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The Level of Engagement of Typically Developing Students versus Students Enrolled in Special
Education and Their Response to Teacher-led Music Instruction versus Technology-led Music
Instruction

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Northwestern College

An Action Research Project Presented
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Abstract

Technology comes in many forms and is more accessible than ever before. There are many notable benefits of using technology. However, there are also negative effects when used incorrectly or not in moderation. There are various views on when technology should be incorporated into a classroom, the types of classrooms and how early within the educational setting it should be used. Based on research gathered, technology should be used within the classroom to enhance learning, not replace face-to-face interactions or experiences. Music within the early childhood classroom is beneficial to all learners within the environment. There are various ways to supplement music instruction, some early childhood teachers are choosing to use an interactive whiteboard to display the video to the song they are teaching. The purpose of this research study is to observe 2 different classrooms that contain different groups of children (children that are typically developing compared to children that are currently enrolled in Special Education) and if they respond with different levels of engagement to face-to-face music instruction, compared to music instruction supplemented with technology. Results from this study concluded that both groups of children engaged at least one full song more on days that the instruction was face to face compared to the days instruction was supplemented.

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The Level of Engagement of Typically Developing Students versus Students Enrolled in Special Education and Their Response to Teacher-led Music Instruction versus Technology-led Music Instruction

Early Childhood programs often bring the vision of children playing, interacting with peers and teachers, all while learning about the world around them. Not much has changed through the years on the theory of how children learn. However, what has changed is the amount of technology that is used in classrooms to support learning. Based on a research study by Madureira Ferreira, Makinen and Souza Amorim play along with the interaction that happens with play are some of the most important experiences in order to promote positive development. Children with intellectual delays or global developmental delays, can participate and join peers at their own level and effectively contribute to the play scenario. This is most evident in an inclusive classroom where the classroom environment and materials can meet the needs of individual students at various levels of development (2016). This research supports how children develop and grow through interactions with adults, peers and their environments. Now is the best time to consider all of these factors when choosing technology and interactive media to use in the classroom, to ensure classrooms continue to focus on the importance of play.

Incorporating technology into the classroom can look very different from classroom to classroom, even within the same building. Some teachers that have been teaching for 10 or more years, may not have the knowledge of the most up-to-date programs or devices, while a teacher that is just finishing a program is required to take technology integration classes. Other things that might be considered are the accessibility of the most up-to-date technology due to funding. Programs may require frequent updates that can only happen at scheduled times, resulting in glitching or the technology being seen as unreliable. People have different perceptions on

technology in the classroom. There are some teachers that use it as a primary source for instruction. Others may only use it at designated times throughout the day and to supplement or build on a topic of instruction.

Children are experiencing technology as early as infants. It is readily accessible and is becoming more attainable financially. The most common devices for children at an early age are mobile devices, tablets or devices with touch screens. These types of devices do not require a high level of skill or understanding, so they can be used at an early age (Elkind, 2016).

However, it remains an individual choice on how it is used, incorporated or monitored.

Technology has a powerful influence on children and adults. Therefore, it is imperative for teachers to understand the implications of supplementing instruction with technology.

Technology has opened windows for children with communication delays and allowed them to communicate, to be actively engaged in the life of the class (Donahue & Schomberg, 2017).

Based on a study by Kersten, in order to successfully integrate technology supplemented instruction for music in an inclusion classroom, housing both students that are typically developing and children with various disabilities enrolled in Special Education, it depends on the individual readiness of each child in all developmental areas (2006). Music can be incorporated and taught in a variety of ways from using minimal materials, to enhancing it with technology and the use of an interactive whiteboard.

The hypothesis of the current study was assessing the difference between face to face imitation engagement and face to face imitation engagement supplemented with technology instruction. Differences by class were also explored (i.e. SPED, SPED Inclusion, Gen. Ed.).

Literature Review

In the year 2020, technology has become a staple in just about every household. The technological abilities and uses are readily increasing each-and-every day. Most adults, and even children can be found carrying some type, or multiple types of devices with them at all times (Parikh, 2012). Technology has become a fundamental part of a child or young adult's daily life. Technology is no longer primarily referring to televisions, computers or the software that goes with it. The 21st Century has many technological innovations that are becoming more accessible to the average person. Some examples are hand-held devices, cars that drive themselves, 3-Dimensional printers, drones, interactive televisions and many others, as the list seems infinite. Cable television is becoming a thing of the past, as the use of streaming subscriptions has increased. However, staying up to date with the latest technologies is becoming difficult (Nikolopoulou & Gialamas, 2015).

With the accessibility of technology, it is important parents make educated decisions on what type of technology and media use they put within their child's reach. Lerner's research suggests that screen time and use of media tools can be educational when the content, amount of use and child's intellectual ability are taken into consideration. There is very limited research available showing that children under the age of 2 with exposure to screen time, have enhanced development when compared to children that have not had screen time prior to age 2. Children learn from real-life experiences and the interactions taking place during the experience (2015).

There are various recommendations on screen time. The American Academy of Pediatrics suggests that children under the age of 2 years old do not have any amount of screen time. While children over the age of 2 have not more than 1-2 hours of screen time in total per

day. Children ages 2 years old to 5 years old within a half-day childcare setting should have no more 30 minutes screen time, and children in full day programs should have no more than one hour of screen time (2012). The small amount of learning that takes place for children under the age of 3 from screen time, is not easily transferrable into real-life situations. Excessive use of technology at an early age can have long-term negative effects which could include attention span, problems with self-regulation, difficulty with learning, obesity and disrupted sleep patterns (2016). By using devices to help a child to calm or soothe themselves, it may lead to delays in a variety of developmental skills later on in life, including social emotional behavioral skills, cognitive, language or social skills (Academy of Pediatrics, 2016).

Based on a study by Zhang, Tillman and An, sleep deprivation has become prevalent globally, with children and adolescents engaging in heavy media use while playing video games or watching videos (Zhang et al., 2017). Mitrophan, Paul and Spencer completed a study on aggression in children with television viewing and video game playing. They found when children watch television programs or play video games depicting negative or aggressive behavior, children often reenact the behavior observed, role play the character or have been noted to exhibit some of the characteristics observed for a short time after watching (2010).

Technology in the classroom comes with many benefits, along with challenges. There are different perceptions of whether or not technology in early childhood classrooms are seen as developmentally appropriate (Parette et al., 2009). In a study investigating teachers' perception of integrating technology into the classroom, there were 4 major barriers that were perceived. They were lack of funding, lack of technical and administrative support, teacher confidence in using technology, as well as inadequate training opportunities. (Nikolopoulou & Gialamas, 2015). Many teachers are given pre-service education on devices and technology and the ways it

can be incorporated into the classroom, along with the benefits that come with it. Once the technology is incorporated, the study found that there is not often means to keep the technology up-to-date, especially in smaller or private schools. The study also found that once teachers have it in their classrooms, there is often lack of support or continued education on how to further enhance what they are already doing and to incorporate new concepts with additional resources (Nikolopoulou et al., 2015).

Educators in the early childhood field need to be advocates for ensuring technology embedded into these settings is developmentally appropriate and that it follows suggested guidelines for screen time, taking into consideration the amount of screen time the child is receiving out of the childcare or early childhood classroom setting. Not only do teachers need to advocate to ensure proper implementation, but the need to advocate for professional development training so that they understand the importance of supplementing instruction to enrich learning, rather than replace teaching strategies. Teachers typically receive on-going professional development on state standards, federal guidelines, developmentally appropriate practices and evidence-based practices (Parette et al., 2010).

Based on a 5 -year longitudinal research study conducted by Donahue and Schomburg (2017), much of the use of any type of digital media used within the classroom setting, should incorporate academic/learning concepts, imagination, creativity and reflection. When media is used correctly, and in moderation, it can increase school readiness skills and help boost their social emotional skills. Successful integration of technology is not measured by the types or amount of technology being used, it is how it is being used to expand and build on learning that is taking place that is important (Donahue & Schomberg, 2017). It is vital the learning is enhanced with technology and not replacing the hands-on experiences children need to learn.

Technology may have more advantages and benefits than it does its challenges within the classroom. Technological advances have created bridges for children with disabilities to interact with peers, teachers and their environments through playing and communicating more than ever before. Augmentative devices, paired with appropriate applications, along with accommodations, modifications and adaptations can allow for learning opportunities that were not open to children with disabilities before (Lesar Judge, 2000). Now, children of all abilities can interact using the same tools. Technology has helped children with disabilities in many ways. Non-verbal children are able to communicate through augmentative devices that allow children to have voice output, it has given electric wheelchairs a way to be driven by a child that has limited motoric ability to be independent when moving from one place to another. Technology has given ways for many people with disabilities to become more independent in their activities of daily life.

In 1975, President Gerald Ford signed into law The Education for All Handicapped Children Act, also known as Public Law 94-142. This law would ensure that all children with disabilities received an appropriate education, as did their non-disabled peers. In 2004 The Education for All Handicapped Children Act became known as the Individuals with Disabilities Act (IDEA). This law was amended to include early intervention services, starting as early as birth for children showing significant delays or having a diagnosis of a disability known to hinder development. In December 2015, the act was once again amended and renamed the Every Student Succeeds Act. The overall purpose of this law, in addition to the amendments, is to ensure that all children with disabilities receive a Free Appropriate Public Education (FAPE). This means that children that are able to be educated with typically developing peers within a general education classroom, are placed in the classroom and given the necessary modifications, accommodations and modifications and related services within the classroom in order to be

successful. This is called the Least Restrictive Environment (LRE). When a child with a disability is impacted with a significant or severe disability and supplements and additional services cannot be implemented to make the child successful within the general education setting, it is then the child receives education and related services in an alternative classroom in order to ensure the child is receiving education in the most appropriate setting ("Individuals With," 2018). This act assures that to the maximum extent appropriate, children with varying disabilities are educated with non-disabled peers.

Based on a research study conducted by Hanson, Blakely, Dolata, Raulston & Machalicek (2014), young children that participate in a quality early childhood program exhibit positive outcomes with academic and social skills development. Through the experience children gain in a quality early childhood program, children learn from observation, interaction, explicit teaching and hands on experiences. These children typically have an easier time exhibiting self-regulation skills, social interaction skills such as interpreting social cues, reciprocal turn-taking, and impulse control. All children benefit from early social interaction and participating in play creates a strong foundation for development. Children with disabilities benefit from being educated within the same early childhood program, providing benefits to both the typically developing children and the children with disabilities (Hanson et al., 2014).

Children, both typically developing and children showing delays learn from interaction and joint attention, as young as birth. Children with Autism Spectrum (ASD) show delays in imitation and reciprocal interaction from a very young age. Imitation is the foundation for many types of developmental skills including communication, social interaction, appropriate play skills and functional skills (Cardon & Wilcox, 2011). Lacking strong imitation skills can often be indicative of a delay, which can also be an observable symptom of Autism. ASD is a social

communication disorder. Many concepts, especially social-interactional skills need to be explicitly taught in a one-on-one setting. There are specific strategies and therapy methods to help promote imitation, such as Applied Behavior Analysis (ABA) and Discrete Trial Training (DTT) (Eschenfelder & Gavalas, 2017). By applying different types of therapy, which can be done medically or through trained Early Intervention staff, children with ASD generally demonstrate significant gains in cognitive, communication (receptive, expressive and social), social skills and adaptive functioning (Nahmias et al., 2019).

In addition to ABA and DTT therapy, music strategies have been effective to promote engagement and academic growth within the inclusive classroom. Participating in music and related activities can promote language development, increase the ability to attend, listening skills, being able to express and identify emotions, math and literacy development and promoting creativity! Music within an inclusive classroom can stimulate different senses and allows children to engage at their various abilities. This creates a sense of autonomy and makes the children feel part of the classroom as a whole. They can come together through songs, finger plays, gross motor movements, social exchanges and reciprocal interactions (Vaiouli & Ogle, 2015). Within the classroom setting, the use of music and songs has been found as beneficial to allow children with ASD to participate and engage in a variety of daily routines, increasing interactions and bringing them to a different level, all while increasing their attending and communication skills (Simpson & Keen, 2011). Familiar songs promote a sense of predictability and routine for both typically developing students, as well as students that have delayed development. A routine that offers predictability will give a sense of familiarity, causing students to be more engaged and willing to participate.

Children with varying disabilities respond differently to different types of instruction. Music in an inclusive classroom where there is both general education and children enrolled in special education engages children at varying levels due to their individual needs and abilities. It allows them to feel a part of the classroom as a whole because they can engage to their ability. (Vaiouli & Ogle, 2015). Music can be taught through face-to-face instruction without the use of any materials. A teacher may incorporate minimal materials such as visuals, a cd playing the song, or musical instruments. It can also be taught by displaying a video on a large interactive screen for children to watch as they participate. Children can respond differently to the different types of instruction, based on their developmental skills. Observation of various children both typically and atypically developing, all of which have various developmental skill sets, paired with varied instruction to examine the response rate to imitation to see if one form of instruction is more beneficial for specific learners than another.

Not only does music ease transitions and increase interactions, but the single component of rhythm can be credited for boosting learning as well (Matthews et al., 2016). At an early age, many words and rote academic skills, such as counting or reciting the alphabet are taught through rhythmic patterns and chants. Body language used in certain rhythmic ways can convey messages to others and can be interpreted differently based on cultural background. Children learn best when they can discover a rhythmic component to tasks like sequencing, patterning or being able to coordinate movement. Using music and rhythm has also proven to support literacy and reading skills. It is up to individual teachers to determine when music and rhythm can be incorporated into learning activities and classroom routines (Matthews et al., 2016).

When rhythm and beat synchronization are embedded, it stimulates neurological processes. Children that struggle to find rhythm or beat, often tend to be the same children with

cognitive or developmental delays. By creating these opportunities in the classroom, it naturally lends itself to increase neurological processing, in turn increasing the ability to self-regulate (Williams, 2018).

Music can be incorporated in a variety of ways in a preschool classroom. It can be used for transitions, chants to help memorize academic information, teach an educational concept, motivate and reinforce behaviors and increase vocabulary concepts. The actual concept of music itself can teach children about sounds, sound patterns, rhythm, harmony and culturally diverse concepts such as different languages and cultural stories (Nichols & Honig, 1997). Many early childhood teachers designate a specified part of their schedule to have music instruction. Many educators can be seen incorporating various types of technology to support or enhance learning opportunities throughout the day.

Incorporating successful use of technology in music depends on the readiness of each individual child. Some of the benefits of incorporating an interactive white board to supplement music instruction include different reinforcements for different children, providing visual, auditory and tactile opportunities to be incorporated. It can also be used to expand knowledge on various cultures and types of music, allowing children to experience realistic experiences (Kersten, et al., 2006). Additional skills that can be addressed during this time are interaction with the adult, interactions with peers, cause and effect, wait time and turn taking.

Methods

Participants

The participants in this study are from 2 different variations of classrooms. One classroom is a self-contained classroom with 8 students all enrolled in Special Education and receiving services on an IEP (referred to as SPED in Table 1 and Figure 1), led by an Early Childhood Special Education (ECSE) Teacher and supported with 2 Special Education Paraprofessional. This classroom has 4 different languages present, including: English (4), Spanish (2), French (1), Amharic (1), with 3 girls and 5 boys. The other classroom is an Early Childhood Family Education (ECFE) inclusion classroom, with 8 general education students (referred to as Gen Ed in Table 1 and Figure 1) and 8 students enrolled in Part B (3 to 5-year-old) Special Education and are receiving services as stated on an Individualized Education Program (referred to as SPED inclusion in Table 1 and Figure 1). This class is co-taught by a general education ECFE teacher and an ECSE teacher, with the support of 1 ECFE paraprofessional and one ECSE paraprofessional. This is a diverse classroom where most of the students are second-language-learners, consisting of 7 different Native languages, including: English (4), Spanish (4), French (2), Denka (1), Karen (3), Karenni (1) and Pohnpeian(1). There are 9 girls and 6 boys.

The children enrolled in Special Education qualify under a variety of disabilities. Cumulatively, there are 6 children under the category of Autism Spectrum Disorder, 3 children under the category of Physical Impairment, 2 children under the category of Developmental Cognitive Disability, 1 child under the category of Other Health Impairment and 4 under the category of Developmental Delay. Of these students, 10 have been receiving services for at least 2 years, 4 have been receiving services for at least one year and the other 2 have recently qualified for services and this is their first school experience.

Out of the children that are served under general education, at least 50% have had previous preschool or daycare experience. The general education teacher and paraprofessional have been a classroom team for 4 years. This is their first experience. The special education co-teacher and paraprofessional have been in the education field for approximately 12 years and a classroom team for 3 years. The special education teacher in the self-contained classroom has been teaching for 15 years, and both paraprofessionals are new to education and the team this year.

Measures

The measure for this study is engagement. Observation is used to obtain a number through a tally system. Once the observations are complete, tallies are used to create a chart of the children participating and children who are not participating in targeted behaviors. Target behaviors are defined as actively engaging and participating in music, songs, word plays by using vocalizations, actions or gross motor movements.

Procedures

The data analysis used in this research is quantitative. Observation is used to obtain a number through a tally system. Once the observations are complete, tallies are used to create a chart of the children participating and children who are not participating in targeted behaviors. Target behaviors are defined as actively engaging and participating in music, songs, word plays by using vocalizations, actions or gross motor movements.

The data collected will be specifically looking at children enrolled in special education in both teacher-led and technology- led instruction and tallying the amount of imitation and social interactions taking place during each type of instruction. Both comparative analysis and content analysis techniques will be used. Data gathered will be compared for both imitation and social interaction of the general education students to the children enrolled in special education, in addition to comparing in both types of instructional settings.

Over 4 weeks of varied instruction, data was gathered through the use of observation. Data sheets were organized with a visual representation of the large area rug used in each classroom for large group instruction. Each student in the classroom had an assigned spot on the rug, so seating was consistent throughout the study. In addition to qualitative data, quantitative data was collected throughout the study. When a child was observed to participate (i.e. imitating actions, singing along, engaging in finger plays), a tally mark was placed in the corresponding square where the student was seated. Data was collected on 5 songs each day. Both the Resource Room and the Inclusion classroom used the same set of 5 songs for weeks 1 and 2 and another set of 5 songs for weeks 3 and 4.

On Monday, Tuesday and Wednesday instructors taught the songs without the use of technology (i.e. Ipads, screens, interactive white boards). Instruction included the use of a cd

player and/or hand-held manipulatives. On Thursday, the same songs were supplemented with the use of an interactive white board and displayed a video to accompany the song. The instructor was located in front of the board, modeling the same actions that were taught on face-to-face instructional days.

Question 1- Is there a difference in preschool students' imitation skills between teacher-led and technology-led music instruction? The independent variables are teacher-led music instruction and technology-led music instruction. The dependent variable is imitation skills. The data collected will be a tally for each student observed engaging in imitation. Both comparative analysis and content analysis techniques will be used. I will compare the teacher-led with the technology-led imitations and chart to analyze the content.

Question 2- Is there a difference in preschool students' social interaction (eye contact, interaction between peers) between teacher-led and technology-led music instruction? The independent variables are teacher-led music instruction and technology-led music instruction. The dependent variable is social interaction. The data collected will be a tally for each student observed engaging in the defined social interaction. Both comparative analysis and content analysis techniques will be used. Comparison data of social interactions taking place during the teacher-led and technology-led instruction and charted to analyze the content.

Question 3- Do children on IEPs have different responses to teacher-led and technology-led music instruction than their regular education peers? The independent variables are teacher-led music instruction and technology-led music instruction with general education students. The dependent variables are imitation skills and social interaction.

Results

The hypothesis of the current study was assessing the difference between face to face imitation engagement and face to face imitation engagement supplemented with technology instruction. Differences by class were also explored (i.e. SPED, SPED Inclusion, Gen. Ed.).

There were statistically significant differences in engagement by whether they were exposed to technology ($M = 2.31$, $SD = 0.65$) or not exposed to technology ($M = 3.26$, $SD = 0.51$), with large effect size, $t(23) = -7.86$, $p < .05$, $d = 1.61$.

There were marginally statistically significant differences in engagement when not exposed to technology by whether they were in SPED, SPED inclusion, and Gen Ed with large effect size, $F(2,21) = 3.43$, $p < .05$, $\eta^2 = .25$. See Table 1 for means and standard deviations. Post hoc analysis revealed marginal significant differences between SPED and SPED inclusion but not significant differences with Gen Ed.

There were no statistically significant differences in engagement when exposed to technology by whether they were in SPED, SPED inclusion, and Gen Ed with small effect size, $F(2,21) = 0.36$, $p > .05$, $\eta^2 = .03$. See Table 1 for means and standard deviations.

Table 1

Means and Standard Deviations for Engagement by Technology Use and Class

	Technology		No Technology	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SPED ($n = 8$)	2.47	.95	3.61	.47
SPED Inclusion ($n = 8$)	2.19	.32	3.02	.41
Gen Ed($n = 8$)	2.29	.59	3.17	.51

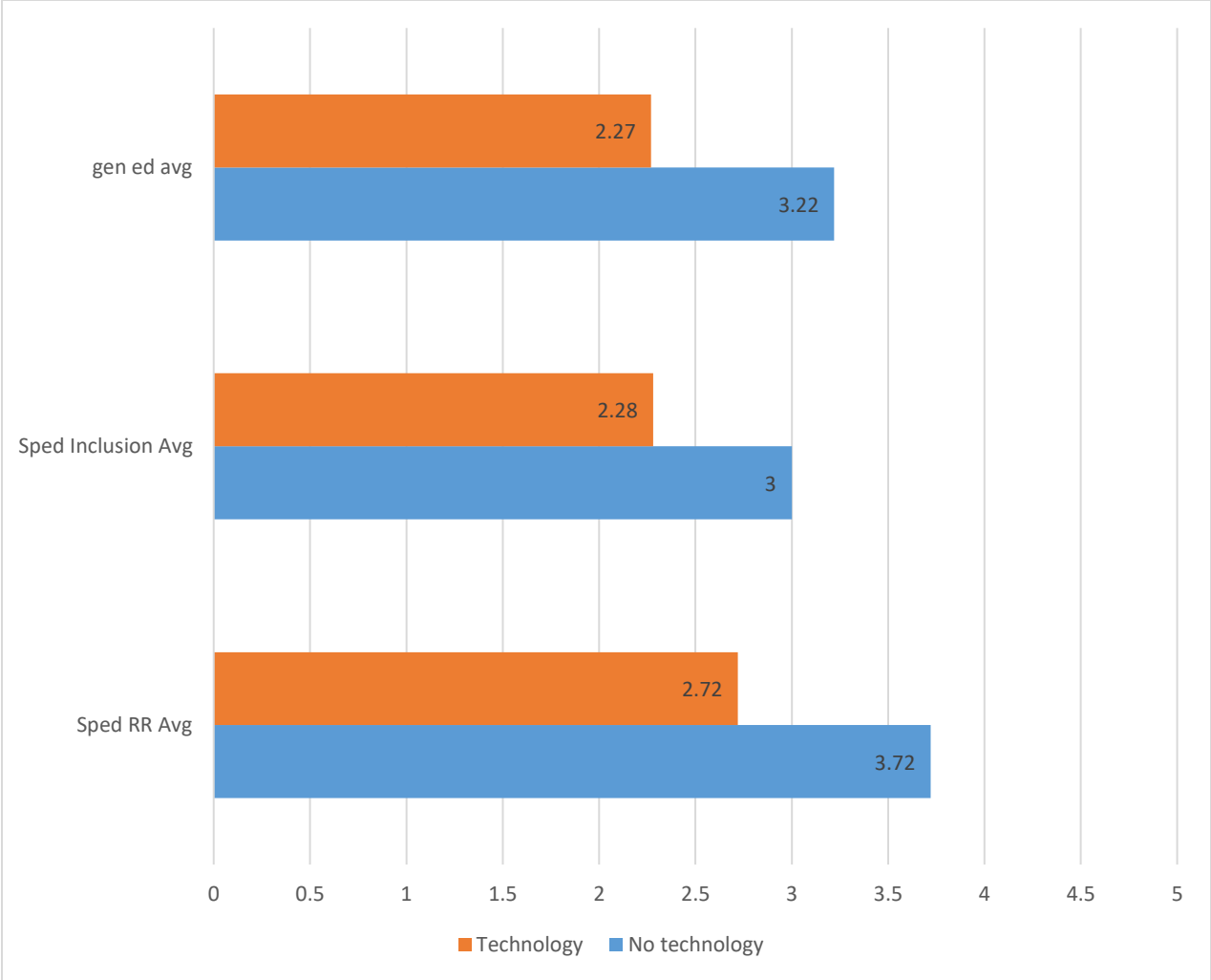


Figure 1. The average number of songs participated in by students ($N = 24$).

Discussion

Summary of Major Findings

As noted in Table 1, student participation varied each day. It is noted that the students enrolled in special education seldomly had full attendance. This is reflective of the increased amount of illnesses schools are seeing, in addition to the services a student may be receiving from a related service provider. Music instruction is not considered ‘core instruction’ and is seen as an acceptable time for the child to be pulled to receive necessary services such as Speech Therapy, Occupational Therapy or Physical Therapy.

Based on the quantitative data, it does not appear there is a large discrepancy between the amount of participation of general education peers to peers enrolled in special education. However, there is a noted decrease in the amount of participation when the instruction is supplemented with technology, see Figure 1.

Limitations of the Study

There are variable factors that can be taken into consideration for limitations of the study. This study involves children with various disabilities. There are disabilities, such as Autism Spectrum Disorder (ASD) that have implications for the inability to imitate spontaneously. Imitation is typically taught through Applied Behavior Analysis or Discrete Trial Training. Not all students that qualify under the category of ASD have participated in this type of therapy prior to the study. In addition to ASD, there are 2 children who have experienced these therapy types in the study. There are also 2 children with physical limitations included in the study. Both of these children have Cerebral Palsy and use a wheelchair to move within their environment. They both require one-on-one assistance to participate in most activities, due to muscle tightness, fatigue and mobility limitations.

In addition to varied disabilities there are children from diverse backgrounds, most of which are learning English as a second language. In this study there are 8 different native languages, other than English. It is unknown how long the children have been exposed to the English language. However, it is known that this is their first school exposure since living in the country.

Another factor to consider is the fidelity of how the music instruction was implemented. Each teacher was not specifically instructed on the way to implement each of the songs, finger plays, or poems, but rather that the song/activity was the same. This allowed for individual interpretation and inconsistently between the two environments in which the observations took place.

The familiarity of the songs to the children is also something that is noted. At the beginning of the 2-week implementation of the songs, students did not participate as much as they did on the second week of data collection. It appears the more exposure they had to the song, the more familiar they were with the song and the actions that went with it, and they were more likely to participate.

One of the biggest limitations of this study was the increase in illnesses seen with staff and students. When looking at the absences of students, there were days that were at a 65% attendance rate. This decreases the ability for positive peer role models for students, in addition to overall decreased peer interaction. When staff was absent, there were variables such as placing an unfamiliar adult within the classroom, in addition to the adult being unfamiliar with routine and implementation of lessons. There were also cases that the teacher was absent, and the position went unfilled with a substitute, therefore causing the classroom to operate short-staffed. Again, causing the classroom inconsistent instruction.

Further Study

This study would be beneficial to further look at the impact of the types of technology used with music instruction to see if there are any positive impacts, if the technology type differed, rather than using a Smartboard to merely display a video of the song or word play being taught.

Conclusion

Results of the study indicated that on days students participated in face-to-face instruction, the entire student population were observed to participate an average of 1 full song more than on the days instruction was supplemented with technology. On days instruction was supplemented with technology, student participation varied greatly.

Based on information gathered through research completed and the findings of this study, technology implications need to be taken into serious consideration. When determining the type of technology, it is important to remember that technology should be used to enhance the learning, rather than to replace the face-to-face interaction. Based on information gathered from this study, future teaching practices for music instruction may benefit from removing technology that may be used, unless used to present a video of types of music around the world, expanding knowledge of different types of instruments and music types. However, displaying a video that accompanies a song has been observed in this study to not be engaging or beneficial to the learner by enhancing a concept.

Technology may be considered more beneficial in other areas of learning such as literacy or math where the learning can be interactive and engaging. These different curriculum areas can naturally embed and reinforce learned skills and concepts.

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