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Music Education From Birth to Five: An Examination of Early Childhood Educators' Music Teaching Practices

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Abstract

Children from birth to five are generally enthusiastic about music. However, because many early-childhood educators (ECEs) feel that they have insufficient knowledge to foster musical development, music education practices are not equivalent across ECEs. This study aimed to identify and determine the frequency of music activities used by ECEs. In all, 108 French Canadian ECEs ($N = 108$ women) from mixed areas (urban and rural) participated in the study. All participants completed an online questionnaire addressing their music education practices. The data analysis considered three profiles: 1) ECEs with little musical knowledge, 2) ECEs with good musical knowledge, and 3) ECEs with in-depth musical knowledge. Results showed that all ECEs used a wide variety of music activities. However, use frequency varied according to the level of musical knowledge. Initial training and continuing education programs for ECEs should be improved in order to enhance music education for young children.

Introduction

A majority of early childhood educators (ECEs) indicate that children enjoy music activities, although most of them also say that they are inadequately trained to awaken children to music (Gruenhagen, 2012). This stands to reason, as in addition to educational principles, music learning consists of specific knowledge that can be acquired only through medium-to long-term training (Young, 2016). It is therefore unsurprising that both the Music Educators National Conference (MENC, 1994) and UNESCO (2002) reported that only half of all ECEs felt that they had the skills they needed to reach children through artistic activities, and particularly music activities. According to Koca (2013, p. 897), a good early childhood music program requires an educator with a good sense of self-efficacy in terms of music education skills.

This raises the question: *What place is given to music in early childhood education?* Some studies indicate that ECEs who learned music as part of their education (high school, college, university) give more priority to this domain (Kelly, 1998; Kim & Kemple, 2011). Moreover, a recent study showed that musically educated ECEs provide more activities involving sound discrimination, music interpretation, and music appreciation on a daily basis (Bolduc, 2012). In contrast, ECEs with little musical training appear to be less interested in doing music activities, and report that it is difficult to compensate for their lack of training (Gharavi, 1993; Kim, 2013). Kane (2005) and Koca (2013) also found that educators with low perceived efficacy in music teaching had less confidence in their ability to turn children on to music. According to Bandura (1997), to develop self-efficacy, people may regulate their own behavior through motivation, thought processes, affective states, and actions, or they may attempt to change the environmental conditions to bring them more in line with their efficacy beliefs (Bandura, 2006). In fact, it seems that music education practices still vary widely across ECEs. The literature has shown that ECEs and future preschool teachers generally do not receive equivalent music training (Koca, 2013). This would produce evident disparities in the ways that young children (under age five years) experience music (Nardo, Custodero, Persellin & Brink Fox, 2006). To respond to this issue, two main elements need to be explored. First, what are the impacts of music education in early childhood? Second, what type of training would help ECEs improve their music education practices?

Impacts of music education in early childhood

Recent discoveries in psychology, neuroscience, and education have contributed new insights into the field of musical development in early childhood. Intrauterine sonar measurements have revealed that the fetus is capable of reacting to familiar words and songs from the second term of pregnancy (Ilari, 2002; Trehub, 2003). During the first years of life, toddlers rapidly develop the

ability to identify, discriminate, and reproduce a variety of distinct sound sequences (Trainor, 2012; Trehub, 2010). In her dissertation, Vannatta-Hall (2013) states that a mother's singing captures an infant's attention better than that mother's speech (Trehub, 2002), and infants prefer the musical qualities of speech that is directed to them over speech that is directed to adults (Cooper & Aslin, 1990). When young children learn music, all the cognitive operations they require to receive and analyze sound stimuli are activated (Kraus and Chandrasekaran, 2010). Additionally, learning music improves memory capacity, as indicated by Franklin, Moore, Yip, Jonides *et al.*, (2008) and Ho, Cheung and Chan (2003), who found in brain imaging studies that the left temporal lobe region, associated with verbal memory, is more developed in children and adults who regularly practice music. Music learning also has considerable impacts on sensory and motor functions. A recent study demonstrated superior movement planning and execution in young musicians compared to non-musicians (Steele, Bailey, Zatorre & Penhune, 2013). Furthermore, other researchers have noted that listening to and practicing music increases activity in various brain regions such as the amygdala, the orbitofrontal cortex, and the ventral striatum, some of which are associated with motivation, reward, and other pleasurable situations (Blood & Zatorre, 2001).

The above-presented basic research confirms that music education has significant effects on the brain. These findings represent a major advance in the early childhood education field, because they provide evidence that hearing, memory, psychomotricity, visuospatial control, and emotions are also involved in many music education conditions (Rauscher & Hinton, 2011; Strait, Parbery-Clark, Hittner & Kraus, 2012). Using targeted music activities, children can be encouraged to focus on a variety of tasks that foster the development of meta-knowledge (Beran, Brandl, Perner & Proust, 2012; Waters & Kunmann, 2010). NAFME (MENC, 1995) stresses that early childhood is the ideal time to build a musical foundation based on music education standards for prekindergarten.

Music education practices

Early childhood educators are increasingly required to improve their expertise in early childhood education, knowledge, developmentally appropriate practices, and educational strategies in order to provide quality care and education to young children. Early childhood education requires the use of particular pedagogical practices that encompass all the tools and methods that educators can apply to foster the children's overall development (Gordon & Brown, 2013). However, many ECEs are unfamiliar with the prekindergarten music standards (Kirsten, 2006). Lenzo (2014) says that highlighting points of agreement between developmentally appropriate practices and the prekindergarten music standards could positively affect ECE attitudes toward music education along with their self-efficacy in music teaching. This could result in more musical activities being offered to children.

Lenzo (2014) also argues that ECEs tend to receive conflicting information about their role as a facilitator of musical development. Professional guidelines advocate integrating music across the early childhood curriculum as a way to foster development (Copple & Bredekamp, 2009). In this sense, educators would value the use of music. However, when asked about the content of their music education training, ECEs reported that they were ill prepared to integrate music into the curriculum (Kretchmer, 2002).

Although ECEs have expressed interest in integrating music, and although music integration is considered a developmentally appropriate practice that is guided by prekindergarten music standards, music educators have generally placed greater importance on teaching musical skills and concepts (Venesile, 1992). However, Gordon (2007) describes early childhood as a period of musical enculturation and informal learning that prepares them to learn musical concepts once they enter kindergarten. According to Lenzo (2014), caught between these opposing approaches, ECEs

may be conflicted about their roles as music educators. Moreover, the differing pedagogical foundations across early childhood education programs and the personal philosophies of the ECEs appear to influence their education practices (Gordon & Brown, 2013).

The research indicates that ECEs should have a grasp of the key elements to address in music, namely pitch, duration, intensity, and timbre. In addition to these, play activities can be used to supplement early childhood education practices, including nursery rhymes and songs, soundscape stories, and creating melodies and accompaniments. In order to offer good-quality music education, ECEs must be adaptable. Hoy and Spero (2005) demonstrate that educators with a strong sense of self-efficacy would tend not only to use effective musical approaches, but to introduce new educational practices as well.

The learning environment also wields a direct impact on music education practices. The quality, variety, and above all frequency of preschool activities can impress upon children the importance of music in their daily lives (Campbell & Scott-Kassner, 2002). Moreover, a number of associations, including MENC (1995) (now NAfME), have specified that a minimum of 20 minutes per day should be devoted to music, staggered over several short periods throughout the day. According to many practitioners, music education can be readily integrated into a multidisciplinary education approach in order to support learning in other areas, notably early literacy and numeracy skills (Habsen, Bernsorf & Stuber, 2004; Vaughn, 2000).

A deeper understanding of the characteristics and role of the early childhood music teacher as well as knowledge of the prekindergarten music standards would inform and clarify effective music education practices, and could pave the way to greater use of musical activities by generalist teachers (Lenzo, 2014; Koca, 2013; Vannatta-Hall, 2013). Although researchers have recommended training for practicing educators/preschool teachers and collaborative initiatives with music

specialists (Upitis, 1990), music education training programs for ECEs needs to be appraised and their scope expanded (Neelly, 2000).

Aim, objective, and relevance

The aim of this study was to document music education practices based on self-report assessments of ECEs. Our objective was to identify the music activities that ECEs employ and determine the use frequency, while considering the three following profiles: 1) ECEs with little musical knowledge; 2) ECEs with good musical knowledge; and 3) ECEs with in-depth musical knowledge.

The relevance of this study lies in the confirmation or rejection of the relationship that has been established between ECEs' level of musical knowledge and the priority they give to music. In practical terms, this study highlights the strengths and weaknesses of each of the three targeted groups. The findings should contribute to improve currently offered training programs by focusing on the knowledge that must be developed or deepened so that ECEs can offer good-quality music education to young children. In order to optimize their development, ECEs should draw on a variety of music education practices. However, for many ECEs, this poses a considerable challenge.

Method

Procedures

To comply with ethical research standards, prior approval was obtained from the research committee of Ottawa University. Recruited through an advertisement posted on a social networking site (October 2012) and by posters displayed in 33 daycare centers, 176 ECEs working in the X metropolitan area were invited to take part in this study. 108 ECEs (all women) working in urban and rural settings responded positively and agreed to complete an online questionnaire addressing

their music education practices. Participants were given one week to complete the questionnaire.

Validation of the questionnaire

Prior to formal testing, the questionnaire on music education practices was validated in a sample of 25 French-Canadian ECEs under a pilot project. The questionnaire content was inspired by the California Survey of Music in Early Childhood (Nardo, 1996) and was adapted to the educational reality of this specific population. The questionnaire began with a section on personal information (respondent's name, sex, position, socioeconomic status, years of experience working with children, extent of music education, estimated level of musical knowledge) [Appendix 1]. The next section contained 24 questions on their music education practices, grouped into six types of activities addressing the following musical aspects: 1) pitch; 2) duration; 3) intensity; 4) timbre; 5) songs, nursery rhymes, poems, and instrumental and vocal pieces; and 6) creation and appreciation.

For each of the 24 questions, ECEs in the pilot project were asked to circle the abbreviation that best corresponded to the frequency with which they used the activities in their music education practice: never (N), sometimes (S), often (O), or very often (VO). No point was awarded for a "never" (N) response, one point for "sometimes" (S), two points for "often" (O), and three points for "very often" (VO). If they wanted to skip a response or did not understand a question, they were asked to circle the (?) symbol.

To identify and determine the use frequency of music activities for the three ECE profiles, a Likert scale was used (Likert, 1932). This psychometric evaluation tool is a non-comparative scaling technique and is unidimensional. ECEs were asked to indicate their level of agreement with a given statement by rating on an ordinal scale (Jamieson, 2004). Cronbach's Alpha was used to evaluate the internal consistency. A value of .81 was established, suggesting strong internal

consistency reliability of the scale for this ECE sample. The questionnaire was subsequently adjusted to better target the music education practices by ECEs in the formal study.

Appendix 1

Questionnaire on music education practices

First name, family name	Sex: <input type="checkbox"/> F <input type="checkbox"/> M
Position: <input type="checkbox"/> early childhood education center <input type="checkbox"/> private childcare center	
Neighborhood socioeconomic status: <input type="checkbox"/> disadvantaged <input type="checkbox"/> moderately advantaged <input type="checkbox"/> advantaged	
Experience working with young children: <input type="checkbox"/> > 1 year <input type="checkbox"/> 1–3 years <input type="checkbox"/> 4–9 years <input type="checkbox"/> 10 years <	
Music education: <input type="checkbox"/> none <input type="checkbox"/> high school <input type="checkbox"/> college <input type="checkbox"/> university	
Estimated level of musical knowledge: <input type="checkbox"/> low <input type="checkbox"/> good <input type="checkbox"/> high	

Respond to each statement by circling the abbreviation that best corresponds to your practice.

<p>N = Never S = Sometimes: A few times during the year O = Often: About once a week VO = Very often: More than once a week ? = I don't know</p>

Pitch	
1. I use activities in which the children recognize or distinguish low sounds (bass), high sounds (treble), and rising or descending sounds.	N S O VO ?
2. I give the children opportunities to vocally imitate or reproduce with an instrument low musical sounds (bass), high musical sounds (treble), and rising or descending sounds.	N S O VO ?
Duration	
3. I organize activities in which the children recognize or distinguish quick tempos, slow tempos, and accelerating or slowing tempos.	N S O VO ?

4. I give the children opportunities to vocally imitate or play an instrument to reproduce music with quick tempo, slow tempo, and accelerating or slowing tempos.	N S O VO ?
5. I use activities in which the children recognize or distinguish steady and unsteady beats.	N S O VO ?
6. I ask the children to imitate or reproduce a steady musical beat while singing or listening to music.	N S O VO ?
Intensity	
7. I give the children opportunities to recognize or distinguish soft sounds, loud sounds, and sounds that increase or diminish in intensity.	N S O VO ?
8. I use activities in which the children vocally imitate or play an instrument to reproduce sounds that are soft or loud, and sounds that increase or diminish in intensity.	N S O VO ?
9. I ask the children to distinguish between silence, whispering, speaking voice, singing, and shouting.	N S O VO ?
Timbre	
10. I give the children opportunities to recognize or distinguish environmental sounds (animals, nature, etc.).	N S O VO ?
11. I get the children to recognize or distinguish the sounds of familiar instruments.	N S O VO ?
12. I organize activities in which the children imitate or reproduce sounds in their environment using their voice or musical instruments.	N S O VO ?
13. I use activities in which the children classify objects and musical instruments according to their sound characteristics (muffled, clear, etc.).	N S O VO ?
Songs, nursery rhymes, poems, and instrumental and vocal pieces	
14. I animate children' play-songs, nursery rhymes, and play-poems.	N S O VO ?
15. I use songs, nursery rhymes, and poems to awake children to literacy or numeracy (pedagogical purpose).	N S O VO ?
16. I give the children opportunities to recognize and identify songs, nursery rhymes, and poems with a familiar melody.	N S O VO ?
17. I get the children to make up or change the words to songs, nursery rhymes, and poems with a familiar melody.	N S O VO ?
Creation and appreciation	
18. I get the children to create diverse sounds and accompaniments to go with song, poems, and stories.	N S O VO ?
19. I make soundscape stories with the children.	N S O VO ?
20. I ask the children to move to music? (recorded or live).	N S O VO ?
21. I get the children to present their own music productions.	N S O VO ?
22. I get the children to listen to and appreciate instrumental and vocal music pieces (recorded or live).	N S O VO ?
23. I use activities in which the children identify their feelings when they listen to songs, nursery rhymes, poems, and instrumental and vocal pieces (recorded or live).	N S O VO ?
24. I get the children to express their feelings about diverse music pieces (primary analysis).	N S O VO ?

Population characteristics

The section of the questionnaire on personal information showed that 27% of the 108 ECEs had from one to three years of experience working with young children, 41% had from four to nine years' experience, and 31% had over 10 years' experience. Slightly fewer than half the ECEs (54%) reported only limited musical knowledge, with 39% good musical knowledge and 7% in-depth musical knowledge. Note also that 42% of the ECEs were working in an environment that was socioeconomically disadvantaged, 36% moderately advantaged, and 12% advantaged.

Data analysis procedure

As for the pilot project, responses to the ECE music education practice questionnaire were compiled using the same numeric values. The same Likert scale was used. This time, a Cronbach's Alpha of .71 was obtained, indicating good internal consistency reliability of the scale for this sample. However, the adjusted items for the pilot study may not be fully representative of the ECEs who responded to the questionnaire in the present study.

Results

The first profile, ECEs with little musical knowledge, tend to use activities involving perception. In fact, the questionnaire analysis showed that a large proportion of these ECEs "often" or "very often" use activities in which children distinguished and recognized musical duration (81%), pitch (78%), and intensity (52%). The introduction of nursery rhymes and songs was also a significant component of their practice. The majority of these ECEs reported that they "often" or

“very often” present children with nursery rhymes, songs, and play-poems (97%). Over three-quarters of them integrate nursery rhymes, songs, and play-poems for educational purposes (79%). They also reported frequent motor activities (68%) and soundscape stories (51%). In contrast, these activities were mentioned less often by ECEs with little musical education. They “sometimes” use activities involving imitation or reproduction of pitch (63%), duration (62%), and intensity (53%). Timbre was “sometimes” (69%) or “never” (31%) addressed. Activities designed to elicit certain forms of music study and appreciation, such as expressing their feelings about various musical productions or pieces, are “sometimes” (61%) or “never” (39%) considered in their practice. Statistical analyses showed that the use of activities related to perception of duration and pitch was strongly correlated to children’s songs ($r = .87, n = 108, p < .001$; $r = .80, n = 106, p < .005$). Animating songs was also moderately correlated with the use of motor activities ($.63, p < .001$).

The second profile, ECEs with good musical knowledge, reported different practices with participants: they “often” or “very often” introduce activities related to perception of duration (73%) and pitch (67%) and imitation and reproduction of duration (65%) and pitch (44%). Moreover, these ECEs “often” (52%) or “sometimes” (48%) use activities concerning musical intensity. With respect to songs, more of these ECEs “often” or “very often” present nursery rhymes, songs, and poems for pedagogical purposes (91%), with a similar percentage for play-songs (89%). In addition, they integrated motor activities (66%) and soundscape stories (58%) into their practice “often” or “very often.” In contrast to ECEs with little musical knowledge, ECEs with good musical knowledge “often” give their children opportunities to appreciate instrumental and vocal pieces (54%). They “sometimes” encourage children to create accompaniments to songs, poems, and stories (41%). On the other hand, activities associated with timbre are used less often: “sometimes” (62%) or “never” (38%). Moreover, they rarely use music appreciation activities in their practice.

For example, they “sometimes” provided opportunities to express feelings about diverse musical productions (75%). They “sometimes” allowed children to make up new words for songs, nursery rhymes, or poems with a familiar tune (72%) or to present their own musical productions (61%). The statistical analyses reveal that activities involving imitation and reproduction of duration were strongly correlated with motor activities ($r = .91, n = 108, p < .001$). Activities involving pitch perception were moderately correlated with listening to and appreciating instrumental and vocal pieces ($r = .52, n = 106, p < .005$).

For the third profile, ECEs with in-depth musical knowledge, the analysis of the practices revealed findings similar to those for the second profile. Results indicate that they “often” or “very often” use activities involving duration perception (67%), pitch (64%), and imitation and reproduction of duration (69%) and pitch (61%). They also “sometimes” use activities involving imitation and reproduction of intensity (45%) and timbre (56%). They “often” or “very often” integrated play-songs (96%), educational songs (94%), rhythmic activities (84%), and soundscape stories (73%) into their practice. These ECEs “sometimes” use listening and appreciation of instrumental and vocal pieces (76%) and the creation of sounds and instrumental accompaniments (65%). Nevertheless, they use music appreciation activities less often. In fact, these ECEs only “sometimes” ask their students to identify how they feel about songs, nursery rhymes, and poems (58%) or to express their feelings about diverse musical pieces (64%). They “sometimes” or “never” give their students opportunities to make up words to songs, nursery rhymes, or poems sung to a familiar tune, or to present their own musical productions (67%). Statistically, it is noteworthy that activities involving imitation and reproduction of timbre were strongly correlated with the creation of sounds and instrumental accompaniments ($r = .87, n = 108, p < .001$).

Discussion

In summary, the results of our study demonstrate that all the ECEs carry out activities in the six categories addressed in the questionnaire (self-report). However, the use frequency of these activities varies according to the level of musical knowledge. The main finding was that ECEs with little musical knowledge use more activities related to perception. They integrate fewer activities that call for some kind of analysis, creation, or music appreciation. In contrast, ECEs with good musical knowledge use a greater variety of practices as well as more activities involving music perception and music production. However, their practices are less diversified than those used by ECEs with in-depth musical knowledge. The latter integrate a larger number of creative activities, but also consider music appreciation activities less often.

Although the ECEs were given clear instructions for completing the questionnaire, we were unable to assess the validity of their responses. For diverse reasons, some ECEs may have underestimated or overestimated their use of music education practices. In addition, any deliberately false or inaccurate responses could have biased the results. However, our results corroborate the findings in the literature (Kim & Kemple, 2011; Kim, 2013; Nardo, Custodero, Persellin & Brink Fox, 2006). Like Bolduc (2012), the results of the present study indicate that ECEs with more musical knowledge use superior music education practices. However, these results must be interpreted with caution, because certain limitations may have wielded some influence. For instance, the questionnaire could not have been fully representative of the practices of the ECEs who responded in this study. Furthermore, although the ECEs were clearly instructed on how to complete the questionnaire, we were unable to assess the validity of their responses.

In light of these results, it is possible that some ECEs felt uncomfortable or incompetent due

to a lack of training (Lenzo, 2014; Koca, 2013; Vannatta-Hall, 2013). However, other factors should be considered, such as limited exposure to music in their living environment or disinterest in music. We must keep in mind that facility in music requires specific knowledge that goes far beyond the basic educational principles.

In order to improve interventions and offer training that targets actual needs, larger-scale studies should be conducted to investigate the music education practices of educators who are responsible for the daily care of children under five years old. In practical terms, it would be useful to develop a repository of activities suitable for various age groups to help train ECEs to work in mixed areas (urban and rural). Because music plays an inestimable role in early childhood development, it is crucial to explore these research avenues further.

References

- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307 – 337). Greenwich, Connecticut: Information Age Publishing.
- Bandura, A. (1997). *Self-efficacy. The exercise of control*. New York: W. H. Freeman and Company.
- Beran, M., J, Brandl, J., Perner, J., & Proust, J. (Eds.) (2012). *Foundations of metacognition*. Oxford, England: Oxford University Press.
- Bolduc, J. (2012). Les interventions éducatives en éducation musicale d’enseignantes de maternelle. *Revue pour la recherche en éducation*, 2, 17 – 31.

- Blood, A. J., & Zatorre, R. J. (2001). Intensely pleasurable responses to music correlate with activity in brain regions implicated with reward and emotion. *National Academy of Sciences*, 98, 11818 – 11823
- Campbell, P. S., & Scott-Kassner, Carol. (2002). *Music in childhood: From preschool to the elementary grades* (2nd edition). New York: Schirmer Books.
- Cooper, R. P., & Aslin, R. N. (1990). Preference for infant-directed speech in the first month after birth. *Child Development*, 61, 1584 – 1595.
- Copple, C., & Bredekamp, S. (Eds.). (2009). *Developmentally appropriate practice in early childhood programs: Serving children from birth through age 8*. (3rd ed.). Washington, D. C.: National Association for the Education of Young Children.
- Franklin, M. S., Moore, K. S., Yip, C., Jonides, J., Rattray, K., & Moher, J. (2008). The effects of musical training on verbal memory. *Psychology of Music*, 36, 353 – 365.
- Gharavi, G. L. (1993). Music skills for preschool teachers: Needs and solutions. *Art Education Policy Review*, 94(3), 27 – 30.
- Gordon, E. E. (2007). *Learning sequences in music: A contemporary music learning theory*. Chicago, IL: GIA Publications, Inc.
- Gordon, A., & Brown, K. (2013). *Beginnings & Beyond: Foundations in Early Childhood Education*. Belmont, California: Wadsworth.
- Gruenhagen, L. M. (2012). Learning in practice: A first-year early childhood music teacher navigates the complexities of teaching. *Research Studies in Music Education*, 34 (June 1), 29 – 44.
- Koca, S. (2013). An investigation of music teaching self-efficacy levels of prospective preschool teachers. *Educational Research and Review*, 8(12), 897 – 900.

- Kane, J. (2005, November). New ways of teacher “training” in primary school music education: Results and implications of a longitudinal research study. Paper presented at the Conference of Australian Association For Research In Education Conference, Parramatta, Australia. Retrieved December 21, 2016 from [http:// www.aare.edu.au/05pap/kan05133.pdf](http://www.aare.edu.au/05pap/kan05133.pdf).
- Kelly, S. N. (1998). Preschool classroom teachers’ perception of useful music skills and understandings. *Journal of Research in Music Education*, 46, 374 – 383.
- Kirsten, J. (2006). *Pre-kindergarten music education standards and the Opportunity-to-learn standards as applied to preschool settings in the United States*. (Doctoral dissertation). University of Miami, Coral Gables, Florida.
- Kraus, N., & Chandrasekaran, B. (2010). Music training for the development of auditory skills. *Nature Reviews Neuroscience*, 11, 599 – 605.
- Habsen, D., Bernstorf, E., & Stuber, Gayle, M. (2004). *The music and literacy connection*. Lanham, Maryland: National Association for Music Education.
- Ho, Y., Cheung, M., & Chan, A. S. (2003). Music training improves verbal but not visual memory: Cross-sectional and longitudinal explorations in children. *Neuropsychology*, 17(3), 439 – 450.
- Hoy, A.W., & Spero, R. B. (2005). Changes in teacher efficacy during the early years of teaching: A comparison of four measures. *Teachers Teaching*, 21, 343 – 356.
- Ilari, B. (2002). Music perception and cognition in the first year of life. *Early Child Development and Care*, 172, 311 – 322.
- Jamieson, S. (2004). Likert scales: How to (ab)use them, *Medical Education*, 38, 1217 – 1218.
- Kim, H. K. (2013). A comparison of early childhood preservice teachers’ beliefs about music and developmentally appropriate practice between South Korea and the U.S. *Australasian Journal of Early Childhood*, 38(2), 122 – 128.

- Kim, H. K., & Kemple, K. M. (2011). Is music an active developmental tool or simply a supplement? Early childhood preservice teachers' beliefs about music. *Journal of Early Childhood Teacher Education*, 32(2), 135 – 147.
- Kretchmer, D. (2002). *Developing pre-service teacher self-efficacy to integrate music in elementary classrooms: An investigation in growth through participation, observation and reflection*. (Doctoral dissertation). University of Colorado, Boulder, Colorado.
- Lambert, R., Abbott-Shim, M., & Sibley, A. (2014). Evaluating the quality of early childhood educational settings. In B. Spodek & O. N. Saracho. (Eds.). *Handbook of Research on the Education of Young Children* (pp. 457 – 476, 2nd edition). New York, NY: Routledge.
- Lenzo, T. B. (2014). *Online professional development in preschool settings: Music education training for early childhood generalists*. (Doctoral dissertation). Kent State University, Kent, Ohio.
- Likert, R. (1932). A technique for the measurement of attitudes, *Archives of Psychology*, 140, 1 – 55.
- Music Educators National Conference [MENC]. (1995). *Prekindergarten music education standards : Guidelines for early-childhood educators, music specialists, parents, and day-care providers*. Reston, VA: National Association for Music Education.
- Music Educators National Conference [MENC]. (1994). *Opportunity-to-learn standards for music education: Grades preK – 12*. Reston, Virginia: National Association for Music Education.
- Nardo, R. L., Custodero, L. A., Persellin, D. C., & Brink Fox, D. (2006). Looking back, looking forward: A report on early childhood music education in accredited American preschools. *Journal of Research in Music Education*, 54(4), 278 – 292.
- Nardo, R. L. (1996). *California survey of music in early childhood: Teacher preparation and the*

role of the community college. (Doctoral dissertation). University of Southern California, Los Angeles, California.

Neelly, L. (2000). *Collaborative early childhood music practice: A year in the life of a prekindergarten music teacher*. (Doctoral dissertation). Eastman School of Music, University of Rochester, Rochester, New York.

Rauscher, F. H., & Hinton, S. C. (2011). Music instruction and its diverse extra-musical benefits. *Music Perception: An Interdisciplinary Journal*, 29(2), 215 – 226.

Steele, C. J., Bailey, J. A., Zatorre, R. J., & Penhune, V. B. (2013). Early musical training and white-matter plasticity in the corpus callosum: Evidence for a sensitive period. *Journal of Neuroscience*, 33(3), 1282 – 1290.

Strait, D. L., Parbery-Clark, A., Hittner, E., & Kraus, N. (2012). Music training during early childhood enhances the neural encoding of speech in noise. *Brain and Language*, 123(3), 191 – 201.

Trainor, L. J. (2012). Predictive information processing is a fundamental learning mechanism present in early development: Evidence from infants. *International Journal of Psychophysiology*, 83, 256 – 258.

Trehub, S. E. (2010). In the beginning: A brief history of infant music perception. *Musicae Scientiae*, Special Issue, 71 – 87.

Trehub, S. E. (2003). The developmental origins of musicality. *Nature Neurosciences*, 6(7), 669 – 673.

Trehub, S. E. (2002). Mothers are musical mentors. *Zero to Three*, 23(1), 19 – 22.

UNESCO. (2002). *Culture : Art education in focus*. Retrieved February 25, 2014 from

<http://portal.unesco.org/culture/en/ev.php->

[URL_ID=2916&URL_DO=DO_TOPIC&URL_SECTION=201.html](http://portal.unesco.org/culture/en/ev.php-URL_ID=2916&URL_DO=DO_TOPIC&URL_SECTION=201.html)

Upitis, R. (1990). *This, too, is music*. Portsmouth, NH: Heinemann.

Vannatta-Hall, J. (2010). *Music education in early childhood teacher education: The impact of a music methods course on pre-service teachers' perceived confidence and competence to teach music*. (Doctoral dissertation). University of Illinois, Urbana-Champaign, Illinois.

Vaughn, K. (2000). Music and mathematics: Modest support for the oft-claimed relationship. *Journal of Aesthetic Education*, 34(3 – 4), 149 – 166.

Venesile, J. (1992). *The relationship among personality characteristics, self-esteem, and music teaching behaviors in prospective elementary classroom teachers*. (Doctoral dissertation). Case Western Reserve University, Cleveland, Ohio.

Wang, M. C., Haertel, G. G., & Walberg, H. J. (1993). Toward a knowledge base for school learning. *Review of Educational Research*, 63(3), 249 – 294.

Water, H. S., & Kunnmann, T. W. (2010). Metacognition and strategy discovery in early childhood. In H. S. Water & W. Schneider. (Eds.). *Metacognition, Strategy Use, and Instruction* (pp. 3 – 22). New York, NY: Guilford Press.

Young, S. (2016). Early childhood music education research: An overview. *Research Studies in Music Education*, 38 (June 1), 9 – 21.

Jonathan Bolduc, Canada Research Chair in Music and Learning, is exploring the potential impacts that music education can have on academic achievement in reading, writing and mathematics, during infancy and childhood. Dr. Bolduc and his team are documenting the cognitive processes involved in learning music, language and mathematics, and are examining the influence of music education on academic achievement. They are also linking their research to ongoing research in neuroscience, particularly on the brain's natural ability to change. Dr. Bolduc aims to demonstrate that learning music can promote the development of useful knowledge in early literacy, reading, writing and mathematics, and that it can help some children do better in school.

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