The Use of Musical Techniques by Speech-Language Pathologists

to Improve Phonological Processes (Speech Sounds)

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Language is a construct that allows people to communicate by representing objects and ideas in the form of words (Call, 1980). Primarily, language is used to communicate through written text and spoken words. The ability to communicate verbally is an important form of human interaction and development. When a speaker cannot be easily understood due to delayed speech development or impairment, it is more likely that he could develop communication skills more slowly than his peers (Call, 1980).

Language acquisition begins from birth through informal interactions and is intentionally further developed in school settings. Classroom teachers teach the English language as part of a core curriculum. When a student is identified with a developmental delay or impairment in his/her verbal communication, a speech-language pathologist assesses skills, then develops goals and provides intervention. This model recognizes the need for an additional mode of assistance that provides special emphasis on phonological awareness. Therefore, it seems imperative that schools ensure students can use verbal as well written communication skills.

While reports of underfunding and downsizing of education across many school districts abound, speech-language pathology is a field that has shown significant growth in the last ten years – and is expected to continue growing at a faster than average rate over the next ten (Bureau of Labor Statistics, 2012). The rise in numbers of speech-language pathologists (SLPs) indicates that a greater number of children are in need of their services. It stands to reason that – more than ever – children today are struggling with speech sound acquisition and require additional modes of support.

For many years, music teachers have pondered if music could offer assistance to students with developmental delays in the area of speech. Some researchers have studied ways in which music can influence language development (McCarthy, 1985; Mizener, 2008). However, most
studies that investigated the connection between music acquisition and language acquisition investigated applications for improved fluency concurrently with phonological awareness. However, students with phonological processes deficits may not have deficits in fluency. In 2006, students with articulation/phonological disorders were encountered by more school-based SLPs than any other impairment and by 91% of school-based SLPs. (ASHA, 2006). Therefore, the present study examined phonological processes alone.

The purpose of this study was to discover techniques used by SLPs employed by public schools to improve phonological awareness and how SLPs view the incorporation of music to improve phonological awareness for students in grades K-5 identified with a speech sound disorder and no additional disability or impairment. The questions that guided the study were:

1. What techniques do speech-language pathologists use to improve phonological awareness
2. How do speech-language pathologists incorporate music to improve phonological awareness?
3. What opinions do speech-language pathologists hold about using musical techniques to improve phonological awareness?

**Definition of Terms**

1. **Speech Sound Disorder**: “A significant delay in the acquisition of articulate speech sounds” (Lewis et al., 2006, p. 1294).

2. **Phonological Awareness**: The ability to analyze and manipulate language, including individual sound units within a word and/or an entire word (Dege & Schwarzer, 2011).

3. **Intervention Strategy or Strategy**: Throughout the speech-language literature the terms: approach, technique, strategy, intervention strategy and intervention seem to be used interchangeably to refer to the same idea: a reproducible way to achieve a desired
result. For the purposes of this paper, the term to encompass these guiding ideas was “intervention strategies.” These intervention strategies were then grouped into larger categories using like characteristics partially based on the work of (Williams, McLeod, & McCauley, 2010). Categories were used to help organize the large number of intervention strategies possible by grouping them based on like characteristics.

Literature Review

Speech-Language Development

Call (1980). Symbolic functioning is the ability to use words to represent and organize objects, places and people in the mind. The ability to communicate through language is a manifestation of symbolic functioning. In addition to verbal language, other forms of symbolic functioning include sign language, gesture, dance, visual imagery, music and mathematical symbols. Theories posed by the researcher assert that “language functioning is essential for ego development” (Call, 1980, p. 260) and “language development and ego development proceed in an interdependent fashion” (Call, 1980, p. 261). Therefore, it stands to reason that if a person experiences difficulty communicating through language, ego development could be hindered or effected negatively.

Pullen and Justice (2003). Phonological awareness was identified as one of the most important building blocks of speech and language acquisition. Since children develop phonological awareness “along a continuum reflecting a transition from shallow to deep levels,” (Pullen & Justice, 2003, p. 88) “the preschool period is an important source of development for phonological awareness” (Pullen & Justice, 2003, p. 88). When phonological awareness is measured in preschool children, “awareness indicators examine children’s performance on shallow tasks, that is, tasks examining sensitivity to large phonological features (e.g., words,
syllables)” (Pullen & Justice, 2003, p. 89). Key ways in which a young child can represent phonological development include the ability to comprehend and produce rhymes; sort words based on beginning, middle or ending sounds; understand sentences contain words (word awareness); and understand syllables comprise words (syllable awareness). Students with deficits in phonological awareness can have difficulty understanding alphabetic principles of language. Deficits in phonological awareness can create a series of negative effects that would impede the child’s ability to speak, read and understand language.

**Intervention Strategies for Speech Sound Disorders**

Lowenthal (1995). When students are identified with a disability or delay there are a number of interventions that can be employed to help the child reach developmental goals. A naturalistic approach to language intervention is a strategy in which interaction and guidance is born out of the child’s everyday experiences, interests and routine. This approach allows the child to remain in his/her natural environment (which is typically the classroom) so that his/her language interactions with students and adults are more natural. In this approach the teacher acts as a positive language model and the student is encouraged to interact and play with other children to be provided peer models. Many of the interactions between teacher and student are in the form of conversations in which questions are posed by either teacher or student.

**Baker and McLeod (2011a).** Seeking to discover common intervention strategies for students with speech sound disorders (SSDs), the researchers reviewed 134 studies published between 1979 and 2009. In total, 46 different intervention strategies were identified and only 23 strategies appeared in more than one study. The top five strategies cited were minimal pairs, maximal oppositions, empty set, intervention targeting complex onsets and intervention targeting laryngeal/supralaryngeal distinctions. The typical format of an intervention reported within a
studies were divided into efficacy studies and effectiveness studies. Efficacy studies examined “causal relationships between interventions and outcomes in controlled conditions” (Baker & McLeod, 2011a, p. 107) and effectiveness studies examined “previously established efficacious interventions under real world conditions” (Baker & McLeod, 2011a, p. 107). Of the studies that could be divided into the two categories, 86 were efficacy studies and only two were effectiveness studies. This indicates there were many more studies to determine whether or not an approach could work under ideal conditions and far fewer studies to determine whether or not an approach is effective under real-world conditions. The researchers also noted that as they moved chronologically through the studies, studies on intervention research have declined over the last 10 years (aside from a spike in 2005). This could be the result of busy caseloads, which does not allow for the large time commitment needed for such investigation.

**Baker and McLeod (2011b).** Evidence-based practice (EBP) is the “integration of current best research evidence with clinical expertise and client values and preferences” (Baker & McLeod, 2011b, p. 140). It is a set of guidelines that “has been espoused as a framework for guiding speech-language pathologists’ (SLPs’) management of speech sound disorders (SSDs) in children” (Baker & McLeod, 2011b, p.140). However, engaging in EBP is not common among SLPs. Implementing EBP can be very time-consuming and SLPs may lack sufficient time to sift through a myriad of research that is often superfluous. When SLPs did locate published research on a pertinent subject, they felt the “research results were not generalizable to their own settings” (Baker & McLeod, 2011b, p. 141), which further alienates them from seeking out research
Music and Speech-Language Development

For years researchers have espoused the positive effects that music can have on speech and language development (McCarthy, 1985; Mizener, 2008; Solomon, 1980; Wolverton, 1991). In a study about music in special education before 1930 with hearing and speech impaired students, Solomon (1980) found that music was commonly used with special populations and that “music was often a stepping stone to speech” (p. 240). Prior to 1930, “singing has been used to involve the non-speaking child in speech, to improve breathing, and to develop proper articulation” (Solomon, 1980, p. 241). In addition to singing programs tailored to the needs of students with hearing and speech disabilities, such programs advocated humming; purposeful movement (including eurhythms); ear-training; breathing exercises; and playing pitched and un-pitched instruments.

More recent research suggests practices that can improve language and speech skills for all students (McCarthy, 1985; Mizener, 2008; Wolverton, 1991). These sources provide strategies to improve speech skills and phonological awareness. Emerging themes from this field of inquiry include the use of movement, rhyme, reading, text, singing and game/action songs (McCarthy, 1985; Mizener 2008). Mizener (2008) developed several strategies to improve phonological awareness based on the Orff methodology to enhance language skills. Mizener’s (2008) strategies incorporated chanting, body percussion, name songs, patsching, locating similar sounds (phonemes), peer interacting, visual aids, listening, discussing and predicting. McCarthy (1985) likened elements of music such as dynamics, rhythm and melody to elements of speech such as volume; pacing and duration of syllables; and the tune the voice creates when speaking. To improve language skills, McCarthy (1985) further suggested creating new lyrics for known
songs and completing cross-words with the text from songs or vocabulary from class.

**Forgeard, et al. (2008).** A study designed to determine the relationship between language-related skills and musical discrimination found that “a musical intervention that improves the basic auditory music perception skills of children with dyslexia may also remediate some language deficits” (Forgeard, et al., 2008, p. 383). The relationship between phonological skills and musical discrimination in typical students was “more significant in children with music training than in control children without musical training” (Forgeard, et al., 2008, p. 383). Overall, researchers found that musical discrimination predicted phonological skills in both typical and dyslexic children.

**Dege and Schwarzer (2011).** Understanding the advocated suggestions for success, the researchers designed a study to determine the effect of a prescribed music program on the phonological awareness of preschoolers. In this study, 41 students were “randomly assigned to a phonological skills program, a music program, and a control group that received sports training” (Dege & Schwarzer, 2011, p. 2). Students were trained in groups of five to seven for a period of 20 weeks for 10 minutes each day using a music program developed by the researchers. The music program was “based on a well-established program for early music education and contained joint singing, joint drumming, rhythmic exercises, meter execution, training of rudimentary notation skills, dancing, and playful familiarization with intervals” (Dege & Schwarzer, 2011, p. 2). In a pretest, no differences were found among students in any of the groups in regard to phonological awareness or other demographic information. At the end of 100 sessions, the students were given a post-test and “children in the phonological skills group and the music group showed significant increases in phonological awareness from pre- to post-test” (Dege & Schwarzer, 2011, p. 1). This study seems to provide clear evidence that “a music
program can enhance phonological awareness, in particular phonological awareness of large phonological units (e.g., rhyming, segmenting, and blending)” (Dege & Schwarzer, 2011, p. 6). The researchers further assert “the current results can be interpreted unequivocally in terms of an enhancing effect of the music training program on phonological awareness in preschoolers” (Dege & Schwarzer, 2011, p. 6).

**Kindermusik (2010).** Interest in the field of music and language development has led to the development of a new curriculum for young children. In 2010, Kindermusik published a curriculum for preschool children entitled *ABC Music and Me: Early Literacy and Language Curriculum.* The curriculum is designed for use in a preschool classroom setting by a preschool teacher, so musical expertise is not required. During 30-minute lessons based on monthly themes, the teacher leads the class through songs, rhymes, storybooks, dances and playing pitched and un-pitched instruments. All children can benefit from this curriculum and it has particular benefits for children with special needs.

**Plan for Implementation**

**Participants**

Speech-language pathologists working in elementary public schools in Pennsylvania were the participants for the study. In Pennsylvania, school districts are assigned to intermediate units (IUs), which are designated by size and geographic region. The twenty-nine IUs, were contacted by phone and email to participate in the study.

**Intermediate Units.** Nineteen IUs officially agreed to participate in the study by sending the link to the online survey tool to their SLPs. Sixty-one SLPs from across Pennsylvania started the online survey tool and 53 completed it. Within the survey tool, the question regarding the IU of employment was optional for SLPs to answer. Forty-seven SLPs indicated which IU they
were from and represented 14 IUs, yielding a 48% rate of participation from all of the IUs in Pennsylvania. Some IUs had more participation than others, which could have been effected by the amount of time SLPs had, interest in the study, or administrator support.

Speech-Language Professionals. Seventeen of 61 SLPs who responded were removed, leaving a total of 44 participants. Three screening questions placed at the beginning of the survey eliminated 13 SLPs due to: lack of contact with K-5 students, lack of contact with SSDs and working in private educational settings. Four additional SLPs were removed because they indicated that they did not encounter students with only SSDs. Forty-two participants indicated their IU of employ and represented 14 IUs. It should be noted that 26% of respondents were from a single IU.

Survey

An online survey was developed to answer the research questions posed in the study. In order to encourage participation from respondents, the researcher limited the survey to a length requiring approximately 30 minutes to complete. To develop survey questions, the researcher read extensively in the field of speech-language pathology to gain an understanding of speech-language terminology, speech-language disorders/impairments and types of interventions/treatments/approaches for said conditions. After building a working knowledge of the speech-language field, two professors of speech-language pathology were consulted about the validity, relevance and clarity of research questions.

Directions at the beginning of the survey asked SLPs to treat their responses to survey questions as a summary of their most used practices for K-5 students with speech sound disorders and no additional impairments in public school settings. Directions also indicated that data from private schools would not currently be analyzed so time was not needlessly spent by
SLPs working in private schools. To ensure that a person who did not work with the desired population of students did not complete a survey three screening questions requiring answers were placed at the beginning of the survey. An SLP who indicated working with populations other than K-5, who worked in private school settings or who did not encounter Speech Sound Disorders was automatically redirected to the end of the survey.

The survey tool was comprised of forced answer: one answer and multiple answers; and open-ended questions. However, only the screening questions required an answer to continue through the survey tool. The content of the survey tool was limited to questions regarding treatments of speech sound disorders, pertaining particularly to phonological processes. Demographic information, which included the IU number, was gathered so the researcher could track which IUs had responded to the survey. Other questions pertaining to years of experience and professional credentials were included in order to establish possible trends in practices among SLPs according to experience or credentialing. Respondents were asked to summarize their techniques and approaches from groups of responses in general, then by mode of assistance: kinesthetic, aural, oral, visual and musical. After each question pertaining to practice, there was a space where SLPs could write in additional methods. At the end of the survey, SLPs were asked questions about ways in which they felt musical techniques could be incorporated into a speech-language therapy session – and whether or not, if provided research-based musical techniques, they would try incorporating musical techniques. Respondents were also asked to provide contact information if they would be willing to be contacted in the future.

Based on the literature and discussions with practicing SLPs, intervention strategies could be known to SLPs by different names, although they could be the same technique. Therefore, each intervention strategy was given a short definition and/or example for the SLP to reference
when reading through the answer choices. This ensured that SLPs were all referring to the same intervention strategy using a consistent definition for the strategy. This also controlled for the event that an SLP did not recognize a given name for a strategy, but did recognize the methodology within the strategy name. Three of the larger categories taken from the textbook were also defined and explained.

Answer choices pertaining to treatment approach were derived from a combination of the most common techniques indicated in Baker and McLeod (2011a) as well as input from the two speech language professors with whom the researcher consulted. Other survey content, specifically the categories of Direct Speech Production Intervention Strategies, Speech Interventions in Broader Contexts and Interventions to Achieve Speech Movements and their answer choices listed in the section entitled “Commonly Used Intervention Strategies” was developed based on the categories listed in Williams, McLeod and McCauley (2010).

Within each category of intervention strategies, SLPs could select any strategy they employed from a list of possible options. Respondents could also write in additional strategies employed for all categories except: Direct Speech Production Intervention Strategies, Speech Interventions in Broader Contexts and Interventions to Achieve Speech Movements because those categories were taken from a list compiled by Williams, McLeod and McCauley (2010). Therefore, it was not deemed appropriate for SLPs to write in new answers to a “completed” list. Additionally, space was provided at the end for SLPs to write in any strategy that was not available to be selected throughout the survey tool.

The survey was reviewed by four SLPs who work or have worked in school settings with the targeted student population. Some changes were made to the survey based on the input from these SLPs. The three screening questions were made a requirement to complete the survey. The
responses from SLPs working in private schools were excluded for the final survey. It was not deemed appropriate to allow SLPs working in private school settings to answer questions at all – whether or not they were intended for use – so that only data relevant to the current survey was gathered. Additional answer choices including a job title as a “speech-language specialist” were added. Two additional questions regarding speech-language group size and composition were added.

**Approval.** The survey underwent two modes of approval before dissemination. First, Institutional Review Board (IRB) approval from the overseeing institution was attained. Next, the surveys were screened and approved by each IU. In January of 2013, the researcher attempted to contact each IU by phone first. Once contact had been made the researcher emailed a PDF version of the online survey for the IU to approve. Once the IU approved the survey content and study methods, the researcher sent an email and a link to the survey to the IU. The IU forwarded the email in its exact form to the SLPs under their employ. Each IU responded at its own rate and some had internal review procedures, which delayed an affirmative or negative response. With four days remaining in the study, the researcher emailed the IUs who had agreed to participate and requested a reminder be sent to participants to complete the survey. Data was analyzed quantitatively to yield a descriptive image of current practices in regards to the use of music in speech-language therapy in the public schools of Pennsylvania and the opinions toward the use of musical techniques held by SLPs.

**Limitations**

Limitations of the study include that the members of each IU could not be sorted by public or private status; or by elementary, middle or high school employment. The matter of public and private schools was controlled for by a screening question on the survey where
respondents indicated whether the school they represented was public or private. If respondents worked in public and private schools, they were asked not to include approaches used only in private school settings. To control for the grade level encountered, a screening question was included on the survey asking respondents to indicate grade levels they assisted and were only given Kindergarten, First, Second, Third, Fourth and Fifth grades as options. To control for treatment approaches used with students containing multiple disabilities or disabilities not pertaining to speech sound disorders, respondents were asked to indicate the types of speech disorders they encounter. Only the data from surveys in which respondents indicated the use of techniques with children with speech sound disorders in grades K-5 with no additional disabilities were considered for the study.

Additional limitations of the study include online completion, time of data collection and IU discretion. Given that the surveys were completed online rather than in person there is no way to be certain of the credentials of the person filling out the survey. The survey had to be completed within four weeks and if more time had been allotted more participants could have responded. Lastly, the IU had ultimate control over to whom the surveys were emailed and whether or not a reminder was sent to participants to complete the survey.

Results

Participants Attributes and Job Attributes

Sixty-five percent of respondents worked in a single school district; however, the average number of school districts for which services were provided was nearly two. It was more common to work in five or more school districts than in three or four school districts among the sample. Ninety-eight percent of respondents were female and two percent were male, which is very similar to the data collected in 2010 by the U.S. Census Bureau (2012), in which 96.3% of
those employed in the field were women. Many respondents held multiple certifications and a Master’s Degree in Speech-Language Pathology was the most indicated credential, followed by a Pennsylvania Teaching Certificate with a Bachelor’s in Speech-Language Pathology (see Figure 1). Seventy-four percent of respondents indicated that they were ASHA-certified (American Speech-Language-Hearing Association). Sixty-four percent of respondents had 10 or more years of experience in public educational settings. This result could have been impacted by the fact that the “10 or more years of experience” response option had widest range of possibilities as opposed to the other answer choices that were bound by three years. Overall, most participants had a Master’s Degree in Speech-Language Pathology, were ASHA-certified and had 10 or more years of experience.

**Figure 1: Additional SLP Credentials by Type of Credential**

<table>
<thead>
<tr>
<th>Type of Credential</th>
<th>Count</th>
<th>Count</th>
<th>Count</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>All SLPs with Master's Degree in SLP (35 in total)</td>
<td>35</td>
<td>19</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>All SLPs with PA Teaching Certificate &amp; Bachelor's Degree in SLP (25 in total)</td>
<td>19</td>
<td>25</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>All 22 SLPs with PA Licenses</td>
<td>19</td>
<td>18</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>All SLPs with Other* Credentials</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*Other responses included: Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP), PA Teaching Certification in Speech and Language, Master's Equivalency, and D.Ed.*
Research Question 1: What techniques do speech-language pathologists use to improve phonological awareness?

_Students in sessions._ All respondents worked in public educational settings and encountered K-5 students with only SSDs. However, students with only SSDs never constituted an SLPs entire caseload. Respondents in the study reported treating between 15 and 73 student for any speech impairment with a mean of 51 where, n = . The modes were 55 and 57, each with four occurrences. Barring overlap (two different SLPs treating the same student), SLPs in the study treated a total of 2,045 students with any speech impairment, with a median of 55 and a standard deviation of 14.14. This is similar to a finding from a survey conducted by ASHA of school-based SLPs in which the median caseload for SLPs who worked with ages of students in PA was 53. MEAN?

The number of students treated by an SLP for only SSDs ranged from 1 to 60 students, n = . The mode was 30 with 5 occurrences. Barring overlap, SLPs in the study treated a total of 807 students with only SSDs. The average number of K-5 students seen per week with only SSDs was 20 with a standard deviation of 13.98 and a median of 18. This finding was slightly lower than the mean for students with SSDs found among all grades, which was 23 (ASHA, 2006). In the present study, students with only SSDs account for 39% of an SLPs average caseload. The highest percentage of students with only SSDs reported within a caseload was 92% and the lowest was 2%.

Students with only SSDs in 4th grade were indicated slightly more frequently than other grades, while students in 5th grade were indicated the least. Fifty-one percent respondents indicated that the majority of their students with only SSDs have a small (3 or fewer) number of individual sound errors (see Figure 2). Articulation errors were slightly more prevalent than
phonological processing errors and a majority (86%) of respondents encountered both. Twelve percent of respondents treated only articulation errors and 2% treated only phonological processing errors (see Figure 3). Respondents who treated phonological processing errors were slightly more likely to treat articulation errors also (occurrence rate of 97%), whereas those who treated articulation errors were slightly less likely to treat phonological processing errors also (occurrence rate of 88%).

**Figure 2: Sound Errors in Students with only SSDS**
Time in sessions. Small groups comprised of students who all have a speech impairment was reported by 76% respondents. The majority (95%) of respondents reported working most commonly with students in pull-out settings, rather than classroom-based also known as “push-in” settings. Only four time allotments were reported in the study. The highest was 40 minutes and the lowest was 15 minutes. The average session time allotment was 29 minutes, however 86% of respondents reported allotments of 30 minutes. The most reported time frame for treatment was multiple times per week (48%), followed closely by once per week (45%) and cycles consisting of multiple sessions per 6 day cycle (7%). Respondents never indicated treating students every day (see Error! Reference source not found.). Based on the results, the most likely treatment scenario for respondents in the study was small groups comprised of students with speech impairments in a pull-out setting with approximately 30 minutes in each session that met more than once per week.

These findings are in line with some of the data found by Baker and McLeod (2011a) where the typical format of an intervention reported within a study was: a single SLP with a
single student meeting for 30- to 60- minutes sessions two to three times per week. The difference was that the current population worked with groups of students, a finding that is in line with a 2006 (ASHA, 2006) survey. In that study, group settings were twice as common nationally for every grade level, so group settings were disproportionate to national averages of all grade levels, however, group settings did predominate in the elementary settings.

Figure 4: Types of Students in a Session

Goals. SLPs were asked to state their most common long-term and short-term targeted outcomes/goals/objectives (these three terms were all applied here because they were deemed as interchangeable within the literature). Respondents were provided a list of long and short-term goals and there was also space to write in additional responses (see Figure 5). Speech production was the most indicated long-term goal. Phonological awareness ranked third of the five given answer choices. Conversational abilities and improving speech production within sentences were indicated most frequently for short-term goals with 13.3% of affirmative responses. The percentage of vowels correct was indicated the least among twelve given answer choices while percentage of consonants correct ranked in the top four of twelve given answer choices (see Figure 6).
Figure 5: Long-Term Goals

*Other consisted of functional communication and carryover.

Figure 6: Short-Term Goals

Interventions. The top categories of intervention strategies were determined by the average number of positive responses per answer choice elicited from participants. Table 1 depicts the most-used categories of intervention strategies and is sorted from the highest to lowest average. It also indicates the number of answer choices (strategies given) in each category and the combined total number of positive responses in the category. Table 2 depicts the top intervention strategy in each category (for a full list of the strategies and their selections see appendices).
The final section of the survey tool allowed participants to write in any intervention strategies that were not suggested as response sections of the survey tool. Two “additional” strategies were listed at the end of the survey, but both were considered to be part of the content of the survey. One was added into an intervention strategy (oral #8) and one was removed because the respondent had already indicated a variation of the strategy (oral #7) within the survey tool.

Finding similarities with previous research was difficult due to the number of strategies used in the current study, as well as other survey. There was overlap, but the only finding that seemed to be similar to previous research is that Minimal Pairs is commonly used SLPs (Baker & McLeod, 2011a).

Table 1: Average Number of Times a Strategy was Selected in a Category of Intervention Strategies

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Selections</th>
<th>Possible Strategies</th>
<th>*Avg Selection per Strategy</th>
<th># of SLPs indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention Type</td>
<td>Total Selections</td>
<td>Number of Strategies</td>
<td>Average per Strategy</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>------------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Oral Interventions</td>
<td>258</td>
<td>13</td>
<td>19.8</td>
<td>36</td>
</tr>
<tr>
<td>Visual Interventions</td>
<td>214</td>
<td>13</td>
<td>16.5</td>
<td>36</td>
</tr>
<tr>
<td>Onset-rime Awareness Interventions</td>
<td>77</td>
<td>5</td>
<td>15.4</td>
<td>30</td>
</tr>
<tr>
<td>Phonemic Awareness Interventions</td>
<td>164</td>
<td>11</td>
<td>14.9</td>
<td>35</td>
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<tr>
<td>Syllable-structure Awareness Interventions</td>
<td>74</td>
<td>5</td>
<td>14.8</td>
<td>30</td>
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<tr>
<td>Direct Speech Production Interventions</td>
<td>98</td>
<td>7</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Aural/Listening Interventions</td>
<td>179</td>
<td>14</td>
<td>12.8</td>
<td>36</td>
</tr>
<tr>
<td>Kinesthetic Interventions</td>
<td>169</td>
<td>14</td>
<td>12.1</td>
<td>35</td>
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<tr>
<td>Speech Interventions in Broader Contexts</td>
<td>119</td>
<td>12</td>
<td>9.9</td>
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<td>Technology-assisted Interventions</td>
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<td>Interventions for Achieving Speech Movements</td>
<td>10</td>
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<td>2.5</td>
<td>9</td>
</tr>
<tr>
<td><strong>Musical Interventions</strong></td>
<td><strong>23</strong></td>
<td><strong>11</strong></td>
<td><strong>2.1</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

*Average calculated by total selections divided by number of strategies given*
Research Question 2: How do speech-language pathologists incorporate music to improve phonological awareness?

As indicated in the previous results, music was not highly used among respondents. It was the least-selected category of intervention strategy; and the most-selected strategy within the category was also lower than any other top-selected strategy. Of the 44 participants, nine (20%) respondents indicated using at least one musical intervention in sessions with students. A total of 23 positive responses for any answer choice in the Musical Interventions Category were elicited (see Table 1). The highest number of musical interventions used by a single SLP was six out of the twelve strategies given. Overall, musical strategies that relied on rhythm, rather than pitch,
were the most commonly used strategies in sessions by the respondents. **Figure 7** depicts all strategies given and the times each strategy was selected by a respondent.

Eighty-nine percent of those who indicated using musical intervention had ASHA certification. The most positive responses to using music in sessions were elicited from SLPs with 10+ years of experience. However, the percentages indicated that SLPs with 1-3 years of experience incorporated music more frequently among their response group than those with 10+ years of experience (see Table 3). Every SLP who indicated using a musical technique had a Master’s Degree.

**Figure 7: Musical Strategies Used by SLPs in Sessions**
Table 3: Musical Techniques Used

<table>
<thead>
<tr>
<th>Years Experience</th>
<th>Number of Positive Responses</th>
<th>Percent of Positive Responses</th>
<th>Percent of SLPs with Positive Responses</th>
<th>Percent of these SLPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 Years</td>
<td>4</td>
<td>18%</td>
<td>22%</td>
<td>50%</td>
</tr>
<tr>
<td>4-6 Years</td>
<td>1</td>
<td>4%</td>
<td>11%</td>
<td>13%</td>
</tr>
<tr>
<td>7-9 Years</td>
<td>1</td>
<td>4%</td>
<td>11%</td>
<td>33%</td>
</tr>
<tr>
<td>10+ Years</td>
<td>17</td>
<td>74%</td>
<td>56%</td>
<td>19%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credentials</th>
<th>Number of Positive Responses</th>
<th>Percent of Positive Responses</th>
<th>Percent of SLPs with Positive Responses</th>
<th>Percent of these SLPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Degree in SLP</td>
<td>23</td>
<td>100%</td>
<td>100%</td>
<td>26%</td>
</tr>
<tr>
<td>Bachelor’s Degree in SLP and PA Teaching Certification</td>
<td>12</td>
<td>52%</td>
<td>56%</td>
<td>20%</td>
</tr>
<tr>
<td>Pennsylvania Licensure</td>
<td>17</td>
<td>74%</td>
<td>56%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Research Question 3: What opinions do speech-language pathologists hold about using musical techniques?

The same musical intervention strategy answer choices were presented to the participants later in the survey and participants were asked to indicate which of those strategies could be used effectively in a session. This time, 96 positive responses for suggested use were elicited (see Figure 8), as opposed to the 23 positive responses elicited for current use. The average response rate of a musical intervention for actual use was calculated at 2.1 positive responses per answer choice (see Table 1). Using the same formula, the average response rate for a musical intervention for suggested use was calculated at 8.5 positive responses per answer choice. Based on these findings it seems that SLPs are four times as likely to suggest a musical intervention, rather than use a musical intervention.

The majority (83%) of respondents indicated that if they were provided research-based musical intervention strategies to improve speech-language skills, they would be interested in using them. The most positive responses were elicited from those with 10+ years of experience and Master’s Degrees. However, the percentages seem to indicate that SLPs with 1-3 years of
experience are more open to using techniques and there was little percentage variation among credentialing, favoring those with Pennsylvania Licensures (see Table 4).

The percentage of SLPs who indicated using musical intervention strategies was skewed toward those with ASHA-certification. Twenty-six percent of the SLPs who were ASHA-certified did incorporate music, while only 9% of those without ASHA-certification indicated using musical techniques in sessions. Ten percent of the ASHA-certified respondents indicated that they would not use musical interventions if provided, while 28% of those who were not ASHA-certified indicated that they not use musical if provided. It seems that non-ASHA certified SLPs are nearly three times as likely to not use music or be open to trying musical interventions. Therefore, this finding seems to correlate ASHA-certification with the willingness to use musical intervention strategies.

Most respondents indicated that small group settings would be most appropriate for using musical interventions; and classroom-based settings were preferred over pull-out settings. Musical intervention strategies utilizing rhythmic activity, rather than tonal activity, were the most highly recommended among respondents. Seven respondents supplied usable responses for suggestions for using music to improve speech. However, many of the responses did not pertain to SSDs in particular and were broader in nature. Responses are summarized in Table 5.
Figure 8: Musical Intervention Strategies Suggested by Respondents

Table 4: SLPs willing to use Musical Intervention Strategies if Provided Techniques

<table>
<thead>
<tr>
<th>Years Experience</th>
<th>Number of Positive Responses</th>
<th>Percent of Positive Responses</th>
<th>Percent of these SLPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 Years</td>
<td>4</td>
<td>13%</td>
<td>100%</td>
</tr>
<tr>
<td>4-6 Years</td>
<td>6</td>
<td>20%</td>
<td>75%</td>
</tr>
<tr>
<td>7-9 Years</td>
<td>1</td>
<td>3%</td>
<td>33%</td>
</tr>
<tr>
<td>10+ Years</td>
<td>19</td>
<td>63%</td>
<td>70%</td>
</tr>
<tr>
<td>Credentials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master's Degree in SLP</td>
<td>26</td>
<td>87%</td>
<td>74%</td>
</tr>
<tr>
<td>Bachelor's Degree in SLP and PA Teaching Certification</td>
<td>19</td>
<td>63%</td>
<td>76%</td>
</tr>
<tr>
<td>Pennsylvania Licensure</td>
<td>17</td>
<td>57%</td>
<td>77%</td>
</tr>
</tbody>
</table>
Table 5: SLP’s Suggestions for Using Music to Improve Speech

1. Singing with stroke patients with aphasia and apraxia

2. CD of Silly Songs for Phonology & sound awareness from Thinking Publications

3. Rate of speech for fluency building and apraxia

4. Use for children with autism to improve language and attention

5. To achieve better word retrieval skills and phrase completions

6. Improve fluent speech

7. Sustaining specific sounds allows students to hear the sound longer so they can perceive it more accurately for children with articulation errors

Discussion

In 2006, the number of students with SSDs accounted for the highest mean total of students seen for speech-language nationwide (ASHA). In the present study this population constituted nearly 40% of SLP’s total caseload. This population of students is very large and attention should be paid to how their needs are being addressed.

This study sought to go beyond the methodology suggested for practice, to a major goal to discover the techniques SLPs were actively using in sessions with students. Speech-language pathologists often do not view the results from research as applicable to their own settings (Baker & McLeod, 2011b). In order to make the results relevant to a population of SLPs, the sample was greatly narrowed. All SLPs in the current study share a similar experience in that they work with at least one student with a speech sound disorder and no other impairment in a public school setting in PA. With fewer specifications on the sample more respondents could have participated, however, the results would not be as meaningful to the 91% of speech-language pathologists who treat students for SSDs nationwide (ASHA, 2006).
People may believe that students receiving services from SLPs are severely impaired, however students can receive services for a single sound error. In fact, SLPs reported that 30% of all students receiving treatment as mildly impaired, 45% as moderately impaired and only 21% as severely impaired (ASHA, 2006). The number of severely impaired students was further lowered to 16% for elementary settings (ASHA, 2006). Given the prevalence of students being treated for these conditions and the fact that the majority of treated cases are not severe, it is likely that these students will be in music classrooms. This likelihood is raised when one considers that 51% of SLPs in this study reported that their students had three or fewer individual sound errors, rather than global or more severe communicative impairments. Using these numbers, it can be estimated that nearly 20% of the students in this study (approximately 410 students) are being treated for three or fewer individual sound errors.

Speech impairments and disabilities present in many forms. Speech sound disorders were chosen for investigation for two reasons: 1. Prevalence among the student population and, 2. It was the researcher’s contention that music is most able to assist this population of students as it is currently being taught in the elementary music classroom. This is not to say that music teachers should become speech therapists. The assertion is that music teachers currently employ many of techniques that can improve speech-language skills without compromising musical learning. This sentiment is currently evidenced in the research of Dege and Schwarzer (2011) who found that using a basic music curriculum improved phonological awareness in preschoolers. The findings of this study seem to indicate that part of the reason that music instruction improves speech-language skills is because music teachers and SLPs may be using many of the same strategies, but with different terminology.
There was a particular strategy that led to the conclusion that SLPs may not define musical techniques in the same way as music educators. The use of animal or nonsense sounds was purposefully included in two categories. Under the heading of an “oral technique”, it was indicated 12 times by respondents; however, under the heading of a “musical technique”, it was only indicated twice. Additionally, more SLPs use animal or nonsense sounds (under the heading of “oral technique”) than would recommend the use of the technique under the “musical technique” heading. Given the fact that this strategy was indicated in the “oral” section and largely skipped over in the “musical” section, it is possible that SLPs read the heading of the section as “musical” and did not read the answer choices contained in the category. Other less likely explanations could be that SLPs felt that they had already indicated the technique once or that they did not agree with the casting of that particular technique as musical and, therefore, chose not to indicate it as such.

The use of musical intervention strategies would exceed the number of technology-assisted intervention strategies if the average number of positive responses per answer choice for the current use of music aligned with average positive responses per answer choice for suggested musical strategies. Musical strategies that relied on rhythm, rather than pitch, were most commonly used strategies in sessions by the respondents. Rhythmic strategies were also the most preferred. However, a reason why was not able to be determined from the present study. Speech-language pathologists may feel that rhythmic strategies are generally more effective than tonal strategies. Another possibility could be that SLPs do not feel confident using their singing voices to lead students or they may feel that the tonal element unnecessarily complicates the process and activities.

Although only 20% of SLPs in the study indicated using at least one musical strategy, the
majority (83%) of respondents were open to using research-based musical intervention strategies if provided. Perhaps SLPs do not have the time to locate the resources or the willingness to seek them out at all. However, it is also possible that some are using musical strategies, but are not aware of it. This finding of openness without incorporation could lend credence to the assertion that SLPs may not hold the same definition of a musical technique.

Based on the findings from this study, it is the researcher’s belief that SLPs are not fully aware of the musical underpinnings of their methodologies and music educators are not aware of the speech-language methodologies that they employ. There are many commonalities in the two approaches that both professions may not be aware of. For example, it is not surprising that the most common category of strategy used was the Oral techniques, receiving an average of 18.4 indications per option. What may be surprising to SLPs is that all of the 13 strategies indicated under oral techniques can also be found in many elementary classrooms. This is not to suggest that every oral technique listed in the survey has a musical underpinning, but that the techniques used by music educators have foundations in speech development.

Given this overlap, it is astonishing that there is not more teaming and collaboration between SLPs and elementary music teachers. This overlap also seems to indicate that both professions employ similar techniques, define them in different ways and seek similar outcomes. The term “similar” is used here because there is some overlap within the outcomes as well. Improving conversation skills was indicated the most among SLPs as a short-term goal for students. This tied with sentences and was followed in order of prevalence by improved words, accuracy of consonants improved syllables (phonemes). A music educator’s short-term goal may not be to improve speech skills used in conversation, however songs contain sentences and statements that need to be articulated with clarity. Music educators can target specific words in
sentences as well. Creating unified consonants and phonemes is also a common goal of a music educator. While it is not the music educator’s immediate goal that these skills be transferred outside of the music classroom, it is reasonable to believe that the sounds could be transferrable.

Music education may have something to offer the field of speech-language pathology to help improve practices within that field. Improved accuracy of vowels correct was indicated the least among SLPs in the study. This could be due to students being flagged more commonly for errors in consonants, or – more intriguingly – it could be a lack of knowledge about techniques to address these issues. The field of music education offers a myriad of strategies to address vowel formation and unification. It could be worthwhile to make SLPs aware of this knowledge and open a dialogue about incorporating techniques to improve vowels in their sessions with students.

As the study unfolded, it became apparent to the researcher that many of the practices used by SLPs in sessions commonly occur or could easily occur in an elementary music classroom. In total, SLPs were given 118 different techniques in the survey tool and 106 different techniques were indicated. Of the 106 different techniques used by SLPs in sessions with students, 81 (76%) were identified as having applications or a current presence in an elementary music classroom. Table 6 identifies the strategies identified by SLPs that the researcher believes are part current methods used by music educators or could be easily incorporated with little change to current practices. A list such as this should be made available to SLPs and music educators to help them understand the commonalities between the disciplines.

**Table 6: Intervention Strategies Indicated by SLPs that Could Also be Applied in the Elementary Music Classroom**

<table>
<thead>
<tr>
<th>Aural Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLP Model accurate production of target sounds - 33</td>
</tr>
<tr>
<td>Recordings of the child’s productions in error - 25</td>
</tr>
</tbody>
</table>
Recordings of the child’s correct productions - 25
Discrimination: Recognize same/different sounds - 21
Recordings of correct speech sounds - 14
Memory: Recall of sounds and sound patterns - 9
Alertness: Awareness and localization of sounds - 8
Use of speech buddy (typical student) - 7
Increased volume/Amplification of sound - 6
Perception: Comprehension of sounds heard - 6
Recordings of vocal music – 1

**Direct Speech Production Interventions**
- Minimal Pair Intervention: contrastive word pairs) - 29
- Stimulability Approach Intervention: stimulable and nonstimulable sounds are targeted) - 27
- Core Vocabulary Intervention: sound-by-sound and syllable-by-syllable dense response drill – 22

**Interventions for Achieving Speech Movements**
- Non-Speech Oral Motor Intervention: variable exercises depending on specific oral motor (OM) program, including bite-block and continuous positive airway pressure (CPAP) – 7

**Kinesthetic Interventions**
- SLP discusses how to physically create sounds - 33
- Student uses hands to move own face - 22
- SLP moves own face w hands - 20
- SLP moves student's face w hands - 16
- Low resistance blowing toys - 14
- Bodily movement connected to a sound - 12
- Materials and toys for play - 12
- SLP moves student's body - 11
- Bodily movements enacted by student - 11
- Materials for dramatizations – 4

**Musical**
- Student practices sentences in rhythm - 6
- Student practices phrases in rhythm - 4
- Student sings particular songs - 3
- Student practices phonemes in rhythm - 3
- Student sings phonemes - 2
- Students create animal or “nonsense” sounds - 2
- Students sings any song - 1
Students sings sentences on pitches - 1
Students listen to vocal music – 1

**Onset-rime Awareness Tasks**
Spoken word recognition - 28
Spoken rhyme generation - 24
Spoken rhyme detection or rhyme oddity task – 18

**Oral**
Student speaks sentences with SLP correction - 33
Student produces correct phonemes in isolation - 29
Student speaks phrases with SLP correction - 28
Student practices set of sentences aloud - 27
Student practices set of phrases aloud - 26
Student practices set of phonemes aloud - 25
Student speaks phrases, self-corrects errors - 23
Student speaks sentences, listens for errors - 21
Student generates sentences without SLP correction - 13
Student creates animal or "nonsense" sounds - 12
Student recreates incorrect sounds - 10
Student speaks phrases without SLP correction - 9
Student sings – 2

**Phonemic Awareness Tasks**
Phoneme isolation - 29
Phoneme matching - 25
Phoneme blending with words or non-words - 25
Phoneme segmentation with words or non-words - 23
Phoneme deletion/phoneme elision - 19
Alliteration awareness - 16
Phoneme completion - 14
Phoneme manipulation - 10

**Speech Interventions in Broader Contexts**
Metaphonological Intervention: emphasis on phonological awareness activities followed by production of contrasting sounds and minimally paired words – 22
Psycholinguistic Intervention: speech input, lexical representations, phonological, speech output - 17
Speech Perception Intervention: phonemic perception training - 15
Naturalistic Intervention for Speech Intelligibility and Speech Accuracy: recasts of child productions during naturalistic activities- 14
Family Friendly Intervention: involvement of parents in intervention via parent-as-
therapist, family-centered, and/or family practices - 5
Parents and Children Together (PACT) Intervention: parents/family education – 4
Nonlinear Phonological Intervention: constraint-based nonlinear approach targeting prosodic structures and segments by considering individual phonological units and interactions between phonological units - 2

**Syllable Structure Awareness Tasks**
- Syllable segmentation - 27
- Syllable deletion - 23
- Syllable completion – 17

**Technology**
- iPad or Other Tablet with pictures/games - 28
- Computer with pictures/games - 25
- Audio recordings - 19
- Video recordings - 12
- Amplification device - 9
- Audio recorder - 8
- Audiovisual recording equipment - 2

**Visual**
- Pictures of objects without text - 27
- Pictures of text - 26
- Pictures of text visually cued or highlighted - 20
- Pictures of sentences - 20
- Illustrated books - 20
- Pictures of phrases - 19
- Pictures of individual phonemes - 14
- Physical objects for the child to name - 12
- Other (mirror) - 2

**Conclusions**

Intervention strategies labeled as “musical” were the least incorporated category of strategies and SLPs were four times as likely to suggest a musical strategy than use a musical strategy. However, SLPs may not be aware of what constitutes a musical technique in music educator. The study found that SLPs are open to incorporating research-based musical techniques if provided. The SLPs in the study used techniques which incorporated rhythm more
often than tonal techniques. Rhythm techniques were also more suggested than tonal techniques. Speech-Language Pathologists indicated that musical techniques would be most effective in a group setting.

Although there were not many respondents in the categories for 1-3, 4-6 and 7-9 years of experience, percentages taken of the SLPs in those categories seem to indicate that SLPs with 1-3 years of experience, Pennsylvania Licensure and ASHA-certification are most open to trying musical techniques. Percentages of SLPs with 1-3 years of experience were also highest for incorporating music in sessions. Speech-Language Pathologists with Pennsylvania Licensure were slightly more open to using musical techniques if provided than those with other credentialing; however, SLPs with Master’s Degrees incorporated music more often. Speech-Language Pathologists with ASHA-certification were three times as likely to be willing to try research-based musical techniques and currently incorporate musical techniques.

**Implications for Future Research**

The results of this study demonstrate a need for further research in this area. Speech-Language Pathologists need to be made aware of what constitutes a musical technique. Literature should be published in the area of speech-language pathology that demonstrates the connections between the current practices of SLPs and elementary music educators. A survey listing intervention strategies in plain language, free of as much jargon as possible could be distributed to SLPs and music educators and the results could be compared. This type of research would hopefully spark a conversation between SLPs and music educators to discover how they can work together to help students improve. Research is being conducted in the area of collaboration between SLPs and classroom teachers. To facilitate conversations between SLPs and music
educators, research needs to be conducted in the area of collaboration between music educators and SLPs.

Investigations to discover the reasons SLPs do not prefer or use tonal techniques should be undertaken. Knowing that SLPs use and prefer techniques that incorporate rhythm over tonal strategies, techniques that rely heavily on rhythm could be developed using input from SLPs and research in the field of speech-language pathology. Finally, tools incorporating musical techniques should be disseminated to SLPs in order to begin to develop a body of research supporting musical techniques, thereby creating research-based musical techniques in the field of speech-language pathology.

Neither profession needs the other to survive and thrive, but perhaps speech-language pathology and music education are two disciplines that could mutually benefit from meaningful collaboration. Collaboration between the SLP and music educator could yield great results for all parties involved. Given the educational climate’s focus on literacy, music educators may do well to investigate connections between their practices and improvement in the “core” areas. Given the number of students in need of services and the, sometimes hefty, caseloads of SLPs, SLPs may do well to consider collaborating with other disciplines to provide additional support when students are outside of sessions. With the presence of so many commonalities between the fields it stands to reason that if techniques used in the music classroom can improve some speech-language tasks, the techniques used by the SLPs can improve students ability in some musical tasks. Therefore, collaborating is a win-win for SLPs, music educators and, most importantly, students.
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THE USE OF MUSICAL TECHNIQUES TO IMPROVE PHONOLOGICAL PROCESSES


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