

Chapter Two: Literature Review

Introduction

Developing students' reading skills is a key focus of education during early elementary school years. One element that has a significant impact on future reading success is having a strong sense of phonological awareness. Being able to identify the sounds within words with automaticity is necessary to free up brain power to focus on comprehension. Similar sound discrimination skills are taught through music education using Music Learning Theory. This literature review will discuss both the theory of phonological awareness skills supporting literacy and the Music Learning Theory as well as look at the effects of training music skills to develop phonological awareness skills in students. The research yielded three categories of music training that have shown benefits for developing phonological awareness; tonal training, rhythm training, and a combination of the two; each of which will be discussed. This chapter will close with a summary of the literature and conclusions drawn that will influence the development of the project.

Theory/Rationale

Phonological Awareness

Researchers have long studied the acquisition of reading skills and searched for predictors of success. Liberman (1973) introduced the idea that reading requires students to be specific about the phonemic structure of words, rather than memorizing words simply by sight. Through investigation, it was discovered that this ability to recognize the phonemic structure of words was not something that was readily known

by young readers (Liberman). Since it was shown that phonological awareness is not something that was readily known, it was reasonable to make the conclusion that phonological awareness needs to be taught. This theory sparked additional research into phonological awareness and how it assists in the process of learning how to read. It has been found that there are five main components of phonological awareness: rhyme awareness, sentence awareness, syllabic awareness, word awareness, and phonemic awareness (Kenner, Terry, Friehling, & Namy, 2017). The acquisition of these five components begins with larger word parts and gradually progresses to an understanding of smaller word parts (Hansen & Milligan, 2012).

Music Learning Theory

The ways to approach the instruction of music are vast and varied. This literature review focuses specifically on Edwin Gordon's Music Learning Theory (MLT). The reason for this selection is that Gordon (1999) links the process of learning music to the process of learning language. The acquisition of language begins by listening to others speak, followed by babbling, learning words, and eventually putting them together to convey meaning. Music Learning Theory maintains that a similar process occurs when learning music by first listening to others perform music, then playing with the sounds (musical babble), making verbal associations with vocabulary terms in music and eventually creating new and unique music (Gordon, 1999). Music Learning Theory also operates in sequencing from large parts of music to smaller and more detailed parts (GIML, 2017). Gordon specifically focuses on the idea of audiation. He describes audiation as what "takes

place when we hear and understand in our minds music that we have just heard performed or have heard performed in the past” (p. 42). It is often referred to as a process of thinking music. Gordon links the process of audiation in music to the process of thought in language.

Research/Evaluation

Phonological Awareness

Phonological awareness is a foundational skill necessary to master the process of reading. Knowing the significance of the role of phonological awareness in learning to read, Carroll, Snowling, Hulme and Stevenson (2003) set out to identify how phonological awareness develops in young children. Their study monitored 76 preschool children over the course of a one-year period. While no specific interventions were put in place, it was noted that formal schooling began for most of the participants during the course of the study. The findings show that the development of phonological awareness is a “progression from awareness of large units (syllables and rimes) to awareness of small units (phonemes),” (p. 340). Awareness of large unit sounds develops from normal language development in children, but explicit understanding of the smaller units correlates with an understanding of letter and sound relationship. No child who lacked letter knowledge was successful on any phonemic awareness task (Carroll et al.).

A meta-analysis of research conducted on the role phonological awareness plays in learning to read was done by Melby-Lervag, Lyster and Hulme (2012). The aims of their meta-analysis were to discover larger, overarching trends by analyzing

the research of others. They were predicting that they would see that phonemic awareness, rhyme awareness and short-term memory correlating to differences in children's word reading skills and that of these three correlates, phonemic awareness would be the predictor that would be most closely associated with word reading skills. They also predicted that phonemic awareness could be a predictor of children's word reading skills. The researchers used a quantitative random-effects model to analyze the data collected from previous research. Melby-Lervag et al. found that there was, in fact, a "specific and substantial association between concurrent measures of phonemic awareness and children's word reading skills" (p. 340). The review found that phonemic skills measured in the earliest stages of reading were most closely related with growth in reading. This suggests that early intervention and training in phonological awareness could be more successful than those started later in the process of learning to read.

A study done by Cunningham and Carroll (2015) looked for a predictive effect of phonological processing on later phonological awareness strategies used by students for reading and spelling. The same study also looked for a direct link between phonological awareness and reading accuracy and comprehension. Using quantitative methods, the researchers measured the students' skills in the areas of phonological processing, phonological awareness, reading comprehension and reading accuracy, first in kindergarten/first grade and again three years later. No interventions were put into place by the researchers. The results of the study showed that students who had poor phonological processing skills were "consistently at risk

for difficulties in phonological areas” (p. 523). They also found that children who showed poor phonological processing skills at the time of the first test developed poorer phonological awareness skills three years later. The biggest finding was that phonological awareness has a direct effect on reading accuracy, and to a lesser extent, reading comprehension. The gains in reading accuracy are important, as students who can accurately read what is on the page will be more likely to be able to make meaning of what they are reading.

Once a clear pattern of influence of phonological awareness abilities on later success in reading emerged, research began to focus on whether interventions focusing on phonological awareness could be proven effective at supporting growth in reading. Goldstein et al. (2017) focused on identifying growth in phonological awareness in 113 struggling readers in pre-kindergarten classrooms. The students were divided into two groups, one receiving an experimental phonological awareness specific intervention program, *PAth to Literacy*, while the other group received a control intervention with a program based on comprehension and vocabulary development, *Story Friends*. The results of the study showed that students who received the experimental intervention out-performed their peers in the control group in phonological awareness. While this was a result expected by the researchers, what was not expected is that after students participated in the phonological awareness intervention, only 18 percent had not met the kindergarten benchmark for phonological awareness. This suggests that students who struggle in the area of

phonological awareness may be able to catch up with their peers following small-group intervention.

Music and Phonological Awareness

The process of sound discrimination used when reading words and the process of sound discrimination used when listening to and creating music are very similar. With this thought in mind, research has been done to determine to what extent music can be used to support phonological awareness development in readers. An analysis of the research has yielded three focus areas on which music interventions to support phonological awareness were based: Tonal Training, Rhythmic Training and a Combination Tonal/Rhythmic Training. Each intervention program produced slightly different results while an overarching pattern of growth in phonological awareness was seen through all training methods.

Tonal Training as an Intervention. There are similarities between tonal aspects of speech and the tonal aspects of music. The voice moves up and down in pitch and places stress on certain words to convey meaning through language. In the same way, notes move up and down and are played at different volumes to create a piece of music. Culp (2017) set out to determine whether a relationship existed between phonological awareness and tonal music aptitude utilizing Edwin Gordon's Intermediate Measures of Music Audiation (IMMA). In this study, 17 second grade students were given both the Phonological Awareness Test-2 (PAT-2) to measure phonological awareness and the IMMA test to measure music aptitude. The results indicated that students who scored well on the tonal portion of the IMMA also scored

well on the PAT-2 test of phonological awareness, particularly in the areas of rhyming and phoneme deletion tasks. Similar studies have also found a positive association between a child's pitch perception and phonological awareness in children between the ages of five and nine (Lucas, Gromko, & Eastlund, 2007; Tsang & Conrad, 2011). These findings support the similarities between auditory processing skills used in tonal music with the acquisition of phonological awareness, a basic reading skill.

Researchers have implemented programs which use training in tonal awareness through music to bolster phonological awareness skills. A study was done that implemented an experimental music program focused on songs, tonal patterns and playing melodies on instruments (Bolduc, 2009). The control group also received music training, but it was the traditional curriculum of the local school. The results of the study showed that while both groups made gains in their phonological awareness processing, the experimental group (which had a firm focus on tonal aspects of music) showed higher gains than the experimental group. The control group improved by 16.7 percent in syllable identification, 15.1 percent in phoneme identification and 11.8 percent in rhyme identification. The experimental group improved by 32.5 percent, 30.5 percent and 23.4 percent respectfully.

Rhythmic Training as an Intervention. Speech is a result of a combination of sounds put together to make meaning. Phonological awareness is the ability to detect the sound structure of language or speech. Tierney and Kraus (2013) noted that since speech sounds are short, recognizing and understand speech sounds

requires “precise representations of time and frequency information” (p. 211).

Rhythm in music is a pattern of sounds and silences over time. Rhythm does not just consist of duration, but notes are given different levels of stress depending on where they fall within the beat structure (Tierney & Kraus). This is similar to how different parts of words are given stress depending on syllable and word structure.

Knowing this similarity, David, Wade-Woolley, Kirby and Smithrim (2007) conducted a study to determine if there was a relationship between an ability to recognize rhythms and phonological awareness. The study involved 53 first grade students who were measured in their ability to keep rhythms steady during two musical examples of varying tempo. These same students were also measured on their phonological awareness and reading ability each school year beginning in first grade and continuing through fifth grade. The results of the study showed that the scores on the rhythm assessment given in first grade strongly correlated to not only the scores on the phonological awareness assessments each year, but also to a child’s reading ability up to four years after the rhythm assessment was given.

Thomson, Leong and Goswami (2012) devised a rhythmic intervention utilizing a drumming game and metrical stress patterns designed to help children with dyslexia improve their auditory perception. To measure the success of their intervention they compared their results to the results of a phoneme-based intervention as well as a control group which received no intervention. Both the rhythm group and the phoneme intervention group made gains in rhyme perception and in word and non-word reading. The rhythm group, however, was the only group

to show gains in rise time discrimination, which identifies where stress is placed on a word.

Another study also looked at how a rhythm intervention influenced phonological awareness acquisition (Moritz, Yampolsky, Papadelis, Thomson, & Wolf, 2012). The study included 30 kindergarten students divided into two groups, one of which received music instruction daily for 45 minutes while the control group received music instruction once a week for 35 minutes. At the end of the study period, the experimental group showed significant gains in all six measured aspects of phonological awareness while the control group showed gains in only four of the six areas. The results of this study led the authors to conclude that:

- (1) rhythm pattern ability is linked to phonological segmentation ability; (2) exposure to rhythmic pattern activities and rhyming song lyrics through intensive musical instruction are connected to enhanced PA in the form of rhyming and phonological segmentation skills; and (3) PA facilitates reading acquisition in a reciprocal manner (p. 762).

These studies have demonstrated a link between how the brain processes rhythm in music and how it processes the rhythm of sound in speech as a part of phonological awareness.

Combination Tonal/Rhythmic Training as an Intervention. It is rare to find music that is purely tonal or purely rhythmic in nature. Aside from specifically developed examples, tone and rhythm exist together in music in much the same way as inflection, stress and rhythm of speech exist together in language. As a result of

this, research has been done that does not focus simply on tonal or rhythmic aspects of music as an intervention strategy to support phonological awareness, but rather as a holistic music intervention approach which incorporates aspects from both tone and rhythm.

Dege and Schwarzer (2011) conducted a control-trial study to determine the effect that a music instruction program would have on phonological awareness with preschoolers. The researchers were specifically trying to see if a music instruction program would have a positive effect on phonological awareness, as well as comparing those results to those of students who participated in a traditional phonological skills program. The study focused on students, ages five to six, divided into three groups. One group participated in a music program, one in a phonological skills training program, and the third in a sports program to be used as a control. Dege and Schwarzer predicted that there would be similar gains made between students who participated in the music program and those who participated in the phonological skills training program. The results showed that students in both the music program group and the phonological skills program group made significant gains in phonological awareness from the beginning of the program to the end. The control group showed no significant gains. These results show that music can be an effective tool to help develop phonological awareness in students.

A similar random control-trial study was conducted by Flaunacco, Lopez, Terribili, Montico, Zoia, and Schon (2015). The researchers were testing the hypothesis that music training would have a positive effect on phonological

awareness when used as an intervention with children who are diagnosed as dyslexic. In their trial they divided two groups of children into a control group who received training in painting and an intervention group who received training in music. The group who received training in music made significant gains in the area of phonological awareness, specifically in the areas of phonemic blending and rhythm reproduction, as compared with the control group who received training in art. The researchers theorize from their findings that:

since rhythm and meter, by requiring more precise timing, possibly place higher demands in music than in language, remediation based on music and rhythm may strengthen phonological and language development from a perspective that is quite different from (though complementary to) the more traditional language-based remediation approaches. (p. 13)

These results offer support for the use of music to supplement traditional training programs to develop phonological skills in students.

Summary

Research has shown the importance of phonological awareness skills in the acquisition of reading. Students who struggle with phonological processing in early years of instruction are at a greater risk of developing poorer phonological awareness skills later in their schooling (Cunningham & Carroll, 2015). Research has shown that students acquire phonological awareness beginning with large parts of words and gradually developing recognition of smaller parts of words (Carroll et al., 2003). It has also been shown that training in phonological awareness in students is not only

effective, but is most effective when students are in the early stages of learning how to read (Melby-Levag et al., 2012). When small group phonological awareness interventions were put in place with preschoolers, only 18 percent failed to reach the kindergarten benchmark for phonological awareness at the end of the intervention period (Goldstein et al. 2017). This speaks to the need for early intervention and training in phonological skills.

Training in music has been proven to be an effective means of enhancing phonological awareness skills. Music and language are processed in very similar ways. The Music Learning Theory (MLT) approach uses this as a foundation for how to instruct students in music (GIML, 2017). Just as phonological awareness is acquired through first identifying larger parts of words and progressing to smaller parts, MLT advocates for instruction of music to focus on large parts of music and become smaller and more detailed as learning progresses.

Researchers have inquired as to whether tonal or rhythmic aspects of music best support the acquisition of phonological awareness. Studies have shown that a student's ability to hear pitch and recognize tonal patterns relates positively to their ability to hear parts of words (Culp, 2017; Lucas et al., 2007; Tsang & Conrad, 2011). Bolduc (2009) showed that students who received music training with a strong tonal focus outperformed students who received traditional music instruction on a phonological awareness assessment. Research centering on rhythmic aspects have yielded similar results. Tierney and Kraus (2013) noted how the stress of words in a sentence relates to stress of notes within a beat structure. This may explain why

David et al. (2007) found that students who performed well on a rhythm assessment also performed well on a phonological assessment. Interventions that use rhythm training as a focus have also shown that students who receive training in rhythm have improved their phonological awareness skills as well (Thomson et al., 2012; Moritz et al., 2012). Studies using a combination of tonal and rhythmic aspects have also shown positive results. The study by Dege and Schwarzer (2011) showed that training in music yielded comparable gains in phonological awareness to participation in a program specifically designed to train phonological awareness skills. Training in music also supports the development of improved auditory processing, prosodic and phonemic sensitivity, and temporal orienting of attention (Flaugnacco et al., 2015).

Conclusion

Music instruction has been shown to be an effective tool to facilitate phonological awareness development in students. The nature of how music is learned is very similar to how language is learned. Music is an auditory process, as is language, whereas reading is a visual representation of language. When students receive training in music, both tonal and rhythmic, it strengthens their auditory processing skills which, in turn, allows them to better distinguish the parts of speech in words. Since the auditory processes needed for understanding music (audiation) can sometimes be more demanding than in language, using music as an intervention for lack of phonological awareness skills would be most effective when done in conjunction with traditional language based phonological awareness interventions. These interventions should ideally be done earlier in a student's development of

reading skills to facilitate the greatest growth in phonological awareness. These gains will then lead to an increased ability to accurately read words and comprehend what is being read.