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Sound to Symbol: Teaching Music Literacy

Katherine Herzberg
ktherzberg@gmail.com

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Katherine Herzberg

Concordia University, St. Paul

Master of Arts in Education: Differentiated Instruction

ED 590 Course Instructor: Dr. Phyllis Burger

Second Reader: Dr. Akinde-Fakuajo

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Abstract

Music educators aim to teach music literacy, which is the ability to read music; however, resources for differentiating specifically in the field of music are difficult to find. This paper analyzed available research on creating meaningful ways to represent sound aside from traditional music notation and using this notation to differentiate instruction. Graphic notation, as opposed to standard notation, is therefore analyzed as a potential tool for differentiation both in terms of its benefits when created by teachers or textbook companies as well as when students create their individual graphic notation. Other issues addressed include a focus on aural preparation, or sound before sight. Another tool for differentiating and increasing achievement is collaboration with peers. This is investigated through symmetrical and asymmetrical Peer Assisted Learning and peer-tutoring. The studies support the idea of using graphic notation, such as mapping, song dotting, ideographs, and blended notation, to create meaningful representations of sound that are differentiated to each student. These strategies help the music educator see what students understand about the music, which allows the teacher to further differentiate instruction. By using these strategies for notating music, music literacy can be taught and differentiated.

Keywords: differentiated instruction, elementary music, music literacy, graphic notation, music mapping

Chapter One: Introduction

Sound to Symbol: Teaching Music Literacy Musically

Despite a growing body of research that differentiated instruction, when implemented with fidelity, can lead to substantial gains in student learning, a majority of educators report not differentiating instruction (Santangelo & Tomlinson, 2012). Santangelo and Tomlinson (2012) cite the following two main reasons for not doing so: teachers feel there is no need and teachers do not know how to do so. The latter may be one reason music teachers do not differentiate. There are numerous books on the topic of differentiation, yet there is little discussion on how to differentiate in the specific content areas of specialists, such as art, physical education, and music.

Scope of Research

Student representations of sound and song through graphic notation can help music educators develop aural perception, teach music literacy, and differentiate while providing active learning. Both qualitative and quantitative studies point out that music instruction must maintain a sound first approach (Burton, 2017; Gromko & Russell, 2002). Secondly, studies show graphic notation is a means to represent students' understanding of different musical components (Bamberger, 2011; Smith, Cuddy, & Upitis, 1994; Tan & Kelly, 2004). Third, the importance of these graphic notations being created by the student is explored (Burton, 2017; Pramling, 2009; Reybrouck, Verschaffel, & Lauwerier, 2009; Tan & Kelly, 2004). Finally, findings regarding collaboration with peers will be discussed (Bamberger, 2011; Johnson, 2017; Furby, 2016).

Importance of the Study

Educators across subject areas are exploring differentiation of their curriculum based on the needs of a variety of learners. Differentiating in music is of extreme importance because

music educators have a broad range of influence. At the elementary level, music educators often instruct all students within a school. Music teachers teach students with developmental, physical, emotional, and social disabilities, which elementary classroom teachers may not have in their settings. Students in special education settings may join in with a class for specialists, such as music. Recently, more research has been dedicated to differentiated instruction, but there is still very little research on the subject regarding music. This paper reviews relevant research, synthesizing the studies and highlighting differentiated instructional practices specifically for use in the elementary general music classroom. It will also attempt to outline possibilities for further research in the area of differentiation in elementary music.

Research Questions

Is there a way for music educators to teach music literacy to elementary students through differentiated instruction while preserving musicality? As previously suggested, graphic notation is the proposed solution this paper will explore. Furthermore, it will seek to determine if collaboration with peers has an effect on music learning. Therefore, this paper seeks to answer the following questions: how does graphic notation aid in teaching music literacy in a differentiated and musical manner to elementary students? Does collaboration with peers influence learning in music?

Connection to the Program Essential Question (PEQ). The Program Essential Question of Concordia University, Saint Paul, Minnesota's Master of Arts in Differentiated Instruction is: "In light of what is known about differentiated instruction, how shall professional educators effectively teach every student?" This essential question urges educators to meet the needs of a diverse body of students through differentiated instruction. This paper will attempt to address how to effectively differentiate music literacy instruction in elementary classrooms.

Differentiating instruction in music may look vastly different than differentiating in another classroom. Even among classrooms of the same content area, differentiating instruction may look different due to lesson design, learner differences, teacher preferences, and subject matter, to name a few factors. On the other hand, teachers who differentiate share a common belief that students should be active learners as opposed to passively receiving information from a teacher. In light of this common belief, music teachers strive to meet the needs of all learners in an active, holistic, and musical way. Music teachers must differentiate and teach broad concepts for some while teaching in much more detail for others. Some of the more typical means of differentiating in general education classrooms will not be discussed. Instead, this paper seeks to find ways to differentiate in music, creating classrooms where students are involved in active learning, problem-solving, and collaborating with peers.

Definition of Terms

This section is dedicated to essential concepts, as defined from the literature, and it provides the operational definitions that will be utilized throughout this paper.

Aural preparation is "a term used to indicate when music is heard and understood silently by the listener when the actual sounds are not present" (Gordon, 2013 as cited in Hurley, Musselwhite, & Wesolowski, 2018).

Differentiated instruction is defined by Tomlinson (2005, as cited in Santangelo & Tomlinson, 2012) when she explains that it is "a systematic way to conceptualize the process of teaching and learning such that each student's learning needs are honored and, consequently, each student's learning potential and outcomes are maximized."

Graphic notation refers to student-created representations of sound in which students 'make marks' to visually describe what they heard (Tan & Kelly, 2004). These can be categorized into the following main categories:

> ***Figural representations*** are groupings of adjacent sounds, without the background of regular pulse (Tan & Kelly, 2004, p. 192). These include shapes, spirals, arrows, lines, dots, and the like. (Tan & Kelly, 2004, p. 196).
>
> ***Metric representations*** show rhythms organized over a metrical pulse, as in standard notation (Tan & Kelly, 2004, p. 192).
>
> ***Pictorial representations*** consist mainly of pictures such as dancing figures or objects (Tan & Kelly, 2004, p. 196).

Standard notation is used to denote the typical method of writing music using notes on the staff to show pitch, rhythm, measures, and meter (Tan & Kelly, 2004).

Summary

To summarize, music educators need to differentiate material in order to meet the needs of their diverse learners. Similar to other educators, they may do this by varying content, process, and product. This paper will look at the value of varying the process of teaching music literacy in order to better differentiate for all students. This will be done by examining the use of graphic notation as opposed to standard notation and collaboration with peers.

The following chapter is a review of the pertinent literature surrounding the topics outlined above. In Chapter Two, the researcher reviewed fifteen studies relating to differentiation in music through graphic notation and working with peers, analyzing themes that emerged from these studies. Chapter Three presents a summary of the key findings from the studies reviewed in Chapter Two. Finally, Chapter Four provides more discussion on the

findings as well as practical applications taken from the results of the studies reviewed. Needs for future research in this area are also delineated in Chapter Four.

Chapter Two: Literature Review

This section is devoted to a review of the literature surrounding differentiation in music through the use of graphic notation. This review of literature attempted to provide music educators with practical applications as they attempt to differentiate instruction, make use of graphic notations, and preserve musicality in both study and performance. The literature review addressed four main themes: (1) sound before sight, (2) graphic notation, (3) student-created symbols, and (4) collaborative puzzling with peers.

Sound Before Sight

Many researchers agree that experiences with sound must precede those with sight, such as music notation (Burton, 2017; Gromko & Russell, 2002; Hurley et al., 2018). Students benefit from the ability to develop aural understanding before moving into sound representations (Burton, 2017). Previous research had shown that music acquisition followed a similar trajectory as language acquisition; therefore, Burton (2017) conducted a qualitative study in which 39 students, aged five to eight, were immersed in music, as they would be in language acquisition, for one school year.

Burton's (2017) research followed a curriculum model of language acquisition. Opportunities for vocalization and improvisation were abundant. Burton (2017) explained that "Children were involved in audiation-based active listening, singing, moving, chanting, and playing instruments" (p. 133). Rhythm syllables were introduced; later, symbols were introduced to represent the syllables students had already learned, as would be done in language literacy teaching. Burton (2017) acted as the teacher-researcher, knowledgeable about the zone

of proximal development and scaffolding. Burton (2017) concluded that students learned rhythm syllables and symbols through imitation, vocal interplay, and improvisation, supporting the notion that sound should be a prerequisite to introducing symbols. Instead of just sound before sight, Burton (2017) proposed the idea of first introducing sound, then labeling with a syllable, and then finally introducing a symbol. Validity of this research can be confirmed by repetition of this study with a curriculum model that also parallels that of language acquisition.

Gromko and Russell (2002) also supported the theory of sound before sight. Gromko and Russell (2002) conducted a study with 41 children in second and third grade (20 boys and 21 girls) to test their hypothesis that aural perception and active listening would be significantly related to the accuracy of map reading. The participants were given the Intermediate Measures of Music Audition tests developed by Gordon (as cited in Gromko & Russell, 2002). The participants were systematically assigned one of three assigned listening conditions: passive, unstructured active, and structured active. The researchers maintained a balance of musically trained and untrained students in each group. The passive group listened to the music with no distractions the first time. The unstructured active group listened and simultaneously moved their hands in 50 pounds of sand on the first listen. The structured active group mirrored one of the researchers' choreography with their arms that reflected the music's melodic contour and rhythmic patterns (Gromko & Russell, 2002). After their first listening, students were asked to follow three commercially-produced listening maps which were then scored for accuracy.

Gromko and Russell's (2002) quantitative study concluded that children who could aurally discriminate musical patterns were predisposed to more accurately read graphic notation. Furthermore, the researchers report that the ability to accurately follow a listening map may have been the result of previous musical experience (Gromko & Russell, 2002). Participants in the

study who had received private music lessons in piano had a significantly higher score in aural perception than those who had not. Musical experiences create better aural discrimination skills. Gromko and Russell's study provides evidence that immersion in the sounds of music, as in language acquisition, establishes a foundational knowledge for reading and writing music (2002).

The hypothesis that active listening, either structured or unstructured, would significantly impact reading ability was not upheld as there was not a statistically significant difference between the groups' listening conditions (Gromko & Russell, 2002). By acknowledging that their second hypothesis was not upheld, Gromko and Russell (2002) increase the credibility of their results. Future studies in this area should be conducted with more than just the three listening maps in their study to corroborate the findings of Gromko and Russell (2002).

Although Gromko & Russell's (2002) study is now dated, it showed that there was a correlation between children who had prior musical experiences and children who could more accurately read a map of graphic notation. This is important for music educators who wish to teach children to read music. Experiences with sound cannot be skipped in order to cover the material or standards of music literacy. It seems that children may gain the ability to aurally discriminate patterns over the course of time and through repeated encounters with music. These findings showed that elementary music education must keep a focus on providing these musical experiences for children. This benefits them in the future by equipping them with aural discrimination (Gromko & Russell, 2002).

Recent research also corroborates the idea that aural preparation is important. In 2018, Hurley, Musselwhite, and Wesolowski conducted a quantitative study to test the notion of sound before sight. The study involved a total of 125 second-grade students in six classes at an upper-

middle-class elementary school in the Southeastern United States. The study was conducted during the students' regularly-scheduled general music classes. Students were given the Intermediate Measures of Music Audiation (IMMA) (Gordon, 1986, as cited in Hurley et al., 2018), a performance task, and a dictation task before the treatment. Scores from the IMMA were used to create two similarly-matched groups between the control and treatment groups. Each group, treatment or control, was comprised of three classes.

The treatment group in the Hurley et al. (2018) study received aural preparation whereas the control group received none. All classes participated in eight rhythmic literacy teaching sessions led by the lead researcher. The control group participated in lessons in readiness, reading, and writing; the aural-preparation group participated in the same lessons, but fewer in number, plus the lessons that included the aural-preparation (Hurley et al., 2018). After these lessons, a post-test was given to all participants measuring performance and dictation, which is the ability to write what has been heard in standard notation. A five-point rating scale was used to evaluate rhythmic accuracy, steady tempo, and proportional rhythms (Hurley et al., 2018).

The results of the Hurley et al. (2018) study showed that the treatment group (aural-preparation) performed significantly higher than the control group on the rhythmic and performance tasks. The treatment group's mean score significantly improved from pretest to posttest (Hurley et al., 2018). This showed that aural preparation did have a significant impact on rhythmic and performance tasks. However, the results also showed there was little difference between groups on the dictation task (Hurley et al., 2018). In other words, aural preparation did not have a significant impact on dictation abilities.

The above findings have significant implications for educators. The results showed that spending class time on aural-preparation helped improve performance on rhythm and

performance tasks (Hurley et al., 2018). Educators have pondered the right amount of time to spend on different activities in the classroom. In Hurley et al.'s (2018) study, the control group spent 88% of the lesson time being exposed to written notation; the treatment group had exposure to written notation for only 38% of the lessons. Despite this disparate amount of time spent being exposed to written notation, there was no significant effect on students' ability to write and decode rhythmic patterns (Hurley et al., 2018). This shows that music educators can, and should, spend time on aural preparation. Even though students in the treatment group had less exposure to written notation, there was no decrease in achievement. This suggests that children gain musical understanding through the process and activities of aural preparation; therefore, this step should not be minimized in value or skipped.

Hurley et al.'s (2018) study also shows that "aurally hearing, performing, decoding, and creating patterns prior to introducing musical notation may increase second grade students' abilities to perform, create, respond, and connect via rhythm-based learning" (Hurley et al., 2018, p. 22). The authors also stated that students in the treatment group experienced the songs on a deeper level than those in the control group, possibly because the treatment group's activities were based on songs more often than the control group's activities (Hurley et al., 2018). Therefore, this study showed that time spent on aural-preparation, or sound before sight, is time well-spent.

Limitations of the study by Hurley et al. (2018) include the use of only two contrasting rhythms in one time signature. Future research could investigate if more complex or varied rhythms would change the results of the study. Hurley et al.'s (2018) study also tested only rhythm; more research would be needed to determine the effects of aural preparation on pitch patterns.

Graphic Notation

Several researchers (Cassidy, 2001; Lee, 2013; Smith, Cuddy, & Upitis, 1994; Tan & Kelly, 2004; Yigit & Ozeke, 2020) propose graphic notation, instead of the formal music symbols of standard notation, can act as a tool to represent a deep understanding of music. This section will discuss the aforementioned studies as well as some implications for teaching. These studies have practical applications that can allow music educators to differentiate learning.

Figural and Metric Representation. In a landmark study, Smith et al. (1994) provided evidence showing figural drawings can represent metric understanding; likewise, figural drawers possess metric skill. Smith et al. (1994) asked 49 children and 48 adults to complete the following four tasks: an intelligence test, a drawing task, a join-in task, and a clap-back task. The drawing task asked participants to draw a representation of what they heard in any way they chose so that someone else could reproduce the sequence. The researchers divided these drawings into four categories: metric, figural, counting, or ambiguous, and then scored them for accuracy. The join-in and clap-back tests were scored as an assessment of metric rhythmic understanding in action. The intelligence tests given were versions of the Raven's Progressive Matrices tests, chosen because they are applicable to both children and adults (Smith et al., 1994).

The results of the Smith et al. (1994) study showed that figural drawings were related to metric understanding in both children and adults. The accuracy of figural drawings correlated to and could predict a higher score on both the join-in and clap-back tasks for both children and adults. This was not true for metric drawers. The accuracy of metric drawers did not correspond to, nor could they predict, a higher score on the join-in or clap-back tasks for children or adults. Hierarchical regression analyses were conducted on figural and metric drawers to be sure that

intelligence scores alone could not account for the variance in the data. The researchers did not note limitations of the study nor does this author find any major flaws in the research (Smith et al., 1994). Although this study is several years old, the findings are significant and have changed music educators' understanding of figural drawings.

The results from Smith et al.'s study (1994) are significant for music educators. This study provides significant evidence that figural, graphic drawings represent an understanding of metric components of rhythm. The study also shows that the accuracy of metric drawings does not correspond with the ability to create accurate metric patterns. The data shows that accurate figural drawings do correspond to the ability to create accurate metric patterns. Educators might assume that correct metric representations of music (i.e. note durations, meter, bar lines, etc.) show student understanding of rhythm, whereas figural representation does not. The findings of Smith et al. (1994) show these assumptions are, in fact, false. Instead, music educators might look to figural drawings as a means to capitalize on figural drawers' understanding of metric components of rhythm.

Another recent study corroborated the findings of Smith, Cuddy, and Upitis (1994). In 2013, Lee conducted a study to determine how young children, aged four to six, invent notation to help them recall rhythm and pitch, both individually and simultaneously. The study took place in a public kindergarten class in southern Taiwan. The researcher first volunteered as an aid in the classroom to become familiar with the students. Lee (2013) taught 32 lessons over the span of a year. Each lesson lasted 40 to 50 minutes. Lee (2013) focused on pitch and rhythm, teaching first the contrast of high and low using the notes G and E, respectively. Steady beat and the rhythm ratios of one-to-two and one-to-four were taught (i.e. eighth, quarter, and half notes, but they were not labeled as such with the children in the study).

The classroom was set up with centers for housekeeping, art, reading, and music. The music center contained various instruments, piano books, a keyboard, paper, and a whiteboard on which students could write. Lee (2013) encouraged students to invent notation to compose music or record something they had sung or heard. Twenty-seven notations were collected from each child. After creating a notation, the researcher would record it. Lee then also classified these notations as rhythm, pitch, or both (2013). After one or two weeks, children would be asked to sing or play what they had written again. If they could do it just as they had before, that meant that the students had found a way to successfully notate and remember the music.

The findings from Lee's (2013) study showed that quantitative size, graphic patterns, and literal symbols were used to show both pitch and rhythm. When asked to represent both simultaneously, children found a way to combine two systems (Lee, 2013). For example, children used their symbols for pitch and then added dots, circles, or underlines to represent rhythms. Lee (2013) also found that "children gradually incorporate symbols to represent units of sound, then to represent its melodic and rhythmic features, and finally reach notations that approximate the features of conventional notations" (Upitis, 1992 as cited in Lee, 2013, p. 394). Contrary to a 1992 study conducted by Upitis, Lee (2013) found that children initially explore various notational strategies; however, after some time, they seem to find and maintain the use of a system that works for them. Thus, Lee (2013) proposes that children's drawings are not 'figural' or 'metric' but that 'figural' and 'metric' refer to the ways in which children organize the symbols and create meaning from them. This shows that figural drawers should not be perceived as having a lower level of rhythmic perception (Lee, 2013). In this way, Lee (2013) confirms the findings of Smith et al. (1994). Lee (2013) showed that children's drawings also got more complex over time.

Lee (2013) provided a suggestion for future research. The classroom teacher in Lee's (2013) study had noted a correlation between students with advanced notation skills and advanced literacy skills. Future research should explore this correlation. Lee's (2013) study used only duple meter for rhythm study. Future research should also include triple meter to see if the findings would be similar.

Figural Representation. Graphic notation can represent an understanding of musical elements (Tan & Kelly, 2004). Tan and Kelly (2004) recorded drawings of 60 undergraduate college students- 30 of whom were musically trained and 30 who were not. Participants were allowed to first listen to a piece of music. The second time it was played, students were asked to make marks to visually describe what they were hearing. Care was taken to not suggest how the listeners would describe what they heard, so the researchers directed them to 'make marks' instead of 'draw' (Tan & Kelly, 2004). Following the drawing task, students were also given five minutes to write an essay to give reason for each mark made. The essays provided the researchers with more criteria than the drawings alone on which to base their judgements of each depiction.

Tan and Kelly (2004) noted the limitations of graphic drawings serving as a means by which to judge what students are able to hear (perception); however, the drawings did shed light on what students viewed as the most important elements of the music to capture. The researchers noted students' surprise at how well their drawings depicted music elements. Tan and Kelly (2004) reported, "Many did not even notice that they had drawn repeated images, symbols, and contours" (p. 208). In essence, students had perceived more than they had realized, as shown in their depictions. Through the use of the symbols chosen, some students had graphically represented the form of the piece, for example, without realizing it. Tan and Kelly

(2004) point out the role of the music educator in bringing to light these perceptions. By using graphic notation, music teachers can capitalize on students' prior knowledge and understanding, pointing out elements of music students had already depicted.

One limitation of Tan and Kelly's (2004) study was that it only allowed time for two hearings of a piece of music. As previously noted by Burton (2017), it is ideal for students to have a solid aural foundation before launching into study or representation. The participants in this study, however, were not elementary students, but rather college students, so the shorter amount of listening time may have been less significant. Tan and Kelly (2004) did suggest a music educator could collect many representations and see how a student's listening tendencies change over time.

In this next quantitative study, figural representation in the format of teacher-generated song maps will be explored. During the 2015-2016 school year, Yigit and Ozeke (2020) conducted a study to analyze to what extent teacher-created song maps would be an effective song-teaching approach. These authors collected data for six weeks with an experimental group of 25 students and a control group of 23 fourth-grade students in Turkey. The classrooms were randomly selected. Six songs were selected by the authors and song maps were created. The experimental group was taught with the song maps; the control group was taught without song maps. Students were given pre-tests and post-tests to measure both the success of learning the songs. Another measurement of the overall affective experience of the song maps was also given as a post-test to the experimental group only.

The results of this study showed that the success of the experimental group in learning the songs was higher than the control group (Yigit & Ozeke, 2020). Data also showed that the song maps made the music more memorable. By analyzing the averages from the affective post-

test, the researchers found that the maps also had a positive impact on student engagement, understanding, interest, and enjoyment (Yigit & Ozeke, 2020).

Limitations of the Yigit and Ozeke (2020) study are found in the assessment tools. The tools were generated by the researchers, thus lacking reliability. Opinions on the tools were gathered from three experts, one professor, one instructor, and one music teacher. Changes were implemented to the tools based on the feedback from the individuals listed above, thus increasing the credibility of the study.

In 2001, Cassidy conducted a study centered on listening maps as well. The study focused on different types of visual iconic representation. In this mixed-method study, listening maps using only pictures were used, as opposed to line drawings or standard notation. Pictorial listening maps could have pictures that showed (1) one picture for each note or phrase of the melody; (2) one picture for each beat or for each measure; or (3) one picture for each section of music relating to the form of the overall piece. Three maps were chosen for their clarity in visual representation and for having similar overall listening durations.

Participants in Cassidy's (2001) study were 51 non-music majors enrolled in an elementary music methods class and 17 music majors enrolled in a secondary music methods class. The participants were seated at computers and shown the three listening maps. They were told that certain spots on the maps had been colored red, whereas the rest of the map was black and white. Their task was to follow the maps while listening to the music. When they reached a red spot on the map, they were to press the number one key on the keyboard which would record their mark in the software, allowing the researcher to note the accuracy in following the map. Participants were then allowed to listen to the music once while following the first map. The order of listening maps for the three songs was varied between groups. All

participants recorded responses in small groups, and computer screens of others were not easily visible (Cassidy, 2001). After listening to all three pieces and recording data, students were asked to rank the perceived difficulty in following each map. Students also identified the music that they enjoyed the most and described why.

Overall, the music majors were more accurate in following the maps (Cassidy, 2001). The non-music majors used less keystrokes than the majors, were less accurate, and less homogenous as a group. Statistical tests were used to compare the participants' accuracy across all three pieces. Because of the difference in number of participants in each group, separate statistical tests were run for the music majors and non-music majors. There was no significant difference in accuracy for the music majors; however, there was a significant difference between pieces among the non-music majors (Cassidy, 2001).

Results from Cassidy's (2001) study support the idea that developmental learning occurs from simple to more complex. The most concrete map, where there was a one-to-one correspondence of pictures to notes, was the most successful for the non-music majors, as well as the most favored. As the maps required more abstract concepts, such as grouping sounds together by metric pulse, the success decreased for non-music majors. The most abstract map, which used pictures to represent the form of the song, was the most difficult for non-music majors to follow (Cassidy, 2001). They suggest that graphic representations can accurately depict rhythm and that students can progress to understanding more abstract elements of the music, such as meter and form, through the use of graphic notation over time.

As seen from a variety of studies, graphic notation can represent deep understanding of musical elements. Graphic notation can show understanding of metric aspects (Smith et al., 1994), structure (form) of songs (Tan & Kelly, 2004), and other elements of music. Graphic

notation has also been shown to be useful in teaching, aiding in memorization, and sustaining interest and engagement (Yigit & Ozeke, 2020). The next section will discuss the importance of graphic notation being student-created as opposed to teacher-generated.

Student-Created Notation

In the reports of their study, Tan and Kelly (2004) acknowledge the growing body of research surrounding the usefulness of teacher-generated listening maps in helping students to understand the structure of a piece and develop more sensitive listening skills; however, they further suggest that undirected graphic representations may prove even more useful. Undirected notations serve as a starting point for educators to see what students hear and choose to depict in their representation. Before looking at more ways that student-created notation can be used, it will be beneficial to look more closely at the symbols children use to notate music.

Symbol Systems. In 2004, Barrett conducted a qualitative study to further analyze symbolic representation. Barrett sought to discover whether children use a common set of symbols when writing, drawing, or representing music, or if children confuse these notational systems. Do they apply different constraints when using each system? Are children's notations only a means of communication or do they also function as a problem-solving space? Barrett's case study of Brittany, who was four years and six months old when the study began, helped answer these questions.

In five separate sessions, Brittany created eleven sketches of notation which employed letters, Kodaly rhythm syllables (tas and ti-tis), and iconic representation. At times, it seemed like Brittany was confusing notation systems. For example, she used letters to notate both invented songs and instrumental songs without lyrics. In her explanation of the songs, Brittany reveals that her intentions for the two songs differed: one was intended to record the lyrics, the

other the music (referring possibly to the sounds the rhythm syllables would make). In another session, Brittany was focused on notating music, but it was clear that the notation served as a problem-solving space for her. She wrote her music using tas and ti-tis, but changed it on the page as she sang the song.

These sessions showed that Brittany's choice of symbols was not arbitrary. She chose Kodaly rhythm syllables when she was more intent on the rhythm and words when her focus was on the lyrics. Barrett's (2004) study shows that children as young as four and a half years old are able to borrow symbols from different notational systems and use them for multiple purposes. It is important for music educators to understand this when analyzing students' representations. Educators need to keep in mind that students may switch symbols or symbol systems entirely from one representation to the next.

One limitation of Barret's (2004) study is that it is older research; however, the author chose this study because of its significance in showing two important findings. First, the study showed that, at least in the case of this one child, students entering kindergarten can shift symbol systems. This shows that a switch from graphic notation early on to more traditional notation is not a novel concept for students. Educators can therefore use more than one symbol system in order to help students grasp musical details. Secondly, Barrett's (2004) study showed that notation, in itself, can act as a useful tool for children. By creating notation, children engage in thought about what the music sounded like and what their representation shows. As seen in the case of Brittany, children may go back and change notation to self-correct their symbols, showing the underlying thought process in which children are engaged (Barrett, 2004). Future research could address whether or not these findings are generalizable to most students Brittany's age.

Elkoshi (2015) also supports the notion that children draw upon different types of symbolic representation. In 2015, Elkoshi set out to analyze the way in which children conceptualize complex, classical music and to analyze the effect of age on children's verbal and graphical depictions. Elkoshi (2015) studied 209 children ranging from four years old to nine and a half. All students were from one Kindergarten and five schools in five major cities in Israel. One forty-five-minute class session was held with each class. During this class, students listened to a classical piece of music by Debussy a total of four times. After the first two hearings, the researcher asked for verbal responses from students to questions like "What did you hear?" and "What do you think about the music?" After the third listening, children were directed to create a drawing in any way they liked that represented the music. The children could draw while they listened to the piece for the fourth time. After that, the researcher conducted individual interviews to ask questions like "How is your drawing related to the music?"

Elkoshi (2015) placed each of the drawings into one of the following categories: associative responses, formative responses, and compound responses. Elkoshi (2015) described each of the categories in this way. Associative responses (A-responses) included depictions of stories, the mood, or metaphors. Formative responses (F-responses) included reference to sound and employed at least one of the following musical dimensions: "instrumentation, timbre, dynamics, tempo, rhythm, pitch, melody, melodic directionality, articulation, harmony, texture, form, musical sequences, musical units, genre, musical style and total duration of the musical piece" (Elkoshi, 2015, p.183). Finally, Compound responses (C-responses) included both A-responses and F-responses instead of just one or the other.

The results from Elkoshi's (2015) mixed-method study revealed a world of associations, metaphors, and imagery associated with music as well as some formal music knowledge and

terminology. A strong preference for A-responses was noted for all age groups in the study. This means that across all ages, students most often represented music through metaphors, stories, or mood. Elkoshi (2015) also noticed a gradual decline in A-responses as students grew older. F-responses were sporadic, indicating that formal music knowledge existed in students of different ages. Of the F-responses recorded, the main musical elements that were depicted were instrumentation and dynamics. C-responses were lowest among first-graders and highest among the kindergarteners.

Elkoshi (2015) pointed out some limitations of the study. First, the study focused on one piece of music. Children's responses via audio-graphic and verbal depictions should be studied further. The sample size of kindergarteners in this study was also relatively small and should be replicated with a larger group. Elkoshi (2015) observed that the verbal parts of the study took place in a classroom where students could hear and, therefore, be influenced by one another. Future studies may wish to do the verbal aspects of the study through private interviews to mitigate any influence from classmates.

External Representations. Pramling (2009) discussed invented notation by labeling it as an external representation. Going on to explain the terminology, Pramling stated that external representations have three main elements. First, they represent or symbolize something other than what they are. In other words, words are not just literally ink on a page. These bits of ink have meaning separate from what they are physically (Pramling, 2009). Secondly, external representations have intentionality; they have a purpose. Finally, external representations have material permanence. Unlike music, which is fleeting and exists in time, notation helps the listener connect something physical with that which is not.

Operating from this theoretical framework, Pramling (2009) conducted a small, empirical study of four 5-year-old children in a preschool setting. Data were pulled from one continuous one-hour long session. Segments from that session were discussed in full detail to show how children and teachers responded to a variety of challenges. Presented with the challenge of representing a song, two girls both decided to use shapes to show patterns; however, one used three-dimensional blocks whereas the other used shapes drawn on paper. Children began discussing what represented what. Pramling (2007) points out that this kind of metacognitive talk about what the meaning of symbols shows that students are gaining representational knowledge and understanding how to think and talk about music. Pramling (2007) also noted how the teachers in this preschool were challenging children to clarify and explain what they understood. The teachers led students to deeper understanding by allowing them to explain their thinking. Teachers were encouraging the metacognition to which Pramling (2007) referred to above. The teachers also introduced concepts by using contrasts, i.e. high versus low and loud versus soft. This helped give students the language with which to express their understanding.

Employing Multiple Styles of Notation. Pramling (2007) notes in the results of the study that children do not progress from one type of notation system to another in a hierarchy, but rather seem to go back and forth between notational strategies. They do not abandon one type of notation in favor of a higher-level notational strategy. As children develop, they add more representational tools to their metaphoric 'toolbox' instead of moving only from a one tool to another. For this reason, figural representations should not be looked down upon as having less sophistication than metric representations.

Other researchers corroborated this finding. In 2009, Reybrouck, Verschaffel, and Lauwerier conducted two studies to explore what children hear when listening to and making

sense of music and what tools can be used to best represent this sense-making. Their studies of 89 children and 331 children in each respective study supported the idea that children move back and forth between notational strategies with qualitatively different levels of musical sophistication rather than through a progression of distinct stages of progressively increasing sophistication.

Reybrouck et al. (2009) also found a preference for global, or pictorial as defined in this paper, notation over differentiated, or figural, notation. When asking students to depict music they heard in any way, other than with letters or words, so that someone else could imagine tomorrow how the music would sound, the researchers found that 93.4% of all representations in the first study were in the global category. The global category consisted of representations that showed the music in a global way, usually with a single picture or image. This most often included a drawing of an instrument or an atmosphere evoked by the music. Surprisingly, the second study elicited 60.5% of the responses to be differentiated. The differentiated category included representations that showed a temporal unfolding of at least one musical element. From this vast difference in data and students' explanations of their drawings, the researchers ascertained that the nature of the musical task affects children's representations as well.

The overall preference toward global (pictorial) depictions over differentiated ones, as well as figural over formal (standard) notation, suggests graphic notation is at a level that represents a more global understanding of music than standard notation. Reybrouck et al. (2009) state an urgent need for further research that will be "aimed at improving music education by helping children to gradually and actively build up conventional formal notations out of their more intuitive and informal ways of representing music" (p. 206). Reybrouck et al. (2009, p. 206) seriously urge educators to reconsider how music notation is taught. The researchers state

that “the rigid conventions of standard notation, in fact, are not the most ideal device to learn to graphically encode musical entities” (Reybrouck et al., 2009, p. 206). Music educators can act on this admonition and consider presenting graphic notation before standard notation as a means of showing musical understanding.

Active Learners. Burton (2017) showed that student-created compositions create active learners. As in language acquisition, students learn that symbols are available to help convey meaning of their own original thoughts, arousing the desire to create within students. Waller (2010, as cited in Burton, 2017, p. 141) states, “music literacy should go beyond the act of reading; that reading and writing music are necessary concurrent processes. Burton discovered that, “Through those experiences that led children to ‘read to write and write to read’, the music was given back to them to form their own musical ideas as full participants in their musical development” (p. 141). Creating graphic notation allows students to fully participate in their musical development. These “full participants” are what music educators who seek to differentiate instruction truly desire.

Musicality. Another benefit of student-created notation is that it allows for musicality during study. Student-created notations allow children to experience the musicality of a song while also distinguishing rhythmic, melodic, figural, and beat-based patterns (Tan & Kelly, 2004). Song maps can be created within the flow of the music, unlike standard music notation. The song is not dissected, heard in only small bits, or changed in any way during the process of study, thus allowing the children and teacher to preserve the musicality of a song while studying other components of the song, including pitch, dynamics, instrumentation, and note duration. Tan and Kelly (2004) suggest that by using student-created song maps “students may be taught

to move from intuitive sketches to more internalized mental representations of musical structure – thus bridging the gap between music listening and *musical* listening" (p. 209).

Puzzling in Collaboration with Peers

Bamberger (2011) conducted a qualitative study of the symbolic representation of children. Bamberger's study involved five children who were chosen by their special education teacher because they had difficulty with symbolic representation systems, such as written language, numbers, and graphs. These eight and nine-year-old children were observed for over two years in the Laboratory for Making Things, resulting in five main events that were reported for the study. These main events "focus particularly on young children at work learning to transform the elusiveness of organized actions — clapping a rhythm, walking a line, drumming — into explanations and descriptions that hold still to be looked at and upon which to reflect" (Bamberger, 2011, p. 82).

As is true in many music education classrooms, movement seemed to be an integral part of Bamberger's (2011) study. Bamberger seemed to be searching for a way to analyze elusive actions. Music, by nature, cannot be held on to; instead, people hold onto visual and spatial representations, such as scores, diagrams, and timelines. For this reason, Bamberger (2011) used movement and spatial representations in the study. A recurring theme of the phrase 'in the middle' came out of the interaction with these temporal-spatial representations. When describing how often children would play compared to another part, children described the faster part as having one 'in the middle.' Children also used this phrase when describing walking to similar patterns. It was as if the visual representations helped children freeze time for a moment and analyze one 'slice' of it (Bamberger, 2011).

Bamberger concluded that encouraging children to engage in puzzling situations, to experience and appreciate confusions, and to reflect on views that differed from their own had a profound impact on learning. Thus, one of the greatest aspects of graphic notation for music educators is that it allows children to discuss and elaborate on their thinking, collectively working together to solve puzzles and puzzling situations. This is valuable because:

> Recent evidence suggests that engaging in explanation can have profound effects on learning. These effects follow from the structure of explanations: explanations accommodate novel information in the context of prior beliefs, and do so in a way that fosters generalization. (Lombrozo, 2006, p. 464, as cited in Bamberger, 2011, p. 86)

The role of the teacher in a task like this is to continually notice the learning and encourage discussion and explanation, possibly providing key terminology that will allow for expression of musical ideas.

Bamberger (2011) focused her study on children who had an innate ability to create and manipulate objects, but had difficulty in school. Due to these constraints, the study had limited generalizability; however, Bamberger's (2011) study held significance for music educators and special educators. Bamberger (2011) showed that working together, thinking aloud, and using visual and special representations helped some special education students collaboratively find solutions to puzzling situations. Special educators and music educators alike can use these strategies as possible tools for differentiating instruction.

Bamberger's (2011) study showed that puzzling through a situation with a peer was beneficial in helping the students describe their thinking and find solutions. Another researcher also found that puzzling through situations with peers is beneficial for learning. Johnson (2017) conducted a study to analyze the effect of Peer Assisted Learning (PAL). This study was

conducted with six different seventh-grade band classes- 261 students in all. A purposive sampling was used in this study. The researcher sought out programs where students were grouped by grade level, there was only one section of seventh-grade band, the school had a non-charter status, and the director had been in their current position for over one year. The six schools chosen were all located in the Rocky Mountain region of the United States.

The research question in Johnson's (2017) quantitative study focused on symmetrical versus asymmetrical PAL. Each of the six bands was randomly assigned either symmetrical or asymmetrical PAL for part of their usual class time over the course of four weeks. During that time, students participated in twelve PAL sessions, each twenty minutes in length, plus five-minute time period for transition. Scores on sight-reading and music theory tests were used to place students with partners of relatively equal ability in the symmetrical PAL classes. For those in asymmetrical PAL groupings, the same scores were used to place the lowest-scoring student above the median rank with the lowest-scoring student below the median rank. Sight-reading was assessed using SmartMusic's electronic assessment option. Music theory was assessed by a researcher-constructed pretest and posttest. Student engagement was also assessed using an adaptation of a scale developed by Wellborn (1991, as cited in Johnson, 2017). Teachers also participated in a three-hour training session that was led by the researcher.

The results of Johnson's (2017) study showed that all students, regardless of PAL assignment, improved their scores on the sight-reading and music theory posttests. This suggests that PAL may be an effective way to improve achievement in these areas. Furthermore, it supports the overall idea that working with peers is beneficial to learners. Johnson (2017) noted that the level of learner engagement increased for students from low Socio-Economic Status (SES) in asymmetrical PAL assignments; however, the opposite was true for students from

middle or high SES in the asymmetrical groupings. This is especially interesting because all students from the symmetrical PAL groups experienced an increase in engagement. These results suggest that symmetrical PAL may be more beneficial as it corresponds with higher engagement for all, whereas asymmetrical PAL appears to be detrimental for students from middle to high SES.

Limitations of the Johnson (2017) study include the purposive sampling. Testing should be replicated with random samplings to confirm the results of Johnson's (2017) study. Testing needs to be done with larger sample sizes than with this study. There is also a need for future research to compare teacher-led instructional gains to instructional gains from PAL. Johnson (2017) also called for the inclusion and analysis of more motivational profiles.

Yet another researcher looked at collaborating with peers in a different way. Furby (2016) conducted a study to determine the effects of peer tutoring on aural skills preparations. Furby's (2016) study was conducted at a four-year liberal arts college. The control group was made up of the lower 50% of the Aural Perceptions I freshman course in 2010, which was 10 students. The treatment group was the lower half of the same class during the 2011 school year, which was nine students. Each class met three times per week for one hour, and the course was 15 weeks in length. Instruction took place during the first two class meetings each week, and students were given either a sight-singing performance or dictation assessment each Friday. Sight-singing and dictation assessments alternated weeks. Students completed a total of 10 weekly assessments. The first two week's assessments served as the pretest and the final exam, which included sight-sing and dictation, served as the posttest. The researcher analyzed the scores of the pretests to determine the lower 50% of the class. These students were encouraged to participate in the peer-tutor treatment. Peer tutors were students who had successfully

completed all four courses in Aural Perception. Tutors were paid $10 an hour. Each tutor worked with two students of the identified students in the Aural Perception I course for an extra hour each week.

Furby's (2016) results showed no significant difference in scores between the treatment group and the control group. Although the results were not statistically significant, possibly due to the small sample size, the treatment group did have a descriptively higher performance on the posttest than the control group (Furby, 2016). This could indicate that the peer tutoring had a positive impact on the performance skills of the tutees.

Furthermore, Furby (2016) found that some informal benefits may have resulted from the peer tutoring. On the questionnaire given to the treatment group after the experience, all students reported that they were happy they had participated in this study. Likewise, all students reported positive tutor/tutee relationships. Tutees reported that they viewed their tutors as friends and confidants. One tutee reported feeling comfortable enough with the tutor to approach other issues like music theory. Another reported that it was easier to integrate into department activities as a result of the tutoring experience (Furby, 2016). It should also be noted that eight members of the treatment group completed all four levels of Aural Perceptions courses compared to only five participants from the control group (Furby, 2016). This poststudy information might imply that those who are more successful are more likely to be retained in a program (Furby, 2016). This is important for K-12 music educators as well as those teaching at the collegiate level. Although this study was conducted with college freshmen, Furby (2016) noted that the teaching and tutoring practices were applicable to K-12 music instruction as well.

Chapter Two reviewed the available studies on the topic of differentiating in music through graphic notation and looked at the effects of collaboration with peers. The importance

of sound before sight was indicated, the types and uses of graphic notation were explored, and effects of peer collaboration or tutoring were investigated. Chapter Three will summarize and analyze the themes that emerged from the literature review.

Chapter Three: Summary

Chapter Two attempted to provide practical applications of how music educators can use graphic notation to differentiate instruction while teaching music literacy. The following themes were addressed: (1) sound before sight; (2) graphic notation; (3) student-created symbols; and (4) collaborative puzzling with peers. Chapter Three will be dedicated to a review the proposed problem, the importance of the topic, and summarizing the findings from the literature review.

Review of the Proposed Problem

Differentiated instruction is needed in the music room just as much as in other classrooms. Music educators have remarked at the wide variety of skills they see in students. Differentiating instruction can address this problem and help students progress in their learning journey, no matter where their starting point may be. Yet, the problem remains that many music teachers do not seek out strategies for differentiating. This may be due to teachers' lack of perceived need for differentiation or it could be due to the lack of resources for doing so. There is a great amount of research on how to differentiate in core subjects, but much less on how to do so in elementary general music settings specifically.

Importance of the Topic

Although there is a growing body of research surrounding the topic of differentiation, there is still a lack of research about differentiating specifically in music. The link between music acquisition and language acquisition highlights the need for differentiating in music.

Aural discrimination is important for learning language. Music teachers can help build these skills so that students will be able to apply them to language learning.

Music educators not seeking opportunities to differentiate for all students is especially troubling given the broad range of influence these teachers have. Music teachers often interact with more students than other teachers because of large ensembles in secondary settings and meeting with all students in a building in elementary settings. Elementary educators generally teach all students in kindergarten through fifth-grade students within a school, including some who are not mainstreamed in general education classrooms for the rest of their day. The latter may be in self-contained center-based classrooms for most or all of their day. This gives elementary music educators the unique opportunity to use their class time to build many skills- aural, social, and musical- for students of all developmental levels and ability levels. If music educators use their classroom as a place to differentiate learning, create community, value individuals, include all, and unleash the potential within each student, these influential teachers can affect students' lives beyond the walls of the music room.

Summary of the Main Points of the Literature Review

As music educators seek to differentiate instruction while preserving musicality, graphic notation may be a useful tool to employ. The research has shown that, in learning music, there should first be a focus on listening before introducing symbolic representations; in other words, there should be a focus on sound before sight. Just as babies learn to make sounds before reading words, students should be immersed in the sounds and language of music.

Graphic notation can be separated into two main categories: pictorial and figural. Both types of graphic notation have value at different developmental stages. Children employ a variety of symbols over time. Research is inconclusive on whether children move through

different stages and types of notation in a cyclical fashion or if over time they gradually abandon invented notations in favor of more traditional notation. On the other hand, researchers seem to agree that children move from more abstract, intuitive responses to more formal and traditional representations of music as they age. The review of literature showed that graphic notation can represent deep musical meaning, including showing an understanding of elements including but not limited to rhythm, form, pitch, dynamics, tempo, and melody.

Graphic notation created by teachers can be helpful in teaching students to read music. However, when it is created by the students themselves, it can be and even more powerful tool. Especially for young children, creating personal representations causes a natural interest. It also creates a natural curiosity for them to understand other students' representations which will power students' learning. Student-created representations allows children to utilize whatever symbols are at their disposal, which may change over time. Essentially, utilizing this tool empowers children to differentiate their instruction.

The literature review showed that collaborating with peers is a helpful strategy in learning music. This can be done in a variety of formats: informally working with peers in class, formal groupings assigned by the teacher, or tutoring. In some cases, it has only shown informal benefits, such as developing relationships with peers or creating more confidence in tutees. In other cases, however, research has shown that graphic notation improves memorability of music and helps children understand more about it. Some studies showed that children can use graphic notation as a problem-solving space. By discussing what the music looked like in their representations, children can come to a greater understanding of their own thinking as well as the problem at hand. As children discuss their thoughts, they can problem-solve together, creating a shared meaning and understanding of the concept.

Chapter Three provided a review of the problem of differentiating in music, why differentiating in music education is important, and a description of the main themes that emerged from the literature review. Allowing time for students to be immersed in the sounds of music before moving into further study has been shown to be of extreme importance. Graphic notation has been presented as a positive influence on learning, both teacher or textbook-created notation as well as student-created notation. Similarly, working with peers has been presented as an effective way to differentiate in music. Chapter Four will provide further discussion and application of the research for music educators. It will also outline possibilities for future studies.

Chapter Four: Discussion/Application and Future Studies

Insights Gained from the Research

Numerous insights were gained from the research pertaining to differentiating in music through graphic notation and collaboration with peers. First, it became apparent that music educators need to approach the teaching of music literacy with a sound-first approach. Students need time to hear the music, make sense of it, move to it, and eventually study it. Secondly, the research made it evident that graphic notation is a natural response to music for children that serves many purposes. The research showed that graphic notation can show global and metaphoric details as well as deep musical details relating to instrumentation, dynamics, melody, and rhythm. Graphic notation helps students find a way to look at music, which is fleeting in nature, and make it hold still. Because of this, students can also use graphic notation as a problem-solving device. Students have self-corrected notation when re-reading music they had previously notated (Barrett, 2004; Burton, 2017). Third, the research pointed out the benefits of allowing students to create notation of their own instead of only following listening maps created

by someone other than the student. Finally, the research showed that working alongside peers can be beneficial by encouraging students to explain, and therefore examine, their own thinking.

Discussion

Graphic notation in tandem with collaboration with peers might be a key to unlocking students' potential, which is the aim of differentiated instruction. Having students create their own representations of sound using their choice of symbols allows students to connect to their own prior understandings and experiences. This is a useful way to naturally differentiate instruction. This connects to Concordia University, St. Paul's Master of Arts in Education Program Essential Question because it helps educators differentiate for all students.

Application

The research studied regarding differentiation in music had several practical applications for elementary music educators. First of all, elementary educators should spend class time aurally preparing students before moving directly into study. This has been shown to help students understand the music on a deeper level, helping them gain familiarity that may help them to further understand musical concepts that will be introduced later. In elementary music education, spending time on the experience of sound before showing the symbolic representation is beneficial for students.

Secondly, graphic notation should be used in elementary music classrooms in a variety of ways as a tool of differentiation. Introducing students to notation that is not developmentally appropriate does not lead to success. Instead, elementary music educators should allow students to represent music through graphic notation of their own making. Educators should keep in mind that younger students will generally depict music in a more global way, which is developmentally appropriate. As students grow older and their ears are more accustomed to the

differences in music, then they may use more concrete representations. Teachers can introduce standard notation after students have puzzled through their own depictions and are recognizing similarities in sound. This approach would capitalize on student readiness and introduce the new concept as part of a puzzle. If teachers were to use known symbols in a listening map and mix in a new symbol that is unknown, students who were ready should be able to solve the puzzle and learn the meaning of the new symbol.

Third, it is important for music educators to provide opportunities for students to collaborate with peers, as this has been shown to be a beneficial way of learning music. This can happen in a variety of ways including pairing students, forming flexible groups, assigning peer tutors, and/or using symmetrical PAL. Working with peers allows students to verbalize their thinking. When advanced learners, such as in the symmetrical or asymmetrical PAL groupings of Johnson (2017), verbalize their thinking, they may be modeling a way through a problem for the lower learners. Likewise, verbalizing learning makes it stronger. Johnson (2017) put it this way:

> A fundamental assumption of PAL is that knowledge becomes more valuable and better understood when it is shared and discussed. … allowing room for a variety of instructional models— especially those that can be accomplished through peer interaction—can help to develop and promote a lifetime of musical learning, enjoyment, and fulfillment. (p. 175)

Giving students the opportunity to verbalize aids the process of learning, no matter what skill level students are at; this makes collaboration a useful tool for differentiating instruction.

Finally, the research has led to the understanding that visual aids, such as graphic notation, serve as a problem-solving space for children. Elementary music educators can keep in

mind that exercises in graphic notation do not need to be accurate representations of any one particular element of music in order to be useful. Student-created notations provide the opportunity to deliberate, puzzle, defend, and correct, if needed.

Future Studies

Limitations of the research are found in the area of generalizability. Several studies were done with purposive or convenient sampling and others had small sample sizes (Elkoshi, 2015; Yigit & Ozeke, 2020). Further research with larger sample sizes and random sampling would be needed to confirm the results of the studies mentioned in the literature review section of this paper. Similarly, Hurley et al. (2018) studied the effects of aural preparation on second-grade students. More studies of students at different grade levels are needed to determine the generalizability of this study, as well. Hurley et al.'s (2018) study also investigated only two different rhythmic patterns. Further study to corroborate their findings is needed with varied rhythms, including more complex rhythms and those in different meters.

In their 2009 study, Reybrouck et al. called for two types of further study that would extend knowledge about differentiation in elementary music education. First, there is a need for further ascertaining studies. There is still much that is unknown about how children make sense of music. Knowing what tools best aid this process would further music educators' ability to teach and differentiate for all learners.

Secondly, Reybrouck et al. (2009) also determined a need for more design-based research that would help music educators understand how to help children build up formal notations out of their more instinctive and informal ways of representing music. If music educators could understand how children could change graphic drawings into formal notations, they could differentiate based on the ways in which students comprehend and convert those types of

notations. Design-based research would be particularly helpful because "it allows researchers to re-construct, re-design and reimplement their findings in one or more design cycles on the basis of what has already been learned" (Reybrouck et al., 2009, p. 206).

The literature reviewed in this paper focused mainly on rhythmic understandings of music. Future research in the area of understanding how children make sense of music are needed in the area of melody. Are the ways in which students gain rhythmic understanding similar to the ways in which they gain understanding of pitch? While qualitative studies would be most helpful in describing how students gain pitch understanding, quantitative studies would be most helpful to the field of music education in determining which process or method produces the best results.

Finally, there is a need for studies that compare large-group instruction to small group instruction, such as PAL instruction in music education. Studies have shown that both symmetrical and asymmetrical PAL are useful in music education, but these studies have not compared learning from peers to learning from the teacher in a large-group format. Future research could compare the two learning formats in a quantitative study to help solidify which format is more beneficial.

In conclusion, differentiating in music is necessary in order for all students to achieve their full learning potential. This can be done by utilizing graphic notation and collaboration among students with a strong emphasis on sound before sight. As music educators design lessons, they should remember to provide ample time for students to be immersed in the sounds of music. This immersion will lead to deeper understandings which then allow educators to introduce more formal notation. Graphic notation has been shown to increase motivation, engagement, and student understanding which makes it a useful tool for music educators.

Students creating figural drawings make use of their prior knowledge while creating representations for sound, making graphic drawings a strategy for differentiating learning in the elementary music classroom. Collaboration with colleagues also has shown increases in engagement and outcomes. Combining these two strategies, music educators can provide students with opportunities to work with peers using graphic notation to further their understandings of music literacy.

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