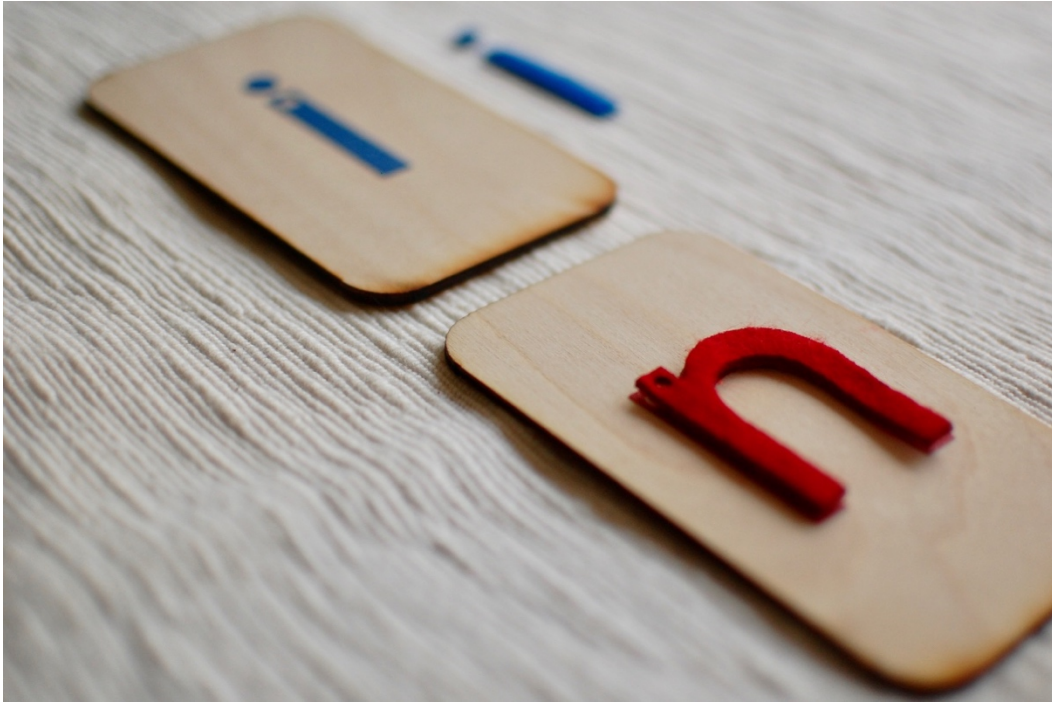
Extension #1: Matching Sandpaper Letters

Pre-requisite: The child should know 3-5 Sandpaper Letter sounds.

Steps:

- Bring the basket containing a set of Sandpaper Letters to a floor mat.
- Select a Sandpaper Letter which the child knows and invite him to trace it and say the sound.
- Invite the child to retrieve the matching Sandpaper Letter from the display ledge.
- Place both Sandpaper Letters next to each other on the mat.
- Encourage the child to continue tracing, sounding, and matching additional Sandpaper Letters.
- At the end of the matching lesson review the letter sounds with the child. Point to each matched letter set and say, "This letter says /m/. And this letter says /m/."

-End the lesson by telling the child that he is welcome to choose this activity any time during the morning work cycle.



Extension #2: Matching Sandpaper Letters to Felt Letters

Pre-requisite: The child should know 3-5 Sandpaper Letter sounds.

Steps:

- Bring the basket containing the Sandpaper Letters to the mat.
- Bring the basket containing the felt letters to the mat.
- Show the child how to select a Sandpaper Letter and place it in the upper left corner of the mat.
- Together, look through the felt letters in the basket until you find the one that matches.
- Show the child how to place the felt letter precisely on top of the Sandpaper Letter.
- Pause together to look at the match.
- Show the child how to carefully lift the felt letter and place it to the right of the Sandpaper Letter on the mat.

-Point to Sandpaper Letter and say, "This says /h/," pronouncing the letter *sound* (not the name) clearly with no 'uh' sound attached.

-Point to the matching felt, and say, "This says /h/," pronouncing letter *sound*.

-Continue the process, matching other letters as long as the child is interested.

--End the lesson by telling the child that he is welcome to choose this activity any time during the morning work cycle.



Extension #3: Beginning Sounds with Felt Letters

Pre-requisites: Prior experience with oral "I Spy" games, knowledge/retention of five to ten Sandpaper Letters, experience with first two Sandpaper Letter extensions.

Steps:

-Bring Sandpaper Letter basket to a floor mat.

- Invite the child to bring any activity from the classroom to the mat.

-Remove the items one at a time from the chosen activity, naming them as you go, and placing them on the mat.

-Select an item and name it, looking at the child so he will name it as well.

-Then ask, "What is the first sound you hear in 'pitcher'?" Place emphasis on the /p/ sound as you pronounce the word.

-Pause for a response. If the child says "p" ask him to look in the Sandpaper Letter basket and "Find the letter that says "p".

-Once found, place both the object and the letter side-by-side on the upper left side of the mat.

-Invite the child to repeat after you, as you point to the object and then the Sandpaper Letter and say, "Pitcher. Pitcher begins with /p/. Let's choose another object."

-Continue the process as long as the child is interested. If the child is unable to provide the beginning sound for an object, modify the process so it becomes a vocabulary lesson or an oral "I Spy" game.

Appendix F

Passive Assent Letter

Cultivating Letters and Sounds in a Montessori Toddler Classroom Assent Form

January 6, 2020

Dear Parents,

In addition to being your child's Infant and Toddler Program Coordinator, and Toddler Half Day 2s and 3s teacher, I am a St. Catherine University student pursuing a Masters of Education. As a capstone to my program, I need to complete an Action Research project. I am going to study "Cultivating Letters and Sounds in a Montessori Toddler Classroom" because the children are exhibiting knowledge and skills of developing emergent literacy and results could inform toddler teaching practice.

In the coming weeks, I will be presenting classic Montessori sandpaper letter lessons as teacher-led and potentially child-initiated choice as a regular part of my toddler classroom activities. All students will participate as members of the class. I will be conducting this study for four weeks beginning the week of January 16, 2020. In order to understand the outcomes, I plan to analyze the results of this sandpaper letter intervention to determine how their access connects with interest and how the use may impact the growth of letter and sound awareness.

The purpose of this letter is to notify you of this research and to allow you the opportunity to exclude your child's data from my study.

- **If you decide you want your child's data to be in my study**, you don't need to do anything at this point.
- **If you decide you do NOT want your child's data included in my study**, please note that on this form below and return it by Monday, January 13, 2020. Note that your child will still participate in the daily sandpaper letter lessons but his/her data will not be included in my analysis.

In order to help you make an informed decision, please note the following:

- I am working with a faculty member at St. Kate's and a project coach to complete this particular project.
- Benefits may include the enjoyment in vocabulary development, awareness of speech sounds, and recognition of letters through printed material.
- There are no anticipated risks to the participants of this study.

- I will be writing about the results that I get from this research. However, none of the writing that I do will include the name of this school, the names of any students, or any references that would make it possible to identify outcomes connected to a particular student. Other people will not know if your child is in my study.
- The final report of my study will be electronically available online at the St. Catherine University library. The goal of sharing my research study is to help other teachers who are also trying to improve their teaching.
- There is no penalty for not having your child’s data involved in the study, I will simply delete his or her responses from my data set.

If you have any questions, please feel free to contact me, Elizabeth Norman. You may ask questions now, or if you have any questions later, you can ask me, or my advisor Dr. Olivia Christensen at (651) 690-6219, who will be happy to answer them. If you have questions or concerns regarding the study, and would like to talk to someone other than the researcher(s), you may also contact Dr. John Schmitt, Chair of the St. Catherine University Institutional Review Board, at (651) 690-7739.

You may keep a copy of this form for your records.

Type your name here and sign above

Date _____

Sincerely,
Elizabeth Norman
xxxx@xxxxxxxxxxx.org
XXX.XXX.XXXX

(Please see reverse side for an opt out signature)

OPT OUT: Parents, in order to exclude your child’s data from the study, please sign and return by January 13, 2020.

I do NOT want my child’s data to be included in this study.

Signature of Parent

Date _____

Appendix G

Half Day Toddler Daily Community Routine

Time	Half Day Toddler Daily Community Routine
8:30 – 8:45 a.m.	Carline arrival
8:45 a.m. – 10:45 a.m.	<p>The routines of everyday living are the foundation of Montessori Infant & Toddler programs. Activities promote independence, order, coordination, and concentration, as well as support social, emotional, physical, and cognitive development. These learning activities are chosen by the children to explore, discover and repeat, individually, with another child, or with a teacher. Activities areas include:</p> <p>Self-care. Washing, dressing, toileting, and eating, according to each child’s individual capacity</p> <p>Care of the environment. Cleaning, food preparation and food service; plant care and animal care</p> <p>Large-motor activities (indoors and out). Walking, climbing, running, jumping, balancing, climbing steps, and more</p> <p>Fine-motor skills. Reaching, grasping, picking up objects, transferring objects, using tools and utensils, doing art work</p>

Language. Naming objects, describing actions and intentions, discussing pictures, conversation, music, and singing

Social skills. Developing manners through interactions with peers, teachers, and adult-led small group games

<https://amshq.org/About-Montessori/Inside-the-Montessori-Classroom/Infant-and-Toddler>

10:45 – 11:15 a.m.

As a few children set the tables for community snack, others join in a sequence of movement, fingerplays, song, and dance, completing with a moment of mindful silence.

A community snack is shared with the class eating together.

11:15 a.m. – 11:30 a.m.

Carline dismissal.

Appendix H

Pre- and Post-Assessment Letter and Sound Knowledge

The raw data on the table below documents the total letter name and letter sound knowledge gathered from the pre- and post-intervention assessments. Letter names and letter sounds are comingled in the raw data.

Table 5.

Comparison of pre- and post-intervention letter name and letter sound knowledge

Child	Pre-Intervention	Post-Intervention	Change
C1	22	25	3
C2	18	15	-3
C3	0	7	7
C4	13	9	-4
C5	0	4	4
C6	0	9	9
C7	0	12	12
C8	19	8	-11
C9	17	25	8
C10	0	2	2
C11	0	5	5
C12	0	0	0
C13	0	15	15
C14	19	20	1
C15	12	0	-12
C16	0	17	17
C17	0	24	24

Note. Positive gains have been bolded.

Appendix I

Teacher- Researcher Coded Complete Anecdotal Running Record

Within the Daily Observation/Field Note data tool was a box utilized to capture spontaneous moments. The running record. Below reflects the full anecdotal recording with the teacher-researchers codes inserted.

Table 6.

Classroom observations analyzed with emergent literacy behavior teacher codes

January 30, 2020. Observation began at 8:50 a.m.	<u>Researcher notes and codes</u>
<p>C12 is seated at a rug with the box of sandpaper letters with him. He has placed /u/, /y/, /z/, /p/, and /a/ side by side along the bottom of the rug. /u/ is positioned upside down (like /n/). C10 joins. C12 takes another letter out, traces it and places the /c/ beside the /a/. C10 is taking the letters out one at a time and stacked beside the box. C10 stops. He watches C12 trace the letter. He picks up one from his pile, traces it. C10 places the letter back in the box and walks away. C12 continues with four more letters. Puts all the sandpaper letters back in box. Rolls his rug. Observation ends 9:05 a.m.</p>	<p><u>3c</u> An awareness of the sandpaper letters as symbols. Aligning side by side. <u>2c</u> Working left to right. <u>3e</u> Developing orientation of the letter form. <u>3d</u> One finger trace both children. <u>8</u> Initiated by child. <u>2c</u> Work cycle has beginning, middle and end.</p>
<p>February 4, 2020. Observation began at 9:30 a.m. C9 is at a floor mat. C9 has selected a basket of real, exotic fruits. C13 is observing. C9 takes out each fruit, places one at a time on the rug. "Dragon fruit." C9 puts the other fruit beside it. "Rambutan," C9 says. "This is fuzzy. Dragon fruit has scales." C13 hands the other fruit to C9. Continues until has matched all the fruits. Looking at the fruit. C9 gets up and walks to the sandpaper letter ledger shelf. C9 selects /r/. Places the sandpaper letter on the rug and traces it. C9 places /r/ next to rambutan. C9 walks back to the ledger shelf, and C13 follows. "This is /s/." C9 puts /s/ on the rug, traces, and places beside starfruit. She proceeds with /d/ for dragon fruit, /m/ mango. C9 directs C13 to put the fruit away. C9 puts the letters back onto the sandpaper letter ledger shelf. Observation ended 9:58 a.m.</p>	<p><u>Researcher notes and codes</u> <u>1a</u> Naming objects <u>5c</u> Isolating initial sound with familiar object <u>8</u> Child idea. Not a previously given classroom presentation. <u>3d</u> One finger trace. <u>7b</u> Peer begins by watching and is included in the process. <u>2c</u> Work cycle has a beginning, middle and end. Child is directing another child.</p>
<p>February 6, 2020. Observation began at 9:32 a.m.</p>	<p><u>Researcher notes and codes</u></p>

C9 is at a floor mat. She has a box of sandpaper letters at the rug. She has a box of the matching felts beside her. C9 manipulates the closure, and takes out a felt letter. She puts it on the rug. She picks up a sandpaper letter. In the air she places the felt letter on top of the sandpaper letter. She shakes her head and the letter is discarded on the floor. C9 picks up the sandpaper letters and places them down the left side of the vertical rug. She sits back. Rolls to her back with her feet in the air, then twists her feet and comes to sit in hero pose. C9 reaches into the felt letter box and takes out /c/. She places it on top of the sandpaper letter /c/. C9 turns the felt letter until it is precisely aligned in the match. "Yes!" Thumb into her mouth. Leans forward and selects another felt. Looks at it. Turns her head to look at the sandpaper letters. The felt letter is discarded to the floor. She looks up. Her eyes appear to travel around to other children. She picks up the first discarded letter on the floor. C9 turns it about in her hands, and then places it on top of /s/. She continues with 2 more felt and sandpaper letter matches. Then she begins to put away the felts, and then the sandpaper letters. Rug is rolled. Observation ends 10:01 a.m.

3c The child is deciding which sandpaper letter will match the felt letter. She has laid out letters and is choosing the felt after rather than 1:1 correspondence of a pair at a time.

8 Child selected this activity and is working independently.

7 Observed a presentation on the matching felts provided by me to another the child the previous day. The child is intentional and purposeful in the letter placement.

2c Work cycle beginning, middle and end.

February 7, 2020. Observation began at 9:15 a.m.

C4 has a wet shirt. She lifts down her cubby basket. One item is taken out at a time. She names each item placing around her on the floor. "Pink shirt. /p/. I want my pink shirt. No. Blue. Black. /b/. I want my /p/ pink, pink shirt. No. Not pants." Stands, jumps in air. Basket falls to floor. "I got it. Pink shirt!" Runs to bathroom to change. Observation ends 9:22 a.m.

Researcher notes and codes

5c Items of clothing have a beginning sound. She is saying a specific sound while searching for her shirt. Oral sound play.

2c Beginning and a middle to the work cycle.

February 10, 2020. Observation began at 9:00 a.m.

C8 has a book. C7 is sitting beside her. C8 is reading the book. She traces the picture. C7 is looking at her hand. C8 turns the pages, shows C7 a picture and continues to read the book. On the final page C8 says, "And that is the end!" She closes the book and hands it to C7. Observation ended. 9:08 a.m.

Researcher notes and codes

3b The book has text and Lucy is relaying the story. Turn pages. Front to back. Book is held correctly. Story language.

2c Then and next. The end. Work cycle has a beginning, middle and end.

February 10, 2020. Observation began at 9:31 a.m.

C13 carried the wooden barn to a floor mat. She has the basket of farm animals. One by one she puts the animals on the rug. Mallard duck, goose, hen, and rooster are lined up together. C1 comes to sit beside her. She reaches out and touches the figures saying, "Birds." C13

Researcher notes and codes

1a Naming objects

1c Classifying for a category (birds).

7a Observes others working sitting beside their floor mat.

looks at her. C13 takes out and says, “Holstein cow. Appaloosa horse.” C13 looks at C1 saying, “They aren’t the same.” C1 grabs them out of her hand, as C13 protests. C1 loudly shakes the items and says, “Yes they are! /h,/h/.” C1 drops the objects to place her hand in front of her mouth to say, “/h/ Holstein cow, /h/ horse!” C9 joins the rug. C1 walks away. C13 begins to put the activity away. Observation ends 9:46 a.m.

February 11, 2020. Observation began at 8:46 a.m.

C16 has begun to bring sandpaper letters from the ledger shelf to a rug. He is tracing, and nodding his head. He goes to the second set of sandpaper letters and finds one brings it back and places it beside the matching /a/. C16 selects another letter and repeats. C 10 comes to observe at the rug. C16 taps me on the shoulder and invites me to say the sounds on his rug with him. Observation ends 8:59 a.m.

February 11, 2020. Observation began at 9:16 a.m.

C17 is kneeling beside the floor drum. He is quietly tapping the drum and singing. The beat is consistent and increases in volume. C5 slides to sit beside him. C17 looks at C5. He looks at the drum. Nods. C17 begins to sing “Ram Sam Sam” song keeping the beat with the drum. C5 sings tapping his thighs to follow the beat. C5 grabs the mallet from C17 and starts the song over. C17 puts his thumb in his mouth and with his other hand taps the beat on his thigh. Song ends. C17 walks away. C5 hangs up the mallet. Observation ends 9:21 a.m.

February 11, 2020. Observation began 10:20 a.m.

C1 has taken a sandpaper letter from the ledger shelf. She places it on a horizontal rug in the upper left corner. C1 stands and retrieves from felt letter box. She opens it and pushes letters around in the box pulling the /s/ out and placing it on top to align. C1 stands up and looks down at her rug. She lifts her heads and her eyes appear to scan the room. We make eye contact. C1 walks over to me and says, “Give me a sandpaper letter (pointing to the sandpaper ledger shelf).” I select a /f/ and hand the sandpaper letter to her. C1 traces it with one finger. She says /f/. She hops. Noor plops beside her rug. She puts the /f/ next to the /s/. And she uses two hands to scramble the felt letters in the box until she locates the /f/. As before, she places it on top. C1 comes over again and we repeat this process for 10 sandpaper letters. C9 comes to sit beside her rug. C1 returns to me again, takes

5c Beginning sound connection to a real object in the environment.

7b A peer begins by watching and is included in the process.

2c Work cycle beginning, middle and end.

Researcher notes and codes

3e Aligning sets of letters.

8 Engaged independently.

7a Observes others working

5b His nod indicates an internal sound expression.

7b A peer begins by watching.

2c Work cycle beginning, middle and end.

Researcher notes and codes

8 Singing a song with rhythmic repetition.

7 Observes others working sitting beside their activity.

4a. Clear pronunciation of the lyrics. The rhythm of the rhyme is connected to the drum beat by both children.

7b A peer begins by watching.

2c Work cycle beginning, middle and end.

Researcher notes and codes

3c Matching a sandpaper letter to a felt letter.

7b She began, and then invited an adult interaction.

3d Tracing with one finger.

7a Child has seen peers presented this activity. Another child is observing her who has had this presentation.

5b Child is saying the sound.

Together we say the sounds at the end.

2c Work cycle beginning, middle and end.

my hand and invites me to her rug. We say together, “This is /s/. And this says /s/ (as C1 lifts the felt letter and places it below the sandpaper letter).” We repeat until all the letters are sounded in this manner, including C9. C1 invites me to put the sandpaper letters away. She puts the felts away. Observation ends 10:43 a.m.

February 12, 2020. Observation began at 9:16 a.m.

C9 has a rug. She is one by one bringing all the letters from the lowest sandpaper letter ledger shelf. She has oriented them at the top of the rug, left to right. Her order is reversed. /z/, /y/, /x/, /w/, /v/, /u/, /t/ and /s/. C2 comes to sit beside her. C9 traces the /z/ with one finger holding it before herself. Next she takes the /z/ with her to the sandpaper letter box. She goes one by one looking at the letters and locates /z/. “Found it!” She places them together below the other letters. “C2 it is your turn.” C2 looks at her. “Come on. This is /y/ (she says the name).” Together they go to the box and C9 shows her how to flip through the letters to locate the /y/. She shows C2 placing them side by side “See, they match. Now, it is my turn.” Together they take turns matching. C9 stacks up one set of letters and directs C2 to put the others in the box. She places her set along the ledger shelf. Rolls her rug. Observation ends 9:43 a.m.

Researcher notes and codes

3c Matching pairs of sandpaper letters.
7b She began, and then invited another interaction. Navigated turn taking.
3d Tracing with one finger.
7b Another child is observing her and is invited to engage.
 5a, 5b Child is saying letter names and sounds.
2c Work cycle beginning, middle and end. Turn-taking. Left to right.

February 13, 2020. Observation began 8:55 a.m.

C2 and I were in a sandpaper letter lesson when interrupted. I stepped outside the door to greet the late arriving families, and when I turned back C2 had placed a rug near the entrance. She’d brought all the letters we had reviewed to the rug and placed them in the upper right hand corner. She had brought the second set of sandpaper letters as well and placed them at the top of the rug. C2 selected /a/, traced it, said the sound, and then filed one by one through the sandpaper letter box looking for the matching /a/. She places them together in the upper left corner of a vertical rug. She continued for /t/, /c/ and /n/. “Miss Beth, I don’t remember. What is this again?” C2 held up a letter and I put my lips together, took a breath and began to say the sound but she produced it first /p/. C2 continued with three more letters. She stopped and directed C16 to not touch her work. C2 came to get me and indicated to say the sounds with her. C13 joins to watch. She guided the lesson pointing, “This says /a/ and this letter says /a/.” Again a hesitation around /p/. C13 and C16 are saying the sounds

Researcher notes and codes

3c Matching pairs of sandpaper letters.
7b She began, and then invited another interaction. Navigated turn taking.
3d Tracing with one finger.
7b Another child is observing her and is invited to engage.
5b All the children are saying letter sound.
2c Work cycle beginning, middle and end. Turn-taking. Left to right.

with us. They move away when she begins to clean up. C2 put the letters and on the ledger shelf and into the box on her own and rolled up the rug. Observation ended 9:00 a.m.

February 13, 2020. Observation began 9:21 a.m.

C9 is standing at the chalkboard. She has placed the sandpaper letter /s/ from the ledger shelf beside her on the chalkboard. She makes a line on the board. Puts her chalk down and traces the sandpaper letter /s/. C9 puts the letter down, and writes the /s/ very large on the board. Then twice more smaller. She erases. The letter is returned and she repeats with /n/. As she traces /n/ she says **out loud** “/n/ like my brother XXX.” Observation ends 9:26 a.m.

Researcher notes and codes

3d The letters can be traced and written.

8 Never shown.

3d Tracing with one finger. Writing holding the chalk with pincer. First large, then smaller in chalk.

7a Another child is observing her.

3d, 5b C9 is saying letter sounds as she traces and writes.

2c One by one. Putting one away before beginning another.

February 13, 2020. Observation began 9:26 a.m.

C9 and C4 are walking along the cubbies pointing to the photo and word placards on the front of each. C16 joins. C9 stands in front of C16’s cubby. She claps the syllables in his name. “Now let’s do your name!” They all clap C4’s name. Observation ends 9:34 a.m.

Researcher notes and codes

7 Another child has an idea and two more join to follow the activity.

4c The children are aware their names are made of sounds and are initiating previously shown syllable clapping.

2c One syllable after another in sequence. Repeated activity.

February 14, 2020. Observation began 9:00 a.m.

C1 and C9 are working together. C13 is watching. On their floor mat they have placed the basket with the matching pictures of members of our community called the friend tiles. Together they are taking out and naming each friend tile. “C7. C7, that’s /f/.” C9 and C1 go together to the sandpaper letter box and locate the /f/. The tile and the letter /f/ are put together at the top of the rug in the left corner. C1 finds her picture, C9 copies her and finds her own. Together they return to the sandpaper letter box and eventually locate their letters. A pile of letters is on the floor beside the box. They return to the rug, and put their pictures down first, and then the letter beside them. “Oh no, C1. Look!” C9 points to the sandpaper letter box and they run over and put the letters upright again inside the box. C1 returns to the rug. C9 has moved on. C1 continues to match friend tiles with the beginning sounds in their names. C13 continues to watch her and says the sounds when C13 does.

Observation ends 9:19 a.m.

Researcher notes and codes

1c Naming pictures.

5a, 5c This symbol is this sound of this name.

8 Working in collaboration. Child idea to use this material as beginning sounds.

3e Tracing with one finger. Quick movements, Up and down, Walking.

7a Another child is observing her.

3d, 5b Both children are tracing and saying the sounds.

2c One by one.

February 19, 2020. Observation began at 9:21 a.m.

Researcher notes and codes

C4 grabbed rug and put the box of felt letters under her arm to a space. She laid out the rug and opened the box placing one felt letter at a time on the rug. C4 is on her hands and knees using one arm as a tri-pod support. The letters were placed left to right beginning at the top of a horizontal rug. C1 came over to watch her. C4 walks around the room and says to me “Miss Beth, look!” “Wow, you have put out a lot of felt letters.” “Yes. Let’s do those!” C4 pointed to the sandpaper letters on the ledger shelves. We sit side by side. I begin to present /a/ but she takes it from me. C4 leans forward and tracing the sandpaper letter with one finger and says /a/. She pushes back in her chair and quickly moves to the rug. The sandpaper letter is put on the rug. She kneels on hands and knees looking for the corresponding felt letter. She finds it. With one hand holds the sandpaper letter (left) and with her other hand (right) she places the letter on top. She manipulates the letter until it matches precisely. Bringing both back to the table to show to me and to request additional verification with our interaction. C4 repeats this process with 6 more sandpaper letters and then states she is finished. We clean up together. Observation ends 9:36 a.m.

February 20, 2020. Observation began 9:17 a.m.

C1 and C16 have chosen two sets of rhyming cards. One set has pictures that rhyme with cat. The other set has pictures that rhyme with top. C1 is guiding. She has placed the cat at the top of the rug, and the top beside it as headers. Below she and C16 have mixed up the pictures. They have turned them over. Each take a picture. C1 names her picture first. She looks at the headers. C1 says out loud that ‘rat’ rhymes with ‘cat.’ C16 asks C1 showing her his picture. “What is this?” “Mop!” She grabs the picture out of his hand and puts it under the rat, shakes her head. She puts the picture below the top. She nods her head. C1 says “Mop rhymes with top. They are the same!” C16 watches for two more pictures and walks away. C1 completes the activity and I float into name along with her.

I initiated a dictated word building. I had brought the sandpaper letter box with me to the rug.

I picked up the picture of the cat. I asked C1 to say the word ‘cat.’ She repeated. I asked her what the first sound she heard in cat was? She said /c/. I invited her to find the sandpaper letter /c/. C1 traced the /c/ and placed on the rug. C9 came to sit beside us. I asked C1 what the

3c Matching the sandpaper letter and the corresponding felt letter. Intentional focus on the precise alignment.

8 Initiation of a plan on the part of the child.

3d One finger trace. A lot of physicality related – walking to and from, kneeling, crawling.

7a Observes others working sitting beside their floor mat.

3c, 5b Symbol and sound connection developing. Only seeking adult interaction as another layer of verification.

7a A peer is observing.

2c Work cycle has a beginning, middle and end. Child is directing and including the adult peripherally in her process.

Researcher notes and codes

4a Rhyming,

5b letter sounds,

2c Columns. Top to bottom.

5c Able to hear the /at/ word family contrasted with the /op/ word family.

7b A peer begins by watching and is included in the process.

2c Work cycle has a beginning, middle and end for one child; and the other is developing. Child is directing another child.

3e Left to right, placing letters side by side. 2c Top to bottom. Can lay out categories with a header.

3d, 8 One finger trace. Initiates beyond the initial experience.

5d, 5f Provides the separate speech sounds. Aware the word is made up of three sounds. Child is able to hear the contrast in a second word family.

next sound she heard in ‘cat.’ Emphasis placed on the /a/. She located the sandpaper letter /a/ and placed it next to the /c/, tracing it first. Running my finger below the /c/ and /a/ I said, “Cat. What is the last sound you hear in cat?” C1 said /t/ and placed it beside the /a/. We said the sounds /c/, /a/, /t/. C1 began to put the letter back into the box. **I thought we were finished, but she picked up the picture of the rat and asked to make it now.** We continued the process for rat, hat, drop, mop and top. Observation ended 9:52 a.m.

February 24, 2020. Observation began at 9:22 a.m.

C9 and C1 each have their own floor mats placed parallel to one another. C1 is laying out the felt letters left to right in two rows at the top of a horizontal rug. C9 has brought the types of dogs figurines to her rug. C9 picks up a dog and walks across the room to me. “This is your dog. She has a black nose. This is a Newfoundland. I want to make the word.” She walked back to her rug indicating I should follow.

I am positioned between their rugs. C13 and C16 are observing C9. C8 and C7 are observing C1.

“Miss Beth. Let’s make Newfoundland.” “Okay, what’s the first sound you hear in Newfoundland?” C9 says /n/. “Go find the sandpaper letter that says /n/.”

Meanwhile C1 has finished laying out her letters. She taps my shoulder and talks quickly about a cartoon character.

I’m writing, and observing C9 and C1 (while attempting to limit my engagement). But I hear C1 say ‘batman.’ I turn and ask her if she would like to make the word batman. She nods her head quickly. “What do you hear first?”

C9 has returned with /n/ from the sandpaper letter shelf and placed it beside the dog in the upper left corner of the rug. “What do you hear next in Newfoundland?” C9 repeats the word a couple of times. She picks up the figure and says it again. “W!” Holding the dog above her head. She rolls to her side and lays placing the dog beside the /n/. She gets up and walks to the sandpaper letter box. Kneels and begins to look at the letters one by one.

C1 has /b/, /a/, /t/ on the rug now. She points at each letter and bounces with a pony kick. She has flipped around and is on all fours looking at C9’s rug.

C9 has returned with a /w/ and placed it beside the /n/. “Newfoundand. What do you hear next in

5e Mapping sounds onto letter to make a word.

7a A peer is observing the process.

2c Work cycle has a beginning, middle and end. Child is directing another child.

Researcher notes and codes

3e Left, right; top to bottom. Placing letters consecutively. Words are made of letters.

8 Each have their idea and a plan to go about it. C1 takes the foray into building a word to an interest in the classroom to continue her experience beyond the previous teacher-initiation.

7b Each has observed the other previously, they have engaged in oral sound play, matching sounds, beginning sounds, rhyming cards.

1a Naming objects.

5d Symbol and sound connection to a real object in their world and in experiences they are connected to.

5f The sound ‘mapping’ is extending beyond beginning sounds, and is inclusive of multi-syllabic words, and phonograms.

Phonetic invented composition of words. Mapping specific sounds to letters individually.

7a Each is parallel to the other but aware of one another. C1 observes C9’s work while engaged in her own. 3 peers are observing during this observation.

2c Work cycle has a beginning, middle and end for each. One letter after the other, placed side by side.

Newfoundland?" She looks intently at me and her mouth purses and closes. Her lips form /f/ and she says /f/ like C7!" C1 claps and turns back to her rug.

C1 places /m/. But there is not another /a/ felt so she goes to get the sandpaper letter ledger shelf /a/ and puts it next to /m/. And picks up /n/. C1 stands up, walks around to look at C9's rug. C9 is putting down an /l/. C1 says Newfoundland. She says to C9 /d/ is the last letter. C1 walks the other way around, back to her rug, puts the /n/ beside the /a/. She drops to the floor. Points to each letter and says each one by one. Then she is up and jumping. On her rug is /batman/. C1 stops jumping and walks to a shelf.

C9 has come back with /p/ and positioned it as a /d/. On her rug is /nwfnld/. C9 begins to clean her work up. C1 comes back to her rug. She has the matching pictures of types of squirrels. She takes out the picture of the black squirrel and she builds /blackskril/. Next she builds /chipmuk/. Observation ends 10:14 a.m.

Appendix J

Half-Day Toddler Classroom Environment



Photograph 11. *A panoramic view of the Half-Day 2-year and 3-year old community.*

This photograph shows a panoramic view of the Half-Day 2-year and 3-year old community. Natural lighting flooded the classroom. The Language area was anchored near the floral patterned rug. A basket of books was located at one end of the Language shelf. Tables were grouped for individual work. The choice to work at a table with one or two other children was also available.



Photograph 12. *Language materials were placed within the daily living activities of the toddler community.* Typical practice in the Montessori toddler environment is a focus on Self-

care and Care of the Environment. The counter in the background was prepared for children to independently prepare a snack and wash their dishes when finished. A few of the activities visible on the free-standing shelf included Coffee grinding, Flower arranging, and Kitchen objects to name then match to teacher-made cards. Books were included in all areas of the environment.



Photograph 13. *Language activities displayed in a variety of attractive baskets to invite the exploration of the children.* As is typical in Montessori toddler classroom design, shelf activities are ordered from the top to bottom, and left to right. The language shelf sequence began with simple or concrete vocabulary activities such as the basket of real squash (see Photograph, top left). Representational activities followed that guided the child to match an object to a picture such as the vegetable/book basket (top, right), and community helpers located on the middle shelf, far right (see Photograph 13). The activities laid on the lower shelf were inclusive of abstract language choices such as types of dogs or goats pictures to match (see Photograph 13, bottom of shelf left, first and second activities). Other language activities were concepts such as sequencing, opposites, and ‘things which go together’ (bottom shelf).



Photograph 14. *The display for preparing the community for a shared snack seated at the classroom tables.* Towards the completion of the morning work cycle the children would gather to set the tables and lay out a community snack that would be served family-style. Indirectly setting the table guided the development of one-to-one correspondence, as well as sequencing for writing and reading.

As detailed in the Daily Observation/Field Note data tool the art area was included within the Language activities because the materials indirectly prepared the young child's hand for writing. (see Appendix D). Just as all the other Montessori developmental activities were

grouped and sequenced so were the art choices. The sequence guided the toddler to select an art mat, and then the activity.



Photograph 16. *The Half-day 2-year and 3-year old art activity shelf.* Displayed on the top left were the art mats. Below the art mats, on the left, was the paper resource. The children were able to resource the paint from the cupboard below the counter (see Photograph 13).



Photograph 15. *A selection of the toddler art activities.* Top to bottom; Left to Right: Crayoning, colored pencils, gluing box; Hollow perforator with paper strips, scissors, and liquid watercolors.