



A Child-Directed Music Curriculum in the Montessori Classroom: Results of a Critical Participatory Action Research Study

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Abstract: Maria Montessori strongly advocated for music learning to be fully integrated into the classroom; however, many Montessori classrooms are dominated by materials aimed at developing children’s visual sense. The purpose of this critical participatory action research (CPAR) study was to address this perceived learning disparity by developing and implementing a curriculum that is consistent with the Montessori approach, child directed, and focused on sound examination and music learning. We designed six shelf works and offered them, over the course of 6 CPAR cycles, to 20 3- to 6-year-old children attending a Montessori school. Findings from qualitative and quantitative data indicate that the children received the works positively, chose to engage with them, became more confident in their musical tasks over time, showed signs of deep concentration and attention, and demonstrated consistent performance across similar tasks related to perception and cognition. We conclude that the presence of these 6 curricular works began to disrupt the perceived learning disparity we identified; however, more can be done to understand and change the classroom practices that support that disparity.

Maria Montessori posited that sense education aimed at “the acquisition of a fineness of differential perception” (Montessori, 1912/1967, p. 178) is a necessary component of a child’s education. Such education prepares children for encounters with their environment and all other areas of learning to come (Montessori,

1912/1967). Essentially, Dr. Montessori believed that sensory education is the foundation for an individual’s successful navigation of life and learning.

Though Dr. Montessori’s belief in sensory experience and development is still apparent in Montessori education

today, support for sensory development fails to exist in balance with other developmental domains within classrooms. As an illustration, 28 Montessori trainers, representing Association Montessori Internationale/USA and the American Montessori Society, identified the Sensorial materials necessary for a Montessori classroom (Lillard, 2011). Only one of the 17 identified materials (6%) pertained to sound perception (i.e., Sound Boxes/Cylinders), one to smell (i.e., Smelling Bottles), and no taste materials were identified as necessary. The majority of the materials (59%) relied upon and developed the visual sense (Lillard, 2011).

This imbalance is likely an outcome of a long societal evolution toward the favoring of the visual sense. In arguing for art educators to move beyond a purely visual approach to their work, Bolin and Blandy (2003) noted Classen's (2002) work in exploring "ways that enlightenment philosophers, industrialists, and scientists were mesmerized by the visual to the detriment of the other senses.... Smell, touch, and taste were eclipsed in importance as the visual became associated with objective reality" (p. 254). Bolin and Blandy (2003) argued that such an imbalance is discordant with our current multimedia world and detrimental to students:

If art educators continue to privilege visual objects and/or visual experiences . . . our students and the field will be susceptible to manipulation through our other sensory modalities. In this, our field will continue to perpetuate the disciplinary and sensory boundaries that fail to encourage a holistic and systemic understanding of experience. (p. 247)

Music educators have long held that the development of the auditory sense and musical capabilities is a right for all students because of music's "ability to communicate the ideas and emotions of the human spirit" (National Association for Music Education [NAfME], 1999, para. 4). Further, research has shown that quality musical engagement can encourage singing development (Dansereau, 2011; Salvador, 2019), rhythmic capabilities (Ilari, Fesjian, & Habibi, 2018), and tonal skills (Gerry, Unrau, & Trainor, 2012) in young children. It has also been shown to have a positive effect on young children's executive function (Gerry et al., 2012; Joret, Germeys, & Gidron, 2016; Moreno et al., 2011), self-regulation (Winsler, Ducenne, & Koury, 2011), social-emotional

development (Gerry et al., 2012; Menzer, 2015; Ritblatt, Longstreth, Hokoda, Cannon, & Weston, 2013), and language acquisition (Bolduc, 2009; Gromko, 2005; Magne, Schön, & Besson, 2006).

The key role music education plays in children's lives and development was reflected in the recent signing of the Every Student Succeeds Act (ESSA), which identified music as part of a "well-rounded education" (ESSA, 2015, Title VIII, Sec. 8101); however, NAFME reported that more than 1.3 million elementary-aged U.S. children do not receive any music education in school (NAfME, 2018). This is particularly distressing given that early childhood, defined here as birth through age 8, has been shown to be a key period for musical development (Cho, 2019). According to Habib and Besson (2009), the time before age 7 is likely a "sensitive period," . . . beyond which music-induced structural changes [to the brain] and learning effects are less pronounced" (p. 279). Further, it is thought that music aptitude, meaning one's potential to learn and understand music, is in a developmental state during early childhood and that this potential is affected by the quality of an individual's early musical experiences (Gordon, 2013). Stated another way, children's early musical environment is an important determinant of their potential to be musical throughout life.

Recognition of the importance of music learning for young children has resulted in a commitment on the part of some early childhood centers to provide music education for their students; however, such education experiences tend to be teacher directed (often in the form of group singing; Nardo, Custodero, Persellin, & Brink Fox, 2006) and not aligned directly with the independent, child-directed learning that characterizes the Montessori approach.

Additionally, music education tends to occur at a separate time, apart from the daily classroom work of the children (Nardo et al., 2006). This practice runs contrary to Dr. Montessori's belief that "music was an inherent part of [her] teaching, having a place alongside mathematics, language arts, and science, never relegated to being extras or optional activities" (Rajan, 2016, p. 236). Dr. Montessori believed that without music learning, children would be unable to "perceive the delicate complexity of sounds" (Montessori, 1912/1967, p. 206). Consequently,

she created materials such as Bells and Sound Cylinders¹, which are still in use today in varying degrees. Despite these efforts, however, Dr. Montessori expressed concerns as to how children might learn music in a way that truly embodied her Method. She wrote:

The rigorous scientific education of the sense of hearing is not practically applicable to the didactic method. This is true because the child cannot exercise himself through his own activity as he does for the other senses. Only one child at a time can work with any instrument producing the gradation of sounds. In other words, absolute silence is necessary for the discrimination of sounds.
(Montessori, 1912/1967, p. 204)

Dr. Montessori herself noted (1912/1967) that the didactic materials related to the sense of hearing were limited in their ability to encourage deep and independent learning of sounds and music. Further, despite developments in technology that allow children to engage with musical sound without disturbing others (i.e., headphones), Montessori music materials and curriculum seem not to have evolved to reflect changes in our world. Consequently, music education remains relegated to a particular time in the day, if it is provided at all, and/or consists of teacher-led activities within a classroom that is dominated by materials aimed at developing the visual sense. The purpose of our study was to address this perceived learning disparity in the Montessori classroom by developing and implementing a curriculum that is child directed and focused on sound examination and music learning. Specifically, we sought to answer the question “How is a curriculum of music- and sound-based works developed, implemented, and received in a Montessori classroom?”

Literature

We have some sense of the effects of a Montessori curriculum on phonological awareness (Franc & Subotic, 2015), social skills, theory of mind, and story writing (Lillard & Else-Quest, 2006; Marshall, 2017), as well as

¹ The Montessori Bells, when ordered, produce a scale; they were designed to encourage children to discriminate among pitches. The Sound Cylinders were designed to encourage children to discriminate among unpitched sounds created by shaking cylinders containing various materials.

on executive function, reading, math, vocabulary, and social problem-solving (Lillard, 2012; Marshall, 2017). There have been few empirical investigations, however, related to music within a Montessori classroom. In a study on the effects of music-enriched Montessori instruction on elements of mathematical achievement, Harris (2007) assigned 200 three-, four-, and five-year-olds from Ontario, Canada, to an experimental or control group. The experimental treatment consisted of a music program designed to teach musical concepts of pitch, duration, timbre, and form, while also encouraging listening, vocal, and motor skills. The control group received traditional Montessori instruction without the musical-enrichment component. The experimental group significantly outperformed the control group on a test of early mathematical skills.

In a descriptive study, Rajan (2016) queried 36 Montessori school directors from eight U.S. states about the role of music in their schools, their personal beliefs about music and children’s development, the challenges of teaching music, and their beliefs regarding the importance of music within the Montessori curriculum. The directors reported valuing music education in their schools but also cited limitations pertaining to resources and faculty. Musical experiences in the schools consisted of listening activities during class time and music as a facilitator of transitions. During independent work within the classroom, teachers often played background music to create ambience. Though the directors believed that music was integral to Montessori education, only 28 schools employed a music specialist, and fewer than half offered daily music instruction. Rajan did not report any instances of the inclusion of music education in the children’s independent work.

Although there is not a large body of research related to music and Montessori education, nor are there studies that pertain to Montessori materials aimed at musical development, there is research on children’s musical behaviors that occur outside of teacher-led instruction. Most of this research relates to children’s participation in a music center, which typically consists of a partitioned section of the classroom containing instruments and recordings for children to freely explore (Kenney, 1997). Such centers have been shown to be quite prevalent in early childhood settings. For example, after surveying 293 early childhood centers, Nardo et al. (2006) reported that

almost half of them offered children opportunities for free play with music materials several times a week, 59% of centers provided a listening center with headphones, and 56% offered a dedicated music center. Similarly, Rajan (2017) found that 88% of 178 surveyed preschool teachers within a large state in the Midwestern United States made classroom percussion instruments (e.g., maracas, drums, bells, shakers, rhythm sticks, triangles, xylophones, egg shakers, bongos) available for children to explore throughout the day via music centers or prop boxes. There is no evidence from either of these studies, however, that the materials available to children were intended to move beyond exploration to encourage consistent and sequential learning about sound or music.

In an effort to study children's behavior within music centers, Berger and Cooper (2003) documented children's play at music centers during 10 weekly music classes for parents and children. The classes were held at a university rather than within a preschool, and the researchers engaged with the children in the music centers upon request. Berger and Cooper did not provide a description of the music centers; however, based on brief summaries of play episodes, it is evident that they contained books, puppets, and instruments that are often provided to preschoolers (e.g., drums, mallets, triangles, xylophones). Three themes emerged from the analysis: while in the music centers, children engaged in unfinished play (i.e., indications that the children wished to continue the musical play), extinguishing play (i.e., play behaviors obstructed by adults), and enhancing play (i.e., musical play that was encouraged by adults). It should be noted that the aim of the music centers was to encourage free musical play and exploration of sound sources, rather than specific child-directed music learning.

Sims, Cecconi-Roberts, and Keast (2011) were also interested in understanding how children freely responded to a music center, but in this case, it was a listening-only center. The researchers provided three cassette players, headphones, and tapes of two musical pieces to 4- and 5-year-old children ($N = 37$) over 8 days, and tracked their behaviors. Sims et al. were struck by the popularity of the center (over 100 visits during the 8 days of data collection) but acknowledged a possible novelty effect. The children spent an average of 12.15 minutes per visit to the center; visits ranged from 2.03 to 40.0 minutes, indicating that the response to the center

varied quite a bit by child. The researchers concluded that the children found value and meaning in the listening experiences.

Music centers were conceptualized somewhat differently by Baker (2008) in a study of kindergartners through sixth graders living in Tasmania, Australia. The centers were open to free exploration and self-paced, as those cited before; however, Baker's centers had a distinctive problem-solving component and reflected Wiggins's (2001) emphasis on performing, listening, and creating music. For example, in one center, students read a poem and then created sounds for the two main characters of the poem. After doing so, they were tasked with notating their sounds, choosing between traditional music notation (i.e., notes on a musical staff) or graphic notation consisting of symbols and/or pictures. The students then altered the sounds based on the activity in which the character was engaged, infusing an aesthetic component into the sound creation. Finally, the students read the poem aloud while incorporating their created and manipulated sounds. Eighteen such centers were piloted with children over a 2-week period, and the children completed questionnaires regarding their experiences with the centers. Baker concluded that "participants overwhelmingly enjoyed the process of completing learning centers, that learning about learning through the centers was strongly reported, that some musical learning was evident and that problem-solving in this context was understood variously by participants" (p. 29).

As has been shown, Baker's (2008) conceptualization of music centers for elementary-aged children as opportunities to solve problems is anomalous in the literature. More commonly, music centers for preschoolers are not goal oriented, nor do they reflect an intentional curriculum of music learning. According to Hornbach (2005),

free musical play is often undertaken in music centers in which children are left without supervision to explore musical instruments or other manipulatives; though exploration is important, if children do not yet have the vocabulary or a sense of rhythmic and tonal syntax for contextual music making, free play in music centers may only be exploration. This musical vocabulary may be provided to young children through their participation in a group music class. (p. 11)

While the development of rhythmic and tonal syntax for contextual music making may occur during teacher-directed music classes, the exclusive implementation of this approach betrays the independent, child-directed principles of a Montessori approach. Further, while musical play is inherently valuable, and exploration of sounds and musical instruments within music centers may be useful, an exclusive implementation of this approach deprives children of the opportunity to develop their musicianship through intentional and sequential musical engagement. Consequently, we have concluded that a child-directed curriculum that is consistent with the Montessori approach, aimed at the development of young children's musical perception and cognition, and designed to balance the strong presence of visual stimuli in the classroom is needed.

Method

This study took place in a Montessori school where Author 2 (Brooke) is a Primary teacher. Author 1 (Diana) is a music-teacher educator and early childhood music researcher at a nearby university and has two children who attend the school. The study was conducted under the auspices of the institutional review board at Diana's university.

The development of a music curriculum was an outcome of several casual, initial conversations between Diana and Brooke, and of Brooke's expressed interest in enhancing the musical offerings in her classroom. Brooke currently has the Montessori Sound Cylinders available in her classroom. The school owns one set of Montessori Bells, which are available at the discretion of the music teacher, when the children attend music class once each week.

Design

We chose to engage in a critical participatory action research (CPAR) study because we sought to disrupt the disparity we perceived within the Montessori classroom, which favors a visual-tactile approach to Montessori education and the corresponding senses, ways of knowing the world, and methods of expression. Kemmis, McTaggart, and Nixon (2013) described action research as "practice-changing practice" (p. 2) and CPAR as rejecting

the notion of the "objectivity" of the researcher in favour of a very active and proactive notion of

critical self-reflection—individual and collective self-reflection that actively interrogates the conduct and consequences of participants' practices, their understandings of their practices, and the conditions under which they practice, in order to discover whether their practices are, in fact, irrational, unsustainable, or unjust. (p. 6)

We began with a series of meetings in which we identified our shared concern, our public sphere, and our ideas for action in accordance with CPAR (Kemmis et al., 2013). Our shared concern was the perceived disparity in the Montessori classroom, which marginalized the role of sound in children's learning and expression. Our public sphere (i.e., those invited to join us in discussion about this concern and work) included the children in Brooke's classroom, the two other Primary teachers, the head of school, Diana, and Brooke. Our idea for action was to create a series of shelf works designed to encourage the development of children's musical perception and cognition capabilities.

Participants

The participants were 20 children in Brooke's Primary classroom: three 3-year-olds, six 4-year-olds, eight 5-year-olds, and three 6-year-olds. Slightly more females ($n = 11$) than males ($n = 9$) were represented, the children were uniformly from middle- to upper-middle-class socioeconomic backgrounds, and all participating children were White. There were no documented learning differences among the children.

Curriculum

We designed six shelf works to encourage children to explore sound and musical concepts. Crucial to these shelf works were the design and manufacture of a device that would allow the children to quickly and easily listen to and compare various sounds. We tested several options before collaborating with one of Diana's graduate students, who had technical expertise, to design and produce the device used in this study. The device was a small, plastic box with a headphone jack, on-off switch, and battery compartment. To explore the sounds, a child placed a plastic disk on the device, and the sound immediately played through the headphones. To hear another sound, the child would replace the first disk with another. The disks were color coded to match their corresponding shelf work but were otherwise identical.

For example, all disks provided to the children for the pitch-height work matched in size, shape, and color. The only variable that changed among the disks was the sound they produced. This decision stemmed from research that indicates children will attend to changes in shape (when present) over changes in sound, color, or texture (Dansereau, 2017). Accordingly, isolating the sound variable was crucial in encouraging attention to that property.

We also designed the works to encourage children to hold sounds in working memory and to audiate. *Audiation* is a cognitive process that involves mentally replaying and comprehending sounds that are no longer present (Gordon, 2013; Runfola & Taggart, 2005); it is theorized to be necessary for achievement across a wide variety of musical behaviors (e.g., singing, playing an instrument, composing, improvising; Gordon, 2013). To complete the works accurately, children needed to correctly perceive the sounds produced by the device, comprehend the sounds after they were no longer physically present, and compare the mental representation of those sounds to other sounds.

The first work we created was designed to encourage children to explore and demonstrate their understanding of pitch height. We provided a three-dimensional wooden tree with three circular openings (Figure 1). After placing the disks on the device and hearing a pitch on each disk, the child would place the disks in the circular openings to indicate which disk produced the highest pitch, the lowest pitch, and a sound between the highest and lowest pitches.



Figure 1. Three-dimensional wooden tree for pitch-height work.

This work included a control of error, which allowed the children to track their learning independently. The disks used in this study were approximately 2 inches thick, hollow, and could be opened by the children to reveal the insides of the disks. Each pink disk had a picture of the tree with the disk in the correct location inside. By opening the disk, children could check to see if their disk placement matched the picture.

The next two works centered on pitch direction. When exploring Work 2, the children heard three sliding pitches: a pitch that slid upward, one that moved downward, and a third that moved up and then down. The children demonstrated their understanding of these pitch directions by matching a two-dimensional picture to the corresponding disks (Figure 2). A colored dot inside the disk that corresponded with a dot on the back of the card served as the control of error for this work. In Work 3, the children performed the same task but used a three-dimensional manipulative to show their understanding.



Figure 2. Two-dimensional pictures for pitch-direction work.

Works 4 and 5 were designed to apply the learning in Works 1–3 to melodic direction. In Work 4, the children heard a piece performed on piano and then moved an object (a small toy kangaroo) across a three-dimensional path to indicate the directions the melody moved (Figure 3). Completing the path before the music ended, or having the music end before the children completed the path, signaled to them that they did not follow the music accurately. In Work 5, the children performed a similar task while listening to three different melodies performed on trombone. The control of error was consistent with the control of error for Work 2.



Figure 3. Three-dimensional path indicating melodic direction.

Work 6 encouraged the children to explore dynamic changes. Each disk contained a sound that increased in volume, decreased in volume, or increased and then decreased. The children manipulated a Hoberman sphere, (i.e., an orb that can expand to more than double its size and then retract), to indicate the changes they perceived (Figure 4). This work was exploratory in nature and did not include a control of error.



Figure 4. Child manipulating a Hoberman sphere while exploring dynamic changes.

Brooke introduced each work to her students during a group lesson. Consistent with the Montessori approach, she demonstrated the work in a slow and precise fashion without language. She then sat with each child while the child engaged with the work for the first time, and she documented the child's response. After each child had the

opportunity to experience the work once, Brooke placed the work on the shelf to be used freely by the children during their 2-hour block of independent work. Each work was available on the shelves for several weeks.

Data Collection

As each child experienced each work for the first time, Brooke recorded descriptive data that included the child's name, age, gender, date of participation, and quantitative data related to the child's accuracy; she also recorded qualitative data in the form of notes on each child's ability to follow and replicate the procedures, perceived interest in the material, completion of the work, observed problems, and any comments made by the child. Diana completed in-class observations of the children's interactions with the materials while they were available on the shelves and recorded field notes. We maintained research journals in which we documented our thoughts about how this new curriculum was or was not meeting the goal of disrupting the perceived educational disparity described earlier.

Consistent with CPAR, we engaged in cycles of data collection, reflection, and revision. Each cycle consisted of (a) introducing the work to children, (b) collecting data on the children's interaction with it, (c) meeting to analyze the data, (d) adjusting the shelf work, and (e) determining implications for future shelf works. We repeated this process with each work we designed. In sum, we completed six of these cycles between March 2017 and March 2019.

Data Analysis

Qualitative data from Brooke's notes on the children's interactions with each work, Diana's field notes, and our research journals were coded for emergent themes by Diana and a research assistant. Themes that were present in multiple data sources were noted as patterns. We checked the themes and patterns with one another, and we triangulated the qualitative data to uncover areas of alignment and difference.

For the quantitative data, we assigned each child scores based on her/his ability to complete Works 1, 2, 3, 5, and 6² while being observed by Diana. If the child responded

² Because Work 4 did not involve sorting three different disks, it was not included in this portion of the analysis.

accurately to all three disks, the child received a score of 3. Children who responded accurately to two disks received a score of 2, to one disk a score of 1, and those who did not respond accurately received a 0. We checked these data for trends in difficulty and looked for any differences based on age or gender.

Findings

As this was a CPAR study, we analyzed and discussed evidence as part of each of the six cycles. The findings revealed during our continuous reflection informed the development and/or implementation of the subsequent work. Often, these findings pertained to components of the experience that were unexpectedly tricky for the children. For example, after introducing Work 5, Brooke wrote:

Children overall had less success matching these melodies correctly. My first thought was that the melodies were too difficult and needed to be longer and more dramatic. . . . I want to experiment with a couple things. First, during the group presentation I want to try listening to the melodies as a group and moving our whole bodies to correspond with the movement. . . . Another thought is to have the child match the movement in a more concrete fashion—such as moving her body, or moving a scarf.

In addition to discussing the findings that emerged within each cycle and informed subsequent cycles, we analyzed all evidence at the completion of the study. The remainder of this section will focus on these results.

Qualitative Findings

Three primary themes emerged from Brooke's notes on the children's interactions with each work, Diana's field notes, and our research journals: positive reception, increased comfort, and fixed attention.

Positive reception

Analysis of qualitative data revealed that the works were well received by the children. Nonverbal indicators of this reception included smiles when engaged with the works, surprised expressions when hearing the sounds, persistence in engagement, and intense focus while exploring the works. Themes from the children's verbal responses included that they found the works "fun" and

"cool" and that they "liked" and "loved" engaging with them. All of the children opted to use the musical shelf works initially, and some children returned multiple times while the works were on the shelves. Brooke wrote in her journal that she "found it fascinating that the children who return to the work most often are the same children who are reluctant to participate in circle time singing."

Increased comfort

Data from Brooke's research journal, as well as the documentation on the children's responses to the works, revealed that the older children appeared to become more comfortable over time as they engaged with the works. By the end of data collection, they appeared quite at ease while engaging in the listening tasks, as evidenced by their positive affect and relaxed demeanor, and all children were entirely capable of using the technological device.

Fixed attention

As data collection unfolded, we saw clear signs that children deeply fixated on the aural stimulus while engaged with the works; Brooke wrote that she had not noted this behavior in her classroom prior to the study. This fixed attention was characterized by the child ceasing all movement, staring into the distance without a specific focus, showing intense facial affect, and sometimes displaying an open mouth and/or tilted head. As Brooke noted in her research journal,

What I have witnessed so far with the two materials we have piloted is an overwhelming need for more of this type of work. The children in my current class have demonstrated a deeper level of concentration with this work. In part, I am sure [it is] because of the use of their auditory sense: if they are distracted by others in the classroom, listening to their friends, or carrying on a conversation, they will miss the very essence of the work. What I find fascinating is that this work must be fulfilling an essential need, because even my most social children go to the material and tune everything else out.

Children were also observed vocalizing while they listened to the sounds or music, or afterward when explaining what they had heard to a classmate. Brooke noted that one little girl was "swooping her head as she listened to the tracks over and over," and several children used hand gestures to reflect the pitch and melodic direction.

Quantitative Findings

Analysis of quantitative data (see Table 1) revealed a perfect positive, significant ($p < .01$) correlation between scores on Works 2 and 3 (pitch-direction works), indicating that the children’s response accuracy was consistent regardless of the manipulative used to demonstrate that understanding. There were no significant correlations between the scores on those two works and the scores on Works 1, 5, or 6, indicating that different processes or levels of challenge were likely involved among the tasks. There were no significant gender or age differences in the data.

Conclusions and Discussion

As articulated earlier, we noted an educational disparity in this Montessori classroom: music education was relegated to a particular time in the day and consisted of teacher-led activities within a classroom that was dominated by materials aimed at developing the visual sense. We concluded that the presence of these six curricular works began to disrupt this educational disparity. We found that the children received the works positively, chose to engage with them, became more confident in their musical tasks, showed signs of deep concentration and

attention, and demonstrated consistent performance across similar tasks of perception or cognition.

Limitations

Because Brooke was busy assisting children during the independent work block, consistent tracking of children’s return to the device and accuracy of response was challenging. We noted that many of the children would return to the work after their initial introduction but then return independently only one or two additional times. Some would not return despite eagerly engaging initially. We did not track the children’s interactions with the works across time nor measure their accuracy across multiple attempts. Follow-up research aimed at documenting the frequency of interactions, length of engagement with the works, and comparisons with engagement in other works would be useful.

It should also be noted that the children were aware that these works were new and different from those they had experienced in earlier months or years. To collect data on every child’s interactions with the works, Brooke sat with each child during his or her initial attempt, a departure from typical practice. Further, the children were aware

Table 1
Means and Standard Deviations for Shelf Works, by Age and Gender

	Music shelf work									
	1		2		3		5		6	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age in years										
3	0.67	0.58	1.33	1.53	1.33	1.53	3.00	0	1.50	0.71
4	2.17	1.33	1.50	1.00	1.50	1.00	2.17	0.75	2.20	0.84
5	2.13	1.25	2.00	1.29	2.00	1.29	2.75	0.71	2.63	0.74
6	3.00	0	2.33	1.16	2.33	1.16	2.33	1.16	2.67	0.58
Gender										
Female	1.91	1.30	1.90	1.20	1.90	1.20	2.73	0.65	2.30	0.82
Male	2.22	1.20	1.71	1.25	1.71	1.25	2.33	0.87	2.50	0.76
Total	2.05	1.23	1.82	1.19	1.82	1.19	2.55	0.76	2.39	0.78

that their classroom was experimenting with the works but that the other classrooms in the school were not, which may have caused a novelty effect.

Discussion and Recommendations for Further Research

It became clear that the disparity we perceived may also have been seen by the children. This was likely an outcome of the *practice architectures*—the “cultural-discursive, material-economic and social-political arrangements” (Kemmis et al., 2013, p. 3) holding practices in place—that are present within the classroom, as well as the procedures that we implemented as part of our study. In future studies, the works might be introduced as equal partners with the other works in the classroom, and patterns of engagement could be tracked and compared with this study’s findings. Additionally, more attention should be given to the architectures that prevent change in classroom practices and may support disparities. As Diana wrote in her research journal,

We are disrupting [the disparity], but not as much as we would like yet. The classroom now has another aspect of learning and engagement, but music is not balanced with the visual component of sensorial (for example). A dedicated music shelf or area, additional pairs of headphones and devices (to allow for multiple works to be used simultaneously), music works involving movement, etc. would help with this.

In general, the tasks seemed to match the abilities of the children; only Work 4 appeared difficult, perhaps because of the quick tempo of the musical stimulus. We intend to adjust this work and then determine whether that adjustment allows it to be accessible to more children. We recommend additional research designed to understand the development of the underlying perceptual and conceptual capabilities, as well as the difficulty of the tasks.

The obvious fixed attention shown by many of the children while engaged with a work was unexpected. This level of attention may be evidence of a *flow state* (Csikszentmihalyi & Csikszentmihalyi, 1992), “an optimal state determined by an individual’s perception of high skill and high challenge for a given task” (Custodero, 2005, p. 185). This state has been evident when children are engaged in a purposeful, self-initiated music activity,

acknowledge error and adjust to conform to rules without adult intervention, engage in focused and controlled movement without extraneous motion, and show signs of anticipating what will come within an activity (Custodero, 2005).

Alternatively, or perhaps relatedly, the fixed attention in our study may be related to *audiation*. As described earlier, *audiation* is the mental replaying and comprehension of music when it is no longer present (Gordon, 2013). Brooke observed this when some children performed Work 4 accurately and in time, without listening to the piece of music: “I was blown away by the few children who did the work without the music. Two children vocalized the musical piece and moved the kangaroo without listening to the music!”

Audiation also can occur while listening to music and is akin to processing what another has said while engaged in a conversation (Gordon, 2013). During such a process, *audiation stare*—which is sometimes characterized by an open mouth and tilting of the head—may be observed. *Audiation stare* is “the first glimpse of discrimination, the realization sounds of music can be same or different” (Gordon, 2013, p. 111).

Another possibility is that the children are responding to the musical stimuli similar to how infants have been shown to respond to novel physical objects, with marked focused attention and decreased heart rate (Lansink & Richards, 1997). In this instance, music and sounds are the stimulus rather than a physically present object. More research is needed to understand the nature of this response.

The children who participated in this study were quite homogeneous in terms of race, socioeconomic status, and learning capabilities. Similar studies with more-diverse populations, as well as those that account for musical experiences occurring outside the classroom, would be highly beneficial. Additionally, studies designed to investigate potential associations between music learning in the classroom and learning within other parts of the curriculum may be informative.

This study indeed brought awareness to the uncommonness of the aural sense within this Montessori classroom and documents one approach to addressing the imbalance that was child directed, positively received,

and resulted in fixed attention to sound and music. We recommend more research and curricular innovations aimed at providing young children with a holistic education that is consistent with the child-directed principles of a Montessori education.

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