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"Perceptions Of Applying Universal Design for Learning to Quaver's Marvelous World of Music to Increase Engagement of Students with Autism."

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by

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PERCEPTIONS OF APPLYING UNIVERSAL DESIGN FOR LEARNING TO QUAVER'S MARVELOUS WORLD OF MUSIC TO INCREASE ENGAGEMENT OF STUDENTS WITH AUTISM.

By

Whitney Mansell

Liberty University

A Dissertation Presented in Partial Fulfillment of the Requirements for the Degree

Doctor Of Music Education

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APPROVED BY:

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Abstract

The prevalence of students with autism is rising in elementary schools across the United States. General music teachers have been tasked with including students with autism spectrum disorder (ASD) in the elementary music classroom but have had minimal training on the topic. This educational applied research study measured the perceived effectiveness of applying universal design of learning principles (UDL) to *Quaver's Marvelous World of Music* curriculum to increase the engagement of students with ASD in elementary music classrooms. Directed by Howard Gardner's theory of Multiple Intelligence, this applied research study produced quantitative data showing increased engagement using UDL with *Quaver's* curriculum and qualitative data from personal interviews with music educators that UDL promotes engagement, expression, and inclusion. Perspectives on positive outcomes in communication, social interactions, and joint attention growth of students with ASD participating in music education emerged through exploring literature, personal interviews, and quantitative data. The data showed the strengths and weaknesses of applying UDL to *Quaver's* curriculum. Largely, the study demonstrated that applying UDL to *Quaver's Marvelous World of Music* curriculum created an inclusive classroom environment for students with ASD. The results of this study showed a perceived increase in positive engagement, social skills, communication, and joint attention among students with ASD in the music classroom. The study benefited general music teachers by showing the effectiveness of applying UDL to *Quaver's* curriculum.

Keywords: general music classroom, autism, *Quaver* Marvelous World of Music, UDL, engagement, accommodations, modifications, curriculum, inclusion.

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I dedicate this to my mother, Sabra Callan. She always supported any of my dreams and goals. Alzheimer's may have taken your memories from you, but I will always remember what an amazing mother you are.

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List of Abbreviations

ASD - Autism Spectrum Disorder

CAST - Center for Applied Special Technology

CDC- Centers for Disease Control and Prevention

DVD- Digital Video Disk

EBP- Evidence Based Practice

EHA–Education for All Handicapped Children

ESEA–Elementary and Secondary Education Act

ESL- English as a Second Language

FAPE–Free and Appropriate Public Education

IDEA–Individuals with Disabilities Education Act

IEP–Individual Education Plan

LRE–Least Restrictive Environment

NCAS–National Core Art Standards

MIT–Theory of Multiple Intelligences

MLT- Music Learning Theory

TA- Thematic Analysis

UDL - Universal Design for Learning

Chapter 1: Introduction

There is an increase in the occurrence of autism spectrum disorder (ASD) among children in schools across the United States.[1] This increase is present in general music classrooms. Many music teachers are inadequately prepared to instruct students with ASD.[2] Music curricula sometimes provide suggestions for teaching students with special needs but not specifically for students with ASD. Music teachers lack support in implementing the curriculum effectively to positively engage students with ASD in the music classroom. Universal Design for Learning (UDL) framework is exceptionally supportive in designing instruction for students with ASD.[3] Quaver's Marvelous World of Music curriculum suggests applying the Universal Design for Learning (UDL) framework when teaching but provides no research or support for the effectiveness of UDL. Therefore, this study aimed to determine the effectiveness of applying UDL to Quaver's Marvelous World of Music curriculum to engage students with autism in the general music classroom positively.

Background

Music education should be accessible to every child, ensuring equal learning, engagement, and participation opportunities. Music can provide an emotional outlet, social connection, and cognitive growth. All children are individuals, and not one child learns in the same way. It is important that teachers prepare their lessons and assessments, acknowledging

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[1] L. A. Sealey et al., "Environmental Factors in the Development of Autism Spectrum Disorders," *Environment International* 88 (2016), 288-298. doi:https://doi-org.ezproxy.liberty.edu/10.1016/j.envint.2015.12.021.

[2] Amalia Allan, "Understanding and Teaching Students with Autism in Music Education Settings," Music in a Minuet, NAfME, last modified July 15, 2021, https://nafme.org/understanding-and-teaching-students-with-autism-in-music-education-settings/

[3] Sharon M. Malley, "Students with Disabilities and the Core Arts Standards Guiding Principles for Teachers," The Kennedy Center, National Core Arts Standards, 2014, https://www.nationalartsstandards.org/sites/default/files/Guiding%20Principles%20for%20Inclusion.pdf

that not all students learn or demonstrate mastery in the same way.[4] Valuing the uniqueness and diversity in every student will provide a more inclusive education for all students.

Attitudes, ethics, and research have changed since the 1800s and 1900s. To understand why it is essential to deliver music lessons that are accessible to all students, a foundation of educational history and educational laws needs to be understood. It is also important to understand how the American Disabilities Act (ADA) influenced equality in physical structures and educational structures and the creation of universal design.

Universal design for learning (UDL) provides a solid framework to provide opportunities for all students to learn, engage, and access music education. Teachers developing an understanding of UDL will help create adaptable learning environments, teaching, and assessments that adapt to individual learning differences. The principals of UDL will help teachers develop programs that address each learner's difference from the beginning of the lesson rather than making accommodations and modifications to the lessons.[5] Applying the backward design process with UDL in a music classroom will help teachers create an engaging learning environment for all students to achieve their goals.[6]

The Centers for Disease Control and Prevention (CDC) report the prevalence of autism has increased over the past 20 years, and more students with autism are in the classroom.[7] Teachers need to be aware, prepared, and able to teach to students with a wide variety of sensory,

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[4] Alice-Ann Darrow and Mary Adamek, "Instructional Strategies for the Inclusive Music Classroom," *General Music Today* 31, no. 3 (Apr, 2018): 61-65, https://journals.sagepub.com/doi/full/10.1177/1048371318756625.

[5] Judith A. Jellison, *Including Everyone* (Oxford: Oxford University Press, 2015), 232, VitalSource.

[6] Jay McTighe and Judy Willis, *Upgrade Your Teaching: Understanding by Design Meets Neuroscience* (Alexandria: Association for Supervision & Curriculum Development, 2019), 151, ProQuest.

[7] "Data & Statistics on Autism Spectrum Disorder," Autism and Development Disabilities Monitoring (ADDM) Network, CDC, last modified April 4, 2023, https://www.cdc.gov/ncbddd/autism/data.html.

social, and cognitive needs. Each student with autism will react in a multitude of ways to external stimuli. Preparing lessons that allow students to learn the same topic but with different approaches will help include students with autism and any student that participates in a classroom that provides an active, engaging, an adaptive learning environment.

Quaver Curriculum

Quaver's Marvelous World of Music is a web-based music curriculum that is available with a paid membership. In 2009, Dr. David V. Mastran and Graham Hepburn established Quaver Music.[8] The two founders have a shared passion for innovative ways of teaching music to children. Initially named the "Mastran Music Group," David and Graham began arranging music and collaborating on educational resources for children. Eventually, the program developed into a set of educational DVDs with two hours of online lesson support called "Quaver's Marvelous World of Music." In 2011, the DVD set, and lessons earned a gold star from "Parents' Choice," a non-profit organization recognizing high-quality children's products.[9]

Quaver's Marvelous World of Music has now expanded into other areas of education. QuaverEd is the title of the website. It now includes physical education, social-emotional learning, PreK, and music. The music curriculum is in line with the National Core Art Standards and UDL principles. It also supports a variety of pedagogies for instruction, including Orff, Kodaly themed, and Music Learning Theory (MLT). All the curriculum is standards-based but acknowledges the element of fun within the lessons to create engaging, entertaining, and student-

[8] Robert A. Doughty, *Strength and Drive: The West Point Class of 1965* (Bloomington, IN: Authorhouse, 2014), 344-345.

[9] Lahri Bond, "Quaver's Marvelous World of Music DVD Set, Gold Award,", Parents Choice Foundation, 2011, http://www.parents-choice.org/product.cfm?product_id=29670&StepNum=1&award=aw.

centered lessons.[10]

Quaver's music curriculum has created 36 weeks of lesson plans for PreK to eighth-grade general music. The program includes over 1,200 songs, 225 ready-to-use lessons, and over 6,500 interactive screens for learning and practice. Teachers can structure large group activities, small group, paired, or individual lessons. The presentation of music lessons includes auditory, visual, and tactile senses. Students can access printable scores, listening maps, and digital instruments. Many digital aspects adjust to help make learning accessible and aligned with sensory input needs. The program strives to comply with the Federal Rehabilitation Act, Section 508, and is accessible to all persons with disabilities.

The power of music is used to connect with students. It's easy to implement Universal Design for Learning (UDL) principles and framework in Quaver as it provides representation, expression, and engagement options that cater to every learner's needs. The curriculum does not provide step-by-step guidance on implementing Universal Design for Learning but recognizes and recommends using the approach to help educate all students. They believe that by applying UDL to their curriculum, all students can engage with the lessons presented in multiple learning styles. The mission of Quaver's Marvelous World of Music is to "enrich the lives of children."[11]

Statement of the Problem

Because of the lack of music curriculums tailored to students with autism, music teachers may not have the knowledge to support the unique needs of students with ASD in their classrooms. The Centers for Disease Control and Prevention has reported that autism prevalence

[10] Bond, "Quaver."

[11] "Quaver's Marvelous World of Music," Music, QuaverEd, last modified 2023, https://www.quavered.com/music/.

is increasing, affecting a more substantial number of students with autism.[12] Many of these students are mainstreamed and included in the general classroom, and general music teachers teach all students from the general education classroom. The literature stated that even with current research and publications, many elementary music teachers lack training in accommodating and modifying pedagogy specifically for students with ASD.[13] Music curricula offer suggestions and examples of modifications for students with special needs. However, the research has not addressed if applying UDL to *Quaver's* music curriculum is helpful for students with autism.[14]

Several significant laws were implemented from 1965 to 1975, and as a result, disabled students today have equal access to funding, protection, and opportunities in schools.[15] In 1965, the Elementary and Secondary Education Act (ESEA) was established to provide funding for public schools. It regulates funding, ensures that schools are accountable, and offers equal education for all students. In 1975, the Education for All Handicapped Children (EHA) became law, and later, in 2004, it changed its name to the Individuals with Disabilities Education Act (IDEA). The law ensured that millions of disabled children were not left out of school due to their disabilities. These laws are critical in ensuring a free appropriate public education (FAPE) in the least restrictive environment (LRE). The laws influence publishers, educators,

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[12] Matthew J. Maenner et al., "Prevalence and Characteristics of Autism Spectrum Disorder among Children Aged 8 Years - Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2018," *MMWR. Surveillance Summaries* 70, no. 11 (Dec 3, 2021): 1-16. https://www.ncbi.nlm.nih.gov/pubmed/34855725.

[13] Ryan Hourigan and Amy Hourigan, "Teaching Students with Autism Spectrum Disorder: Understanding and Perspectives," *General Music Today* 96, no. 1 (2009): 40, https://journals.sagepub.com/doi/10.1177/0027432109341370.

[14] Alexandra L. Ferro, "Music and Autism Spectrum Disorder Possible Effects on the Autistic Mind" (MA Theses, Liberty University, 2021), 76.

[15] Jean B. Crockett, "Legal Aspects of Teaching Music Students with Disabilities," *Music Educators Journal* 104, no. 2 (2017): 45-50, https://doi.org/10.1177/0027432117712802.

administrations, and curriculums to create or acknowledge the need for accommodations and modifications for inclusion.[16]

Many books, articles, and research provide a wide variety of interventions and suggestions for teaching music to students with autism. However, many music curricula do not provide these suggestions within the written curriculum. Teachers must research independently to apply interventions and evidence-based strategies to include students with ASD in the music classroom. Students with autism have various symptoms that affect how they learn in a regular classroom environment. Awareness, accommodations, and modifications to a classroom can help students with autism participate with success. Teachers can support students with evidence-based accommodations and modifications if they understand the specific needs of a student with autism.

Purpose Statement

The purpose of this applied research study is to measure the perceived effectiveness of applying UDL to Quaver's Marvelous World of Music curriculum to positively engage and support students with ASD in the general music classroom. This study includes both qualitative and quantitative data collection approaches. The first approach was semi-structured interviews with seven participants from the various military-connected schools with overseas posts dedicated to teaching students of US military or civilian dependents. Each participant is familiar with the NCAS and Quaver's Marvelous World of Music curriculum and has implemented both for at least two years. The second approach is a Likert-scale questionnaire with the same teachers. The questionnaires were administered using Microsoft Forms, a web-based platform hosted by Microsoft and supported by Liberty University. In the third approach, the researcher

[16] Crockett, "Legal," 45.

investigated books, literature, and peer-reviewed publications. The literature reviewed the historical aspects of the problem, how the problem has evolved over time, the causes of the problem, solutions to the problem, and what the literature says about the problem. The researcher also sought to present factors that support applying UDL when teaching students with autism, understand the benefits of different music pedagogical approaches when teaching students with autism, and using technology to engage students with autism. All this to support the hypothesis that applying UDL to the Quaver music curriculum will benefit students with ASD in the music classroom.

Research Questions

Kodaly states, "Real art is one of the most powerful forces in the rise of mankind, and he who renders it accessible to as many people as possible is a benefactor of humanity."[17] The educational philosophy of UDL is exceptionally supportive of students with ASD, and research has shown that full inclusion of students with autism can benefit their communicative, social, and joint attention development.[18] Both NCAS and *Quaver* curricula strive to make music lessons accessible to all students, but the knowledge of applying the curriculum is not clear. This leads the researcher to seek positive outcomes for the presented research questions.

This study seeks to answer the following questions:

Research Question One: How can applying the UDL principles help modify the *Quaver Wonderful World of Music* curriculum to accommodate the sensory, communicative, and joint attention needs of students with ASD?

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[17] Zoltán Kodály, *The Selected Writings of Zoltán Kodály*, ed. Bónis Ferenc (London: Boosey & Hawkes, 1974), 175.

[18] Malley, "Students with Disabilities."

Research Question Two: Is there a significant difference in social interaction, communication, and joint attention in music class among students with ASD between those receiving modified *Quaver* music lessons/presentations and those receiving non-modified *Quaver* music lessons/presentations?[19]

Significance of the Study

Research has shown that music can positively affect social, communicative, and joint attention development in a child with ASD.[20]

> If music educators assist students with exceptionalities in acquiring the needed tools, accommodations, and advocacy required to be successful, these students will function more readily as members of any music classroom or group. Thus, the many benefits will include, but not be limited to, improved social, motor, and academic skills, as well as provide a healthy outlet to express themselves, and a sense of community that positively impacts them for life.[21]

Participation in a music program can create a supportive social group for a student with ASD. Students with ASD have varying levels of deficits in social development. Singing in a group can provide an example of positive social interactions between themselves and other students. Imitation of singing, performing, and belonging can boost self-confidence in students with ASD, who may not experience many opportunities for social interactions.[22]

Music can provide a boost in communication development. Listening, imitating, and singing songs can provide a student with ASD with an introduction to vocabulary, vocal patterns,

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[19] Mary Crum Scholtens, "Using Music to Encourage Joint Attention for Students with Autism Spectrum Disorder: Attention as a Reciprocal Relationship," *Music Educators Journal* 105, no. 4 (2019): 45-51, https://journals.sagepub.com/doi/full/10.1177/0027432119846954.

[20] Jennifer Lynn Mahr, "Music Therapy: Effects on Children Diagnosed with ASD" (MA Theses, Liberty University, 2018), 38, Scholars Crossing 538.

[21] Kathryn Lambert, "Serving Special Education Students in the Music Classroom: Accommodating and Advocating for Learners with Exceptionalities" (MA Theses, Liberty University School of Music, 2021), 3.

[22] Ryan M. Hourigan and Alice M. Hammel, *Teaching Music to Students with Autism* (New York: Oxford University Press, 2020), 25.

and listening skills. Music encourages imitation and attention to sounds, communication, and speech more than just talking. Often learning a song is a repetitive action that provides students with ASD ample opportunities to imitate sounds and patterns that can later be applied to speech.[23]

Joint attention is another area in child development impeded when a child is diagnosed with autism. Joint attention is a necessary skill for both social and communication development. It is defined as the means of attracting another person's attention to share in the experience of examining an item or experience.[24] Music and songs can help support the development of joint attention. Songs encouraging taking turns, following the leader, or repeating can provide embedded learning that boosts communication and social and joint attention skills.[25]

The study will measure the perceived effectiveness of applying UDL to the *Quaver Marvelous World of Music* curriculum. Applying the evidence-based accommodations and modifications will increase the positive engagement, social skills, communication, and joint attention of students with ASD that are included in the general music classroom. The literature recommends that further studies are conducted on music curricula to ensure they can be modified to support the needs of students with ASD.[26] The results of this study could affect the development of specific general music education curricula for positively engaging various students with ASD. General music teachers can implement the study results to potentially affect the delivery of general music curricula to students with ASD.

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[23] Sheila Scott, "The Challenges of Imitation for Children with Autism Spectrum Disorders with Implications for General Music Education," *Update: Applications of Research in Music Education* 34, no. 2 (Feb 2016), 13-20. doi:10.1177/8755123314548043.

[24] Scholtens, "Using Music", 45-51.

[25] Ibid., 46.

[26] Ferro, "Music and Autism," 77.

Definition of Terms

The definitions listed within this section are pertinent to this study and are based on the literature associated with the topic.

Accommodation

Accommodation is when instruction is changed based on how a student learns. For example, providing an audio recording of a song rather than having a student read the music.[27]

Autism Spectrum Disorder

Autism spectrum disorder (ASD) is defined as a biological neurodevelopmental disorder that impacts a child's behavior, communication skills, and social skills.[28]

Curriculum

A curriculum is a standards-based system of study that will enable the learner to acquire specific knowledge and skills.[29]

Engagement

There are three types of engagement identifiably measurable in students with ASD. Behavioral engagement describes participating in learning and on-task behaviors. Emotional engagement represents a student's interest in activities. Cognitive engagement is a student's motivation to learn and undertake more learning and skills in relation to self-regulated and goal-

[27] Linda K. Damer, "Students with Special Needs," *Music Educators Journal* 87, no. 4 (2001): 17-18, https://doi.org/10.2307/3399718.

[28] Alan I. Rosenblatt and Paul S. Carbone, *Autism Spectrum Disorder: What Every Parent Needs to Know* (Chicago: American Academy of Pediatrics, 2019), 4, ProQuest Ebrary.

[29] Thomas W. Hewitt, *Understanding and Shaping Curriculum: What we Teach and Why* (Thousand Oaks: SAGE Publications, Incorporated, 2006), 14, ProQuest Ebrary.

directed behavior.[30]

Inclusion

Inclusion refers to incorporating students with disabilities into the regular classroom for the entire day.[31]

Joint Attention

Joint Attention is defined as the means of attracting another person's attention to share in the experience of examining an item or experience.[32]

Modification

Modification is when the curriculum is adjusted to meet the needs of the students. For example, when the lesson is to learn the words of a song, the student will not be required to memorize all the words of a song but just partial to a few.[33]

Universal Design for Learning

Universal design for learning (UDL) is an educational framework for instruction. Set with three principles based on the learning sciences, the principles help guide the development and design of an effective and inclusive curriculum for all learners.[34]

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[30] Deb Keen, "Engagement of Children with Autism in Learning," *Australasian Journal of Special Education* 33, no. 2 (Oct 1, 2009): 130-140. https://dx.doi.org/10.1375/ajse.33.2.130.

[31] Damer, "Students with Special Needs," 17.

[32] Scholtens, "Using Music", 50.

[33] Damer, "Students with Special Needs," 14.

[34] Tracey E. Hall, Anne Meyer, and David Rose, *Universal Design for Learning in the Classroom: Practical Applications*, eds. Tracey E. Hall, Anne Meyer, and David H. Rose (New York: Guilford Publications, 2012), 25.

Chapter Summary

The prevalence of students with autism attending and participating in the elementary general music classroom has increased in the United States. Increase in diagnosis and recognition, educational and civil rights laws supporting inclusion and mainstreaming, and more modern educational philosophies on inclusion, all influence the need for supportive music curriculum that addresses the learning differences of all students, especially students with autism. A mixed-method methodology was selected in this study because the aim of applied research is to collect real-world evidence to evaluate the effectiveness of educational curriculums.

The purpose of this study is to measure the perceived effectiveness of applying UDL to *Quaver's Marvelous World of Music* curriculum to positively engage and support students with ASD in the general music classroom. The problem is that many elementary music teachers are not provided with curricula guidance or recommendations for using UDL with the *Quaver Marvelous World of Music* curriculum to instruct, engage, and include students with ASD in the music classroom. This chapter presented an informational review, the statement of the problem, the significance of the research, the purpose statement, central research questions, and definitions of this research. The purpose of chapter one is to give the reader a better understanding of the effectiveness of using UDL to teach elementary music to students with ASD.

Chapter Two: Literature Review

Overview

Sara Efron and Ruth Ravid state in their book, *Action Research in Education,* that applied research can provide educators a way to be active partners in leading school improvement and the purpose of applied research is to improve a practice or solve an educational problem.[35] Due to the increase of students with ASD in the mainstream elementary music classroom, there is a deficit in adequate pedagogical recourses for educators to effectively include these students. The purpose of this applied study is to measure the perceived effectiveness of applying Universal Design for Learning (UDL) to *Quaver's Marvelous World of Music* curriculum to positively engage and support students with autism spectrum (ASD) disorder in the general music classroom. There is no research evidence that using UDL with *Quaver's Marvelous World of Music* curriculum will aide to instruction, engagement, and inclusion of students with ASD in the music classroom. Therefore, the focus of this literature review is to provide evidence that UDL can aide in instructions, engagement, and inclusion of students with ASD when applied to *Quaver's Marvelous World of Music* curriculum.

In applied research it is important that the researcher is familiar and aware of historical perspectives and events that lead to the problem. This chapter presents an overview of the history of special education in America, origins of autism, universal design, inclusive classrooms, and U.S special educational laws. Emphasis is placed on three components of autism: communication, joint attention, and sensory input and the benefits of music in encouraging growth and development in these areas. The chapter includes relevant research and accumulative

[35] Sara Efrat Efron and Ruth Ravid, *Action Research in Education: A Practical Guide* (New York: Guilford Publications, 2019), 13, ProQuest Ebrary.

literature that supports using UDL, music, and technology to help engage and educate students with Autism in an inclusive classroom setting.

Narrative Review

> Taken separately, too, the elements of music are precious instruments in education. Rhythm develops attention, concentration, determination, and the ability to condition oneself. Melody opens the world of emotions. Dynamic variation and tone color sharpen our hearing. Often a single experience will open the young soul to music for a whole lifetime. The experience cannot be left to chance; it is the duty of the school to provide it.[36]
>
> -Zoltan Kodaly, 1974

History of Special Education in America

The first special education efforts developed out of instruction focused on individuals with sensory disabilities (blindness and deafness). Professor of Education and Author, Margaret A. Winzer, writes that the European Enlightenment, during the 1700 and 1800s, influenced the interest in special education and the vision of French philosophers and views.[37] Winzer wrote that the French were very advanced in their reforms, philosophies, and support of people with disabilities. They believed that educating certain parts of the ignored population could significantly support the modernization of the French civilization. They created special schools for the deaf. A French priest, Abbe Charles Michel de l'Epee, invented the first formal sign language. The French continued with education reform, and slowly the rest of western culture began to follow their examples and philosophies.[38]

Robert L. Osgood, a retired Professor of education and author focusing on the history and

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[36] Kodaly, *The Selected Writings,* 130.

[37] Margret A. Winzer, *From Integration to Inclusion: A History of Special Education in the 20th Century* (Washington: Gallaudet University Press, 2009), 17. ProQuest Ebrary.

[38] Winzer, *Integration,* 5.

foundations of special education wrote that individuals with other disabilities in the areas of cognitive, emotional, or behavioral were isolated and treated in institutions and asylums.[39] His research found that these asylums were often very poorly run, neglected, and patients abused. The opinion of the time was that people within the institutions needed to be secured away from the public. It was necessary to confine them to prevent crimes or other offenses in the community. The institutions and asylums went through various reforms during the late 1800s meant to improve the quality of life of all those that attended or lived in these locations. It was in the early twentieth century that more focus on education within the institutions, and life began to change for people within the institutions and asylums.

Winzer's historical research stated that in the early 1900s, changes to child labor laws, new laws on compulsory school attendance, and the movement of the American population from rural to urban settings, all contributed to the growth of state-level legislation on special classes.[40] Larger urban areas began developing special classes for students with various backgrounds with different capabilities. In 1905, the Binet-Simon intelligence test (also known as the IQ test) was created and widely administered. This test classified and organized people that before would have been segregated or institutionalized, but instead, it classified students into different educational classes or groups. Entry into these programs was based upon the results of the Binet-Simon intelligence test. Despite the fact that this interest in labeling and classifying, more severely disabled children were still excluded from school.

Attitudes towards special education changed slightly post-World War II, according to Winzer's research. The veterans returning from World War II made physical disability issues

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[39] Robert L. Osgood, *The History of Special Education a Struggle for Equality in American Public Schools* (Westport, Conn: Praeger, 2008), 27-29. ProQuest Ebrary.

[40] Winzer, *Integration*, 82.

more visible to the public, and more people wanted to include and support these veterans. Students with physical disabilities gained more attention, but segregation of the disabled still occurred. The 1960s brought more interest in reforming special education. There were movements to de-institutionalize many people and begin to mainstream them into the educational system.[41] The definition and view of disabled persons changed significantly. Many professional fields began to examine, redefine, and remove disability categories. This exploration led to an increase in advocacy for disabled persons at all age levels. All this change was known as the Disability Rights Movement.[42]

Osgood's research highlighted that President John F. Kennedy had a personal interest in supporting the civil rights movements for disabled persons. His sister was born with an intellectual disability and would have been segregated based on the standards in the 1960s. According to Osgood, Kennedy's administration began involving the federal government in federal legislation supporting the rights of disabled children. Many of the laws today originate from his view on including, educating, and supporting students with disabilities.[43]

The 1960s was a pivotal point in a variety of civil rights movements. Many different minority groups were seeking equal access and equal rights. Disability rights advocates began to follow the lead of other civil rights groups. In 1973, the Rehabilitation Act became law. This act focused on the civil rights of people with disabilities and protected them with federal laws. It established equal opportunities for employment in the federal government, access to federal funding, prohibiting discrimination based on mental or physical disabilities, and mandated equal access to public services.

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[41] Winzer, *Integration*, 106.

[42] Osgood, *History*, 100.

[43] Ibid., 102.

However, through research Osgood found that, even with new federal laws in the 1960-1970s, updated public opinion, educational reform, and more public acceptance, changes still needed to occur to create a truly inclusive classroom. The 1980s and 1990s saw additional reforms and laws for the disabled. Specialized training for teachers was being introduced into college campuses to help support the new attitude of inclusion and mainstreaming.[44] Professional teaching organizations still advocated for some segregation and isolation depending on a student's disability. Despite some setbacks, the field of special education continued to grow and expand and become more inclusive.[45]

One of the most important changes was in 1990 with the passing of the Americans with Disabilities Act (ADA). This law provided the public with more awareness of barriers, prejudice, and inequality related to people with disabilities. The law addressed environmental barriers, institutional barriers, and discrimination barriers. Most importantly ADA prompted people to consider the barriers in place in education and how the barriers could affect the lives of children and spotlighted the inequality in education for students with disabilities.[46]

The U.S. Department of Education added autism as an eligibility category in 1991. Prior to this, students were only eligible for special education services if they had a comorbid diagnosis with another eligible category. Because of the inclusion of autism as an eligibility category, the number of students identified for special education services for autism has steadily increased. In 1991, there were only 2,896 listed in the autism category. By 2004, it had increased to 165,552 school-age students (ages six to twenty-one). Most of the students identified were in

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[44] Osgood, *History,* 133.

[45] Winzer, *Integration,* 200.

[46] Osgood, *History*¸123.

the age group of six to eleven according, to the U.S Department of Education in 2005.[47]

Advancements in educational research, teacher preparation programs, educational law reforms, and educational philosophies have made inclusion and mainstreaming the future of special education. Being aware of historical backgrounds, facts, and events in special educational history will help stakeholders to move forward with improvements to the special education system in America. During the past few decades, a number of educational laws were updated and reformed to meet the standards, ethics, and values of the 21st century. The social sciences have helped to show that inclusion and mainstreaming disabled students benefit all parties involved.[48] Teacher education programs are preparing future teachers to create classrooms, lessons, and assessments that value each student's individuality. Modern educational philosophers state that not only do children with disabilities require a diverse learning environment, but all students can benefit from a specialized education program that addresses any and all learning styles. The advancements in special education have benefited all within the education program.

Educational Laws for Special Needs

Education in America has not always been free and equal. Schools in early America were for only those who could afford them and were of a particular class, race, and ability. Most of the education laws were governed and created by the state or local government. Students with disabilities were left out, institutionalized, or kept at home without formal education.[49]

Winzer wrote in her book, *From Integration to Inclusion: A History of Special Education in the 20th Century* that, it was not until the early 1900s that the federal government became

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[47] Stephan E. Brock, "An Examination of the Changing Rates of Autism in Special Education", *The California School Psychologist* 11 (2006): 3, https://files.eric.ed.gov/fulltext/EJ902516.pdf

[48] Winzer, *Integration*, 223.

[49] Osgood, *History*, 4-6.

involved and passed a law-making attendance at school compulsory for children. It was the Americanization Bill or Smith-Towner Bill of 1919.[50] Brian Ray's historical research clearly summarizes that the bill was written as a result of the mass immigration to the United States following the end of World War I. The focus of the bill was to standardize education and improve teacher training programs at American universities. The plan was that the uniformed curriculums, language skills, and citizenship courses would help integrate families into the United States more easily. This bill was focused on teaching English language skills to new immigrant children but ended up being the foundation for the National Education Association and providing federal funding for public schools in the United States. Even though the Americanization movement only lasted a small period of time, its influence on education reform, standardization, and inclusion carried on into the future.[51]

Kelle L. Murphy, an Associate Specialist, researching for the Center on Disability Studies for the University of Hawaii at Manoa wrote in her publications covering historical events in the special education movement that the Civil Rights movement of the 1960s influenced educational laws. She explained that, in 1973, the Rehabilitation Act became law and prohibited discrimination against people with disabilities. Specifically, section 504 prohibits discrimination against individuals with disabilities from participating in programs that receive and use federal funding. This law addressed a multitude of issues, including segregation, public accommodations, and inclusion.[52] Then, in 1975, the Education for All Handicapped Children

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[50] Brian Ray, "ESL Droids: Teacher Training and the Americanization Movement, 1919–1924," *Composition Studies* 41, no. 2 (2013): 20, http://www.jstor.org/stable/compstud.41.2.0015.

[51] Ray, *ESL*, 34.

[52] Kelle L. Murphy, "*Civil Rights Laws: Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973,"* Journal of Physical Education, Recreation and Dance Vol. 92, no. 1 (2021): 57-59, doi:10.1080/07303084.2021.1844555.

Act (EHA) "guaranteed a free, appropriate public education, or FAPE, to each child with a disability in every state and locality across the country."[53] The law accomplished four main purposes, to ensure all students with disabilities and their parents are protected, all children with disabilities have access to FAPE that focuses on their education and related services for their unique needs, to financially assist States and local governments to provide education for all children with disabilities, and to monitor and assure the education provided is effective and appropriate.[54]

According to the historical publications from the US Department of Education; EHA, public law 94-142, has been reauthorized, updated, and expanded since it originated in 1975. In 1986, the law addressed early intervention and support for children ages birth to three, that were born or identified with a disability. In 1990, the reauthorization changed the name from EHA to the Individuals with Disability Education Act (IDEA) and added autism and traumatic brain injury to the categories of disabilities supported by the law. IDEA continues to be reauthorized, modified, and added to, based on the needs of the American public. In recent years, IDEA has moved to support equity, mainstreaming, and inclusion. Congress has worked to align IDEA with other educational laws, such as No Child Left Behind in 2001 and the 2015 Every Student Succeeds Act (ESSA). This alignment ensures that FAPE is being followed and that a child is being provided with an Individual Educational Plan that gives "every child a chance to meet challenging objectives."[55]

Arlene Mayerson, an attorney, and author specializing in disability education rights,

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[53] "A History of the Individuals with Disabilities Education Act," US Department of Education, last modified Jan. 11, 2022, https://sites.ed.gov/idea/IDEA-History#1975.

[54] "History of IDEA."

[55] Ibid.

wrote that both the Rehabilitation Act of 1973 and the EHA Act of 1975 greatly influenced the Americans with Disabilities Act (ADA) of 1990. The American with Disabilities Act was developed from the continued work on civil rights and ensured that the Civil Rights Act of 1964 also included anti-discrimination against people with disabilities. Section 504 of the Rehabilitation Act provided a basis for equality. However, it was not enough.[56] ADA has four primary goals to assist people with disabilities, to allow full participation, equal opportunities, independent living, and economic self-sufficiency.[57] Since its inception of the ADA, there have been revisions and enforcements that help ensure equality in almost all areas of life.

The laws governing special education will continue to develop and change in the future. It is important, as an educator, to be aware of the laws to ensure that all stakeholders know their rights and responsibilities. The educational history and laws have demonstrated that isolation and exclusion are inappropriate. These historical information and facts can support the researcher's goal of providing effective, inclusive, and engaging curriculum support for students with ASD in the music classroom. Creating a learning environment that is flexible, engaging, and provides alternative methods of accessing information can help all stakeholders within the classroom.

Autism

Autism spectrum disorder (ASD), according to the CDC, is a developmental disability affected by differences in the brain.[58] People with autism are often identified due to problems with social interactions, social communication, repetitive/restricted behaviors, or interest and

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[56] Arlene Mayerson, "The History of the Americans with Disability Act: A Movement Perspective," Disability Rights Education & Defense Fund, last modified 2023, https://dredf.org/about-us/publications/the-history-of-the-ada/.

[57] "Intro to ADA," Featured Topics, ADA, last modified 2022, https://www.ada.gov/topics/intro-to-ada/.

[58] "What is Autism Spectrum Disorder?", ASD Homepage, CDC, last modified December 9, 2022, https://www.cdc.gov/ncbddd/autism/facts.html.

delay or absence of joint attention. They may behave, interact, and learn differently from typically developed people. There are no differences in appearance from other people, and the abilities of a person with ASD can range widely from person to person. For example, some people with ASD may be nonverbal, while others have advanced conversational skills. Some people with ASD need help to complete daily routine tasks, while others live and work independently with little to no support.[59] Because of this large variation in characteristics of people with ASD it is important to be familiar with the history, diagnostics, and latest research on supporting ASD in education.

Adam Feinstein, author, editor and acclaimed expert on the history and foundations of autism provides an accurate and complete history of autism in his book, *A History of Autism: Conversations with the Pioneers*.[60] Autism is a neurological disorder. In some form or another, it has always existed, even prior to the identification and naming of the disorder in 1934. In literature throughout written history, there are accounts of odd, strange, and anti-social behavior in a multitude of people that, by today's standards, would be diagnosed autistic.[61] Even today, identifying and diagnosing autism is not a clear-cut checklist. The identification of autism is based upon the presence of impairments in communication, social interactions and restricted, repetitive patterns of behavior, interests, or activities.[62] The word autism comes from the Greek word autos, meaning "self."

Feinstein's research describes that there has been documentation of different people with a variety of symptoms similar to autism that are too numerous to account. In 1724, a German

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[59] "What is ASD?"

[60] Adam Feinstein, *A History of Autism: Conversations with the Pioneers* (West Sussex: Wiley-Blackwell, 2010), 4-7, ProQuest Ebrary.

[61] Feinstein, *A History of Autism*, 4-7.

[62] Munib Haroon, *ABC of Autism*, (West Sussex: John Wiley & Sons Ltd., 2019),1, ProQuest Ebrary.

doctor documented a boy known as the "Wild Peter," non-speaking, acute sense of smell and no social skills. Then in France in 1801, Philippe Pinel, father of modern psychiatry, found and cared for a similar boy. The boy was, at the time, labeled an "idiot" and institutionalized. Pinel studied him, and the report listed similar characteristics to the modern definition of autism. In 1898, Dr. M.W. Barr studied a man with an incredible memory, echolalic speech, and other autistic characteristics. Sadly, society institutionalized, jailed, or discarded all these people. The change in educational philosophy, medical and psychological diagnostics have improved how, where, and when people with autism are treated.[63]

In the 1920s, interest in children displaying schizophrenic-like behaviors was growing around the world. Dr. Lightner Witmer, an American, in 1920 described a child that today would be labeled autistic. In 1926, Dr. Grunya Sukhareva, a Russian psychiatrist, described similar behaviors in a group of boys and labeled them schizoid. Then in 1933, Dr. Howard Potter studied and wrote about children with similar behaviors and labeled them with childhood schizophrenia. These children initially diagnosed with infant, or childhood schizophrenia were all institutionalized and deemed "'idiots"."[64]

James Harris and Adam Feinstein's historical research both agree that the two innovators in autism research were Leo Kanner and Hans Asperger. Both Kanner and Asperger worked during the 1930s to better define infantile schizophrenia. Kanner and Asperger believed they were researching and writing about different topics, but historical research has shown they were introducing the true beginnings of autism spectrum disorder. Harris's research stated that Kanner believed that autism was a neurodevelopment disorder from birth and that children arrived into

[63] Feinstein, *"History,"* 3.

[64] Ibid., 19.

the world with an inherent physical or intellectual handicap.[65] While Feinstein claimed that Asperger described the behaviors and symptoms more related to a personality disorder, Asperger believed that education could help children diagnosed with autism.[66]

The definition of autism has changed since its initial inception by Kanner and Asperger. At one time during the 1950s, autism was blamed on the mother's lack of interaction or care. Then in the 1960s, research moved into exploring biological, genetic, and environmental reasons for autism. Unfortunately, for a short period of time, vaccinations were considered the cause of autism, but that has since been found false with some small, misinformed holdouts. Medical doctor and author who specializes in diagnosis and management of neurodevelopmental disorders in children, Munib Haroon, writes that it is clear that there is no prediction for the causes of autism, but it is now known that there is a strong genetic basis for autism along with some environmental risk factors leading to autism.[67]

According to Haroon's research, the autism that many teachers will observe in students today is based on symptoms and variations of symptoms from the Diagnostic and Statistical Manual, fifth edition (DSM-5). The DSM-5 identifies persons with autism based on difficulty with language, cognition, and social interactions.[68] Haroon clarifies that autism is not a one-size fits all disorder. It is a heterogeneous disorder, and not one single person diagnosed with ASD is the same as another person's diagnosis. ASD can also be paired with another disability, giving a person a co-morbid diagnosis of ASD and possibly attention deficit disorder, anxiety, or a length

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[65] James Harris, "Leo Kanner and autism: a 75-year perspective," *International Review of Psychiatry* 30, no.1 (2018): 5, https://doi.org/10.1080/09540261.208.1455646.

[66] Feinstein, *History,* 30.

[67] Haroon, *ABC,* 2.

[68] Ibid., 6.

of other mental or physical disabilities.[69] Prior to the DSM-5, the DSM-IV allowed autism identification to be split into three categories: autistic disorder, pervasive developmental disorder-not otherwise specified, and Asperger's syndrome. The DSM-5 was updated to acknowledge that communication and social behaviors are inseparable, delayed language is not only associated with autism, and changes to improve the specificity of diagnosis while not compromising test's sensitivity. Kroncke, Willard, and Huckabee provide an estimate based on their research, that autism in schools rose by 800% between 1993-2003. In the United States, in 1995 there was a 1 to 500 ratio, and in 2008 it grew to a 1 to 88 ratio.[70]

Three main areas common in the diagnosis of ASD are impaired communication, social interaction and reciprocation, and limited behaviors or interests. Each of these areas is present at some level in a person with ASD. Awareness of the individual's needs, ways of learning, and aversion can help create a learning environment that not only helps the student with ASD, but all stakeholders involved. Music education can help bridge the gap in all three main symptoms of ASD.

Communication is a key area identified in the DSM-5 for ASD, according to Rita Jordan in her article *Particular Learning Needs of Individuals on the Autism Spectrum*. She explains the stereotypical assumption of a child with ASD is that they are non-verbal and unable to communicate. A person with ASD can have language but fail to communicate. Language skills and communication skills are addressed to help a person with ASD participate.[71] She also writes that Echolalia is often associated with ASD. It is a sign of difficulty understanding language; a

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[69] Haroon, *ABC*, 30.

[70] Anna P Kroncke, Marcy Willard, and Helena Huckabee. *Assessment of Autism Spectrum Disorder. Contemporary Issues in Psychological Assessment* (Cham: Springer 2016), 8-9, ProQuest Ebrary.

[71] Rita Jordan, "Particular Learning Needs of Individuals on the Autism Spectrum," in *The SAGE Handbook of Autism and Education*, ed. Jordan, Roberts, Hume (Los Angeles: SAGE Publishing, 2019), 13.

child might echo what is being said but not understand the words or context. Teaching the concept or enhancing understanding is important to produce better communication and language skills. Jordan has found in her research that understanding the concept of language versus communication can help a teacher be prepared to assist and teach a student with ASD.[72]

Impairments to social interactions are another area identified by the DSM-5 in diagnosing ASD. Balasubramanian, Blum, and Wolfberg's article on ASD report that social disconnect, inability to take turns, difficulty understanding the feelings of others, or unable to hold or start a conversation are all symptoms of autism.[73] Social interaction and communication were merged on the DSM-5 because a deficit in communication skills often connects with a deficit in social interactions. In their research they identify one key social skill which is joint attention. Joint attention is when a person shares a focus with another individual on an object. For example, one person alerts another by pointing, eye-gazing, or with verbal or non-verbal indications.[74] The authors of the report all agree that a lack of joint attention is often marked as an early sign of ASD and joint attention is important for developing both social skills and communication skills. Encouraging joint attention will help build meaningful social interaction skills of many areas in the life of a person with ASD.

Two key researchers, consultants, and professors on the topic of ASD, Jacqueline Roberts and Kate Simpson agree sensory issues are common in people with ASD, and processing incoming sensory information differ for someone with ASD.[75] Hypersensitivity or

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[72] Jordan, *"Learning Needs," 20.*

[73] Lakshmi Balasubramanian, Alexander Mario Blum, and Pamela Wolfberg, "Building on Early Foundations into School: Fostering Socializations in Meaningful Socio-cultural Contexts," in *The SAGE Handbook of Autism and Education*, ed. Jordan, Roberts, Hume (Los Angeles: SAGE Publishing, 2019): 134.

[74] Balasubramanian, Blum, and Wolfberg, "Building,", 137.

[75] Jacqueline M. Roberts and Kate Simpson, "Early Intervention," in *The SAGE Handbook of Autism and Education*, ed. Jordan, Roberts, Hume (Los Angeles: SAGE Publishing, 2019): 104.

hyposensitivity can elicit an overwhelming response that can result in meltdowns, withdrawal, or distress. Roberts and Simpson explain, sensory can include sight, sound, smell, taste, touch, balance (vestibular), and body awareness (proprioception). People with ASD can be either under-sensitive in any, all, or combination of the senses or over-sensitive.[76] Classrooms can be exceedingly overwhelming for students, with bright lights, loud peers, fast movements, textures of school supplies, and a multitude of smells. Creating an environment that supports many sensory needs makes a classroom more inviting and accessible to all people.

ASD is a lifelong disorder, and each person will manifest their impairment in a variety of ways, degrees, and changes in situations, locations, and stimuli. Persons with ASD can look the same as any other human being. Abilities and disabilities differ so much that some may have excellent conversational skills while others cannot carry on a simple conversation because of their language disorder or delay. Teachers being aware of a student's level of severity will assist in ensuring the appropriate environment for engagement and learning. In applied research it is essential that the researcher understand what the literature says about ASD, along historical aspects, and evolution. Deeper understanding of the background can help bring about positive change and recommendations for change in the future for all stakeholders.[77]

Universal Design for Learning

Universal Design for Learning is a methodology for instruction and learning that gives all students equal opportunities to flourish. The Center for Applied Special Technology (CAST) is a nonprofit educational research organization that created the UDL framework and guidelines. In a

[76] Roberts and Simpson, "Early Intervention," 103.

[77] Bunnie Claxton and Kurt Y. Michael, *A Step-by-Step Guide to Conducting Applied Research in Education*, 2nd ed. (Dubuque, IA: Kendall Hunt Publishing, 2021), 37, VitalSource.

book edited by Dr. Tracey Hall, a senior researcher, Dr. Anne Meyer, a licensed clinical psychologist, and co-founder of CAST and Dr. David Rose a neuropsychologist and educator, explain that UDL is a framework for an instructional design created around three principles based on learning sciences. Following the principles will help guide the design and development of an effective and inclusive curriculum for all learners. Understanding how the brain works, advancements in neuroscience, and educational research have reshaped the belief that all students are individuals and learn in different ways.[78]

Stephanie Woodward, an attorney, and Director of Advocacy at the Center for Disability Rights in New York explained the history of the founder of Universal Design. Universal Design (UD) was created by Ron Mace (1940-1998) from North Carolina State University. When Ron was nine years old, he contracted polio, which led to a lifetime use of a wheelchair. During his early life, he was blocked by barriers in the physical world. He earned a degree in architecture in 1966 and began designing houses and buildings with a universal design. His idea was to design and create buildings and products that were not only visually pleasing but usable and accessible to as many people possible regardless of age, ability, or situation.[79]

The founding principles of UD went on to be developed by a group of architects, engineers, environmental designers, and product designers. The focus of this group was to proactively reduce environmental barriers and provide increased access to the physical environment in public locations. Ron Mace wanted to encourage the design of all products and buildings to be beautiful and functional to the greatest extent possible by everyone, regardless of

[78] Hall, Meyer, Rose, *UDL, 51.*

[79] Stephanie Woodward, "Ronald Mace and His Impact on Universal Design," Advocacy, Center for Disability Rights, last modified March 15, 2023, https://cdrnys.org/blog/advocacy/ronald-mace-and-his-impact-on-universal-design/

their age, ability, or status in life.[80]

Experts and researchers from North Carolina State University Center for Universal Design explain that Universal Design has seven principles. They clarify that the principles are equitable use, flexibility, simplicity and intuitive, perceptible information, tolerance for error, low physical effort, and size and space for approach and use. The principles take into account the uniqueness of every human being and categorize abilities into cognition, vision, hearing and speech, body function, arm and hand function, and mobility. The UD designers hoped to make everything more universal. Looking into the future and being aware that people are living longer, medical innovations and technology allow humans to survive or return to society and universal design allows all humans access to products, services, or buildings.[81]

Hall, Meyer, and Rose, describe that a small band of educational researchers founded the Center for Applied Special Technology (CAST) to explore ways of using new technology to provide more inclusive and better educational experiences for the many students with disabilities. They went on to write that Universal Design philosophy transferred to educational design, and it was called Universal Design for Learning (UDL). UDL provides guidance on designing curricula, lessons, and environments that allows all individuals to learn, gain skills, and engage in learning. UDL does not follow the seven principles of UD, but instead, UDL guidelines were developed to promote curriculums that include multiple means of representation, actions, expression, and engagement (see Figure 1). They explain the one goal shared by both UD and UDL is to take into consideration as many diverse people as possible when creating and

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[80] Kavita Rao, Wook Ok Min, and Brian R. Bryant, "A Review of Research on Universal Design Educational Models," *Remedial and Special Education* 35, no. 3 (2014), 153-166. https://doi.org/10.1177/0741932513518980.

[81] Molly Follette Story, James L Mueller, Ronald L Mace, *The Universal Design File: Designing for People of All Ages and Abilities*, (North Carolina State University: Center for Universal Design, 1998), 16-28. ERIC ED460554.

designing to make something that will not need adjusting or modification for others to use.[82]

Figure 1 CAST UDL Framework[83]

UDL has three principles based on years of research and development. UDL highlights the what, how, and why of learning. The first principle is to support recognition learning and provide multiple means to represent a topic. The principle recommends offering flexible ways to present what is taught and learned. The second principle is to support strategic learning and provide multiple means of expression and actions. The second offers flexible options on how people learn and demonstrate what they learned. The third principle supports affective learning and provides multiple means of engagement. The third offers flexible option for generating and sustaining the motivation for learning and exploration to demonstrate why they learn.[84]

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[82] Hall, Meyer, Rose, *UDL,* 27.

[83] "UDL Guidelines version 2.2," CAST, last modified 2018, https://www.udlguidlines.cast.org

[84] Hall, Meyer, Rose, *UDL, 103.*

Along with influences from universal design, UDL has relied on advancements in neuroscience and educational research. UDL accentuates three main areas of the brain. These areas of the brain play a central role in the ability to learn. This is why UDL focuses on the individuality of learning because not one person's brain is the same as another person's brain. Brains are as unique as fingerprints.[85]

Hall, Meyer, and Rose explain from their many years of research and application that there are three areas of the brain, the affective, recognition, and strategic. Each area of the brain has a specific job or ability for receiving, organizing, recalling, and understanding information. The affective region assists in behavioral and emotional responses and enable a person to engage in activities and learning from the world around them. The recognition region enables a person to identify and understand information, ideas and concepts and turn this information into usable knowledge. The strategic region controls the executive function, but also helps a person plan, organize, and execute mental and motor patterns. These parts of the brain are separate but work together or coordinate information, movement, and functions of learning. Since the brain is as unique as a fingerprint, how each section of the brain processes information is unique to each student in the classroom.[86]

Dr. Patricia Kelly Ralabate, a nationally recognized leader on instructional design, explains, beyond the three UDL principles are the nine UDL guidelines. Each principle is divided into three separate guidelines that are flexible and the teacher can mix, and match usage based on individual student's needs. The three principles are providing multiple means for engagement for students (the why of learning), providing multiple means of representation of

[85] Hall, Meyer, Rose, *UDL*, 103.

[86] Ibid., 26.

information for students (the what of learning), and providing multiple means of expression and actions for students (the how of learning).[87]

According to Hall, Meyers, and Rose, the UDL guidelines are not required to be done in any particular order. They clarify in their book, the point of UDL is to mix and match to ensure learning, engagement, and retention of information by all students.[88] The first set of guidelines suggests providing options to sustain and engage interest, options to sustain learning and individualized assessment or demonstration of mastery, and promote motivation, reflection, and learning strategies. The second set of guidelines suggests providing options for learning the information (visual, aural, using technology), options for expressing or clarifying knowledge (demonstrating understanding with language, symbols, verbalization), and options for comprehension, supplying connections, generalizations, and relationships. The third set of guidelines suggest providing varied methods for delivery, presentation and demonstration of learning, access to technology, tools, and practice, then guides for completing goals, monitoring progress, and resource management. All of the guidelines can be used in whichever order or sequence the teacher or learner prefers.[89]

UDL has benefits for both the educators and students. The UDL guidelines and principles are flexible. Mixing and matching the UDL strategies and guidelines help overcome barriers inherent in most lessons and curriculum. Even though current educational systems insist on individual educational plans (IEP) for special education students, applying UDL creates a curriculum that is truly appropriate for all students, being able to provide for the needs and

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[87] Patricia Kelly Ralabate, *Your UDL Lesson Planner: The Step-by-Step Guide for Teaching all Learners* (Baltimore: Brookes Publishing, 2016), 5, ProQuest Ebrary.

[88] Hall, Meyer, Rose, *UDL*, 10.

[89] Ibid., 43.

interests for all. Allowing educators to create one plan that is designed to consider all learners.

Applying UDL in music education will allow the music teacher to design an equitable, flexible music lesson that is accessible for all students to the greatest extent imaginable. Judith Jellison Ph.D., an author and music educator, advocates for the use of UDL within the music classroom to support effective teaching, and appropriate musical opportunities for all children.[90] She created some recommendations on applying the principles of UDL to the music classrooms. She stated that it is possible to create a music program that is designed to be accessible, equitable, and flexible. The different learning styles should be viewed on a continuum and standards and expectations should be high for all children. Planning for UDL in the music classroom should not be an afterthought. The development of lessons by teachers that cater to the needs and characteristics of their students is vital to ensure that all students can participate in classroom activities, tasks, and routines. Employing multiple strategies to meet student learning needs can reduce the need for modifications or adaptations.

Sheila J. Scott is a professor with Brandon University in Manitoba, Canada. Teaching pre-service elementary music education students, she advocates and prepares students to teach music class for autistic children. She has published several articles and books supporting the use of UDL in music education. Her research has shown that applying UDL principles helps address the sensory needs of a student with ASD in music class. Her publications have demonstrated and provided examples of how to apply the UDL principles to music lessons. She believes that music is a universal human experience and that all children are capable of interacting with music positively regardless of their talents or aptitudes.[91]

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[90] Jellison, *Including Everyone*, 209.

[91] Sheila J. Scott, *Music Education for Children with Autism Spectrum Disorder: A Resource for Teachers* (New York: Oxford University Press, 2017), 43, Oxford Academic.

Even though UDL is a newer learning framework, it is based in cognitive and learning research. UDL has been applied to a variety of educational settings at all levels (e.g., K-12, higher education). In 2019, Rao, Ok, Edyburn, Evmenova, and Smith examined UDL's efficacy across genres.[92] Their goal was to contribute to effective ways to apply UDL, validation of UDL practices, and support implementation reliability. They developed a universal design for learning reporting criteria (UDL RC) to support the validation and reliability of UDL across education settings.[93] Their work has allowed researchers and practitioners to use UDL practices and collect the data needed to demonstrate that UDL is a valid evidenced based practice (EBP).

Research continues into best practices to teach students of all ability levels. Multiple sources can provide teachers with ideas, guides, and examples of teaching students with ASD, but it is important to use the latest evidence-based practices to teach. The reason EBP are the best is because they have been scientifically reviewed, created, and tested for specific classroom needs. Teachers using EBP can support positive outcomes and document the usefulness of the implemented EBP for other teachers and scholars. Leko, Roberts, Peyton, and Pua research determined that identifying EBP, like UDL, teachers can make more informed decisions on how to best meet the specific needs of their ASD students.[94]

There are many points of view on how to best teach students with ASD in the music classroom. UDL has value in music education by helping teachers create lessons that attend to learner differences without ignoring students and without forgoing educational consistency. UDL

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[92] Kavita Rao et al., "Validation of the UDL Reporting Criteria with Extant UDL Research," *Remedial and Special Education* 41, no. 4 (2020), 219-230. https://doi.org/10.1177/0741932519847755.

[93] Rao, "Validation," , 223.

[94] Melinda M. Leko et al., "Selecting Evidence-Based Practices: What Works for Me," *Intervention in School and Clinic* 54, no. 5 (May 2019), 286-294. https://journals.sagepub.com/doi/full/10.1177/1053451218819190.

allows students with ASD to demonstrate their knowledge of musical elements through multiple means of expression. It also encourages students to connect to learning across various modalities for anyone in the classroom. Students with ASD have an equal right to music education and by applying UDL to *Quaver*'s curriculum, students can produce their highest level of participation in the music classroom.[95]

Benefits of Music Education for students with ASD

There is a multitude of research showing the positive effects of music education on the social, communication, joint attention, and sensory processing of students with autism. The elementary music room is often the only classroom that offers full inclusion to students with disabilities. It is in the music room that students with ASD can experience social interactions, joint attention, and communication growth. Music technology can enhance musical creativity for students with ASD and cognitive disabilities.[96]

In 1984, Jellison, Brooks, and Hucks determined that interactions in the music classroom produced positive social interactions between students with disabilities and their non-disabled peers.[97] This research led others to determine that there was a positive relationship between music education and positive social interactions and engagements of students with autism in the music classroom. It was not the contact itself that led to the positive outcome but rather the situations and lessons within the music classroom teaching both musical and nonmusical skills that encouraged positive social interactions. Designing lessons that included all students was the

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[95] Darrow, "Instructional Strategies," 62.

[96] Amanda R. Draper, "Music Education for Students with Autism Spectrum Disorder in a Full-Inclusion Context," *Journal of Research in Music Education* 70, no. 2 (2021), 132-155, doi:10.1177/00224294211042833.

[97] Judith A. Jellison, Barbara H. Brooks, and Marie Huck Ann, "Structuring Small Groups and Music Reinforcement to Facilitate Positive Interactions and Acceptance of Severely Handicapped Students in the Regular Music Classroom," *Journal of Research in Music Education* 32, no. 4 (1984), 243-264, https://doi.org/10.2307/3344923.

key to cooperation, encouragement, and social interactions. Dr. Amanda R. Draper, author and assistant Professor of Music Education at Indiana University Jacobs School of Music has researched and written about the benefits of including technology within the lessons as to enhance creativity for all involved. [98]

Music therapy research has been a great contributor to educational researchers in supporting the claims of positive effects of music education on students with autism.[99] Mossler, Gold, and Assmus's research has observed a positive change in social skills, communication, and language in children ages four to seven with autism, over twelve months in music therapy.[100] In the recent research article, *Music Therapy for Autistic People,* the authors supported music therapy and their research showed that it provided children with musical experiences that will help them communicate, express themselves, socialize, and improve joint attention.[101] Geretsegger et al.'s., study reviews of over twenty-six music therapy intervention studies and they have concluded that the overall effect of music therapy is positive and beneficial in the reduction of the total severity in autistic symptoms. Music therapy varies worldwide, but music education is more accessible and can have similar benefits to music therapy.

Language and communication development is an area of focus for a student with ASD. Shelia Scott, a prolific researcher on the benefits of music education for students with autism,

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[98] A. Draper, "Music Education," 3.

[99] Mingxun Wang, Gang Luo and Hao Chen, "Practice of Music Therapy for Autistic Children Based on Music Data Mining," *Mathematical Problems in Engineering* 2022, no.4 (2022): 1-9, https://dx.doi.org/10.1155/2022/4576211.

[100] Karin Mössler, Christian Gold, Jorg Assmus, Karin Schumacher, Claudine Calvet, Silke Reimer, et al., "The Therapeutic Relationship as Predictor of Change in Music Therapy with Young Children with Autism Spectrum Disorder," *Journal of Autism and Developmental Disorders* 49, no. 7 (2019): 2806, DOI:10.1008/s10803-017-3306y.

[101] Monika Geretsegger, Laura Fusar-Poli, Cochavit Elefant, Karin A Mossler, Giovanni Vitale, and Christian Gold, "Music Therapy for Autistic People," *Cochrane Database of Systematic Reviews* 2022, no. 5 (May 9, 2022): 2, https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004381.pub4.

states that learning songs in music class can assist students with ASD in acquiring language.[102] Listening, moving, and playing along with songs can encourage students with limited verbal skills to engage in echolalia or explore speech.[103] In similar research Dr. Erin McMullen Jonaitis, a scientist with the Wisconsin Alzheimer's Institute and Dr. Jenny Saffran, a researcher and professor of Psychology with the University of Wisconsin, together explored the links between music and language and explain that language and music are similar in their structure and that the patterns in music can help students with ASD recognize the patterns in speech.[104] The repetition in melody, meter, and rhythm helps students remember the songs and assist them to increase vocalizations and speech patterns.

Scott's research also states the voice is often the first instrument used in the elementary music classroom.[105] Singing in groups, exploring vocal abilities, and not requiring students to sing songs with correct pitch, rhythms, or expression will help students with ASD feel comfortable vocalizing. Modeling, movement, and visualizations will also increase participation. It is essential to understand the varying levels of vocal participation of those students with ASD. Accepting differences in a student's vocal participation will help the student increase their participation and vocalization and eventually increase their level of speech and communication.[106]

Joint attention is another impaired developmental area in children with ASD. Joint attention can be students focusing on the same object or another student. Music is a medium to

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[102] Scott, *Music Education,* 63.

[103] Ibid., 100.

[104] Erin McMullen and Jenny R. Saffran, "Music and Language: A Developmental Comparison," *Music Perception: An Interdisciplinary Journal* 21, no. 3 (2004): 289-311. https://doi.org/10.1525/mp.2004.21.3.289.

[105] Scott, *Music Education,* 69.

[106] Ibid., 103.

encourage and teach joint attention skills to children with ASD. Enabling students with ASD to listen to as many different musical examples as possible will help develop a wider range of listening skills. A teacher must provide musical examples that are tolerated or enjoyed by a child with ASD. If a child reacts negatively to the music, then joint attention cannot be attained.[107] The variety of music genres available can provide children with ASD many experiences of joint attention and creating connections with peers.

Kim, Wigram, and Gold, music therapy researchers, have stated that music can motivate and foster joint attention in children with ASD.[108] Using music to teach joint attention is one goal of music therapy. Listening to music can promote receptivity, stimulate, or relax, foster interpersonal connections, evoke imagery, and induce emotions. All these reactions can help a teacher observe how the child responds and use the assessment to further joint attention growth. Similar to increasing communication skills, the use of repetition in melody, meter, and rhythm can improve joint attention. Mary Crum Scholtens, an educator and researcher, makes recommendations based on research-based strategies that it is important for a teacher to play the same song over some time and incorporate other musical activities with their classmates to foster growth in joint attention.[109] Music education can increase engagement, social interactions, communication, and of course, joint attention.[110]

Dr. Elizabeth B Torres, a Professor of Psychology at Rutgers University and Dr. Caroline

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[107] Scott, *Music Education,* 107.

[108] Jinah Kim, Tony Wigram and Christian Gold, "The Effects of Improvisational Music Therapy on Joint Attention Behaviors in Autistic Children: A Randomized Controlled Study," *Journal of Autism and Developmental Disorders* 38, no. 9 (2008): 1758. doi:10.1007/s10803-008-0566-6.

[109] Scholtens, “Using Music,” 45-51.

[110] Alessandro Antonietti, Barbara Colombo, and Braelyn R. DeRocher, *Music Interventions for Neurodevelopmental Disorders* (Cham, Switzerland: Palgrave Macmillian, 2018), 52, doi.org/10.1007/978-3-319-97151-3_3.

Whyatt, a researcher with the Psychology and Sports Science Department at the University of Hertfordshire, UK conducted a joint research study concerning the possible solutions for sensory challenges for students with ASD. Their research noted that students with ASD often have multiple sensory challenges. Autism can cause sensory sensitivity to tactile, visual, auditory, vestibular, and motor planning. Teachers need to be aware of their student's sensitivity. However, music therapy and music education can assist in regulating sensory input and toleration.[111] Torres and Whyatt suggest that one of the first steps is to add movement to the music lessons. Movement in music lessons will not only encourage joint attention but it will focus the nervous system on controlling the body to move with the rhythm, melody, and meter.[112]

LaGasse, Hardy, Anderson, and Rabon's research has shown that music stimulates areas of the brain that are used for speech, attention, and movement.[113] This is why music is used to treat people with aphasia, strokes, and other brain injuries.[114] The use of music and movement can help stimulate sensory toleration along with motor, communication, and cognitive skills. They found in their study that music education can change the brain in the motor, auditory, frontal, and visual regions of children's brains. They also found that the patterning in the rhythm and melody can help the sensory systems. Thus, they concluded, the use of music will assist in the sensory development of a child with ASD.[115]

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[111] Hourigan, Hourigan, *Teaching Music, 35.*

[112] Elizabeth B. Torres and Caroline Whyatt, *Autism the Movement Sensing Perspective* (Boca Raton: Taylor & Francis, 2018). doi:10.1201/9781315372518.

[113] Blythe LaGasse et al., "Rhythm and Movement for Autism Spectrum Disorder," in *Autism*, 1st ed. (Boca Raton: CRC Press, 2018), 229-242. https://www.taylorfrancis.com/books/9781315372518/chapters/10.1201/9781315372518-22.

[114] LaGasse et al., "Rhythm and Movement," 231.

[115] Ibid., 238.

Music education is vital for students with ASD. A multitude of research has shown that music can reach a portion of the brain that assists with communication, social, and attention. Studies show music allows students with ASD to participate, learn, and grow with other students without disabilities and sometimes with little to no accommodations. Hammel and Hourigan state, "The use of music can be powerful in the life of a student with autism as they provide unique avenues for receptive and expressive language as well as opportunities for growth in communication, cognition, behavioral/emotional, sensory, and physical areas."[116] These are the many reasons why music education is beneficial for students with ASD.

Applying UDL to Music Curriculum

Multiple publications, websites, and teacher resources can provide teachers with ideas, guides, and examples of teaching music to students with autism, but it is important to use evidence-based practices (EBP) to teach. Dr. Melinda M Leko, a professor with the University of Wisconsin in the School of Education specializing in Special Education and the study and research into evidence-based practices, reports that EBP have been scientifically reviewed, created, and tested for specific classroom needs. Teachers using EBP can support positive outcomes and document the usefulness of the implementation of EBP for other teachers and scholars. Her research has led her to recommend that in responding to the needs of students with ASD, it is critical to implement practices that have amassed research support demonstrating a positive effect on student outcomes.[117].

Universal design for learning (UDL) is an EBP that scholars, educators, and researchers recommend using to create music lessons for students with autism. Two renown educators and

[116] Hourigan, Hammel, "Teaching Students", 20.

[117] Leko, "Selecting," 286-294

researchers Dr. Alice-Ann Darrow, a professor of music therapy and music education and Dr. Mary Adamek, a music therapy professor with the University of Iowa frequently collaborate on research and writing on the topic of music education and including students with autism. Darrow and Adamek recommend that music educators utilize the principles of UDL whenever possible in the music classroom.[118] In applying UDL, teachers require fewer accommodations and modifications to lessons. The lessons already provide multiple means of representations, expression, engagement, and motivation. Few students may need further or more detailed support. Their research has demonstrated that using UDL will create a learning environment that will be accessible to the majority, if not all, students.

Darrow and Adamek recommend including technology within the UDL lessons.[119] This allows the teacher to provide different ways for the lessons to be introduced, implemented, and assessed. Technology can also be used to allow the student to demonstrate mastery or understanding of a musical topic. Music technology only sometimes means computer-based; it could also be mixing boards, electric keyboards, guitars, and other electronic means of creating music. Dr. David Knapp added with his own research on the topic that including technology in music education can open multiple means of expression and create a far more inclusive music classroom.[120]

Dr. Draper's research goes on to recommend applying UDL principles in planning music lessons. She states in her study, "teachers may find UDL useful in planning to effectively meet the musical learning needs of all students in their classes. The pillars of UDL encourage teachers

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[118] Darrow and Adamek, "Instructional Strategies," 61-65

[119] Ibid., 64.

[120] David Knapp, "Modern Band and Special Learners," *General Music Today* 34, no. 1 (Oct, 2020): 49-52, https://journals.sagepub.com/doi/full/10.1177/1048371320942279.

to consider providing multiple means of (a) engagement, (b) representation, and (c) action and expression, which allows students to approach educational experiences in the ways they best learn."[121] In her case study she determined that including students with ASD in the music classroom was beneficial to students. She found that the students thrived in the music classroom that applied some of the UDL framework elements to their lessons. Draper states that providing multiple ways to learn, engage, and express themselves allowed the students to demonstrate more of their strengths in music rather than any deficits.[122]

Elementary general music is the ideal platform for using UDL. Gordon's Music Learning Theory (MLT), Kodaly, and Orff are three different approaches that a music teacher can use to deliver music instruction. Each one has its own way of presenting and teaching music content. Music teachers applying UDL can utilize the three different approaches of MLT, Kodaly, and Orff to ensure that students have the widest variety of opportunities to learn music. MLT focuses on listening and understanding each students learning differences. Kodaly focuses on rhythm, singing, and movement, this can assist in joint attention, social and communication skills. Orff includes movement, singing, and instrument playing. All the Orff elements can enhance joint attention, communication, and social skills. Michelle Angeli's research project concluded that a music curriculum that includes more than one pedagogical style can help equip students with the foundational abilities to develop, learn, and reach goals essential for lifelong success.[123] Including each of the pedagogical approaches within the UDL framework for music classrooms can provide all students the ability to learn, express, and engage in music how they learn best.

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[121] A. Draper, "Music Education," 135.

[122] Ibid., 145.

[123] Michelle Angeli, "Music Education Transformation: How Orff, Kodaly, and Suzuki Promote Academic Success"(MA Theses Liberty University, 2020), 55.

Dr. Ellary A. Draper, an associate professor of Music Therapy at the University of Alabama, that specializes in research on inclusive music classrooms, says that given the increase of autism in music classrooms, teachers need to be more prepared to address the multiple needs of all students.[124] Students with autism will be on individual education plans (IEP) that teachers need to address and support. Her research confirms that teachers can use UDL to increase the effectiveness of teaching students with ASD. By making some minor adaptations to the classroom environment and instructional strategies and applying the UDL principles and framework, students with ASD can be successful in the music classroom.[125]

Teachers should first be aware of their student's needs. Glass et al. assert that providing inclusive musical experiences is a process of identifying barriers to learning, problem-solving, responsive teaching, and using principled designs.[126] Dr. Darrow believes teachers need to plan how to introduce topics to students and provide multiple ways of presenting the information. Then teachers should provide multiple means for the students to express, demonstrate, or apply the knowledge they learned on the topic. Lastly, understanding that not all students have the same interests and motivations will help the teacher encourage and stimulate learning.[127]

Technology is important to implementing UDL, according to Dr. Darrow. IDEA of 1997 mandates the consideration of assistive technology when teaching students on IEPs.[128] Technology can be direct, assistive, or adaptive. Including technology in a UDL lesson increases

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[124] Ellary A. Draper, "Teaching Students with Autism Spectrum Disorder: Strategies for the Music Classroom," *General Music Today* 33, no. 2 (Jan, 2020): 87. https://journals.sagepub.com/doi/full/10.1177/1048371319880874.

[125] E. Draper, *Teaching Students*, 89.

[126] Hall, Meyer, Rose, *UDL*, 43.

[127] Alice-Ann Darrow, "Applying the Principles of Universal Design for Learning in General Music," in *Teaching General Music* (New York: Oxford University Press, 2016), 343, https://doi.org/10.1093/acprof:oso/9780199328093.003.0015.

[128] Darrow, "Applying", 308.

the means of representation, response, and experiences in music education for students with disabilities. Modern music classrooms can provide contemporary technology that will motivate students with ASD to participate and learn. A variety of technological instruments or tools can assist with reading, composing, playing, and prompting music.[129]

Quaver's Marvelous World of Music asserts it is an appropriate music curriculum to use when applying UDL principals.[130] UDL guidelines recommend including or using technology when teaching, *Quaver* is a technology-based music curriculum. *Quaver* also provides multiple means of representation, engagement, and assessment, when teaching different musical elements. Students with ASD can be taught using group, computer-based, or individualized activities. *Quaver*'s resources are adaptable for the needs of any students present in the music classroom. The sensory needs of a student with ASD can be easily met with *Quaver* because the web-based program can be adjusted in color, pacing, delivery (technologically or print outs), audio, text, screen controls, and flashing objects. Once teachers learn of the many facets of *Quaver*, applying UDL when delivering lessons will be almost automatic in nature.

Theoretical Framework

Dr. Bunnie Claxton, the director of applied research at Liberty University, and Dr. Dolan, an editor, dissertation mentor, and author, explain in their book, *A Step-by-Step Guide to Writing a Literature Review for Doctoral Research*, that a theoretical framework leads the research and permits the researcher to concentrate on a specific goal.[131] It is important for applied research in

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[129] Darrow, "Applying," 344.

[130] "Universal Design Learning (UDL) Questionnaire," QuaverMusic.com, last modified 2016, https://www.fldoe.org/core/fileparse.php/18454/urlt/2936PUBUDL.pdf.

[131] Bunnie Claxton and Carol L. Dolan, *A Step-by-Step Guide to Writing a Literature Review for Doctoral Research*, (Dubuque, IA: Kendall Hunt Publishing, 2021), 7, VitalSource.

education that the theoretical framework is clear and connected to research. The framework also helps detect the problem related to the research topic, guide the development of the research questions, and reveal the best type of research method for answering those questions. The theory used to explain this research was the Theory of Multiple Intelligences (MIT) by Howard Gardner.[132]

The Theory of Multiple Intelligences by Howard Gardner provides a theoretical framework and foundation for the application of Universal Design for Learning to *Quaver*'s curriculum to teach students with ASD in the music classroom. The theory of multiple intelligence suggests that every person can learn if instruction is focused on teaching students as individuals.[133] Gardner stated that people are born with a multiplicity of intelligences that, when developed in school, can promote the achievement of great individual accomplishments. Individuals should be taught in ways that they can learn and understand. Assessments should be done in a way that allows people to demonstrate what they know and how they can apply their knowledge and skills in different ways.[134]Gardner's theory indicates that there are eight intelligences; naturalistic, spatial, musical, bodily kinesthetic, linguistic, intrapersonal, interpersonal, and logical.[135] He developed his theory because he believed that the conventional definition of intelligence was restrictive and narrow, not allowing people to display other many skills and intelligences they may possess when given traditional IQ tests. Because UDL promotes inclusion, engagement through multiple means, and assessments based on an individual's

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[132] Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences*. (New York, NY: Basic Books, 2011): 378, ProQuest Ebrary.

[133] Gardner, *Frames of Mind,* 348

[134] Howard Gardner, "Frequently Asked Questions: Multiple Intelligences and Related Educational Topics," Harvard Graduate School of Education, 2012, https://howardgardner01.wordpress.com/.

[135] Michele Marenus, "*Gardner's Theory of Multiple Intelligences,"* Creative Commons, last modified February 9, 2023, https://www.simplypsychology.org/multiple-intelligences.html.

abilities, the multiple intelligence theory is an appropriate choice for this study which seeks to determine if applying UDL to *Quaver's* music curriculum will ensure that students with ASD are engaged, enriched, and included in the music classroom.

According to Nasri et al., the UDL framework and MIT can help make advancements in inclusive education.[136] The study identified the differences between a traditional classroom and a classroom implementing UDL to help include and engage all students. They concluded that both UDL and MIT helped teachers engage, support, and enrich students in an inclusive classroom. Both UDL and MIT have a strong emphasis on teaching a student's individual needs and presenting the curriculum to their strengths. This demonstrates that MIT is a logical choice for the theoretical framework for this applied research study.

The Universal Design for Learning Framework follows this theoretical framework in encouraging the creations of lessons that are inclusive of all learners. MIT supports positive inclusive learning for students with ASD in the music classroom. Both UDL and Multiple Intelligence agree that each human being approaches learning differently.

[136] Nurfarahin Nasri, Nik Mohd Rahimi, Nurfaradilla Mohamad Nasri, and Mohamad Asyraf Abd Talib, "A Comparison Study between Universal Design for Learning-Multiple Intelligence (UDL-MI) Oriented STEM Program and Traditional STEM Program for Inclusive Education," *Sustainability (Basel, Switzerland)* 13, no. 2 (2021): 554. doi:10.3390/su13020554. https://search.proquest.com/docview/2477144361.

Chapter Summary

The purpose of this applied study is to measure the perceived effectiveness of applying Universal Design for Learning (UDL) to *Quaver's Marvelous World of Music* curriculum to positively engage and support students with autism spectrum disorder (ASD) in the general music classroom. Due to the increase of students with ASD in the mainstream elementary music classroom, there is a deficit in adequate pedagogical recourses for educators to effectively include these students. No research has shown UDL to be effective with *Quaver's* curriculum for students with ASD. However, according to the literature presented in this review, the research and studies provide a positive foundation for the use of UDL to teach students with ASD in the music classroom. The technology-based music curriculum offers students with ASD multiple means of representation, expression, engagement, and motivation. This literature review reinforces the benefits of music for students with ASD and using UDL and technology within a music curriculum. The accumulative literature overall supports the use of UDL with *Quaver's Marvelous World of Music* curriculum to positively engage and support students with ASD in the general music classroom.

Chapter Three: Methods

Introduction

Educational laws require all students to have equal access to adequate education. The reauthorization of ESEA in 2015, Every Child Achieves Act (ECAA) ensured that music and the arts were core subjects. These laws provide that music is present in schools but does not address the need for specialized music programs that support all learners, not just the musically talented.[137] There needs to be more music curriculum support for students that learn differently. Research has shown that inclusion benefits all stakeholders within the music classroom.[138] Therefore, the purpose of this applied study is to measure the perceived effectiveness of applying Universal Design for Learning (UDL) to *Quaver's Marvelous World of Music* curriculum to positively engage and support students with autism spectrum disorder (ASD) in the general music classroom.

In this chapter, the researcher will summarize the study's methodology by emphasizing the methodological design and interpretive framework that will direct this study-moreover, a synopsis of the study's participant selection, procedures, instrumentation, and setting. A review of the study's data collection and analysis plan will conclude this chapter.

Design

This applied research study used a convergent parallel mixed method research design, illustrated in Figure 2. Lisa M. Given clarifies that applied research, sometimes called action research, is designed for the researcher to make improvements by solving real-world problems

[137] Catherina Hurlburt, "Senate Passes Every Child Achieves Act with Music and Arts as Core Subjects," *Music Educators Journal* 102, no. 1 (Sep 1, 2015): 12. https://search.proquest.com/docview/1719389008.

[138] Jellison, Brooks, Huck, *Structuring*, 243-264.

through practical research with participants who are knowledgeable about the issue.[139] This research seeks to solve the problem of properly including and supporting students with ASD in the general music classroom by determining the effectiveness of using UDL framework with *Quaver's Marvelous World of Music* curriculum. Both narrative and numerical data were collected, making the applied research mix method design the most appropriate choice to determine the perceived effectiveness of the proposed solution to including students with ASD in the general music classroom.

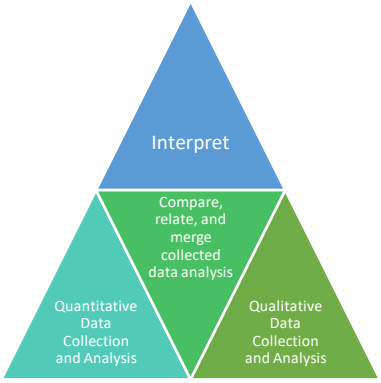

Figure 2 Convergent Parallel Design

Craig Mertler says that educational research involves the application of the scientific method to problems, occurrences, or educational topics in search of answers.[140] In 1996, Beth-Ann Miller used this type of research to determine if integrating music instruction within a core curriculum would enhance learning and study motivation. In using applied research, Miller was able to improve educational functions and informed herself and colleagues of positive changes to teaching music in context and style.[141] Leglar and Collay reported in *The New Handbook of*

[139] Lisa M Given ed. *The SAGE Encyclopedia of Qualitative Research Methods* (Thousand Oaks, CA: Sage Publication 2008), 18.

[140] Craig A. Mertler, *Action Research: Improving Schools and Empowering Educators* (Thousand Oaks, CA: Sage Publications, 2019), 6, SAGE Research Methods-Ebooks.

[141] Kay Ann Hartwing and Georgina Barton, *Research Methodologies in Music Education.* ed. by Kay Ann Hartwing. (Newcastle upon Tyne, England: Cambridge Scholars Publishing, 2014), 80. ProQuest Ebrary.

Research on Music Teaching and Learning, that applied, or action research can help teachers create new knowledge, interpretations, and apply the findings directly to their classrooms.[142] When teachers generate research they have more ownership with the results. Leglar and Collay reflect on Miller's experience and state that applied research is effective for elementary music teachers because it is collaborative, addresses practical classroom programs, and encourages professional development and shared ownership.[143]

Bickman and Rog suggest using a multimethod or mixed method design in applied research.[144] The method allows for flexibility, acquiring more data, and richer insights on the program because of the personal relationship with the topic. The multimethod design includes collecting both qualitative and quantitative data.[145] Mertler explains that the combination of qualitative and quantitative data can provide the researcher with a better understanding of the research problem than each type of data can on its own.[146] The collection of qualitative and quantitative data will help scientifically study the effectiveness of applying UDL to the *Quaver* curriculum to engage students with ASD in the music classroom positively.

Creswell and Poth state that the credibility of the research is stronger when the research uses triangulation to analyze the data.[147] The research will collect data through qualitative and quantitative methods to uncover solutions to the problem and add relevant literature gathered and

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[142] Mary Leglar, and Michelle Collay, "Research by Teachers on Teacher Education." In *The New Handbook of Research Music Teaching and Learning: A Project of the Music Educators National Conference*, ed. Richard Colwell, and Carol Richardson (New York, NY: Oxford University Press, 2002), 855. Oxford Academic.

[143] Leglar and Collay, *Research by Teachers*, 868.

[144] Leonard Bickman and Debra J. Rog, *The SAGE Handbook of Applied Social Research Methods* (Thousand Oaks, CA: Sage Publications, 2008), 12. https://doi.org/10.4135/9781483348858.

[145] Claxton and Michael, *Applied Research,* 7.

[146] Mertler, *Action Research,* 13.

[147] John W. Creswell and Cheryl N. Poth, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (Thousand Oaks, CA: SAGE Publications, 2018), 159, VitalSource.

investigated by the researcher. The three sources will strengthen the validity of the information gathered from multiple data sources.

Questions and Hypotheses

The research questions of this study are:

For music teachers that teach students with autism in the elementary music classroom:

RQ1 How can applying the UDL principles help modify the *Quaver Wonderful World of Music* curriculum to accommodate the sensory, communicative, and joint attention needs of students with ASD?

RQ2 Is there a significant difference in social interaction, communication, and joint attention in music class among students with ASD between those receiving modified *Quaver* music lessons/presentations and those receiving non-modified *Quaver* music lessons/presentations?

The researcher used the following hypotheses in this study:

H1 In applying UDL principles to the *Quaver Wonderful World of Music* curriculum, teachers can provide seamless support to the sensory, communicative, and joint attention needs of students with ASD in the elementary music classroom without making post-planning accommodations and modifications to lessons.

H2 There is a positive difference in social interaction, communication, and joint attention among students with ASD in music class after receiving *Quaver* music lessons planned using the UDL framework and guidelines.

Participants

The researcher recruited seven participants. The researcher works in the same school district and is familiar with all the participants. Gary T. Henry recommends using nonprobability sampling within applied research to support the internal validity of the qualitative portion of the research.[148] In order to recruit participants, the researcher created a purposive sampling method. Purposive sampling is a non-probability method that picks knowledgeable participants for research.[149] Selected participants must meet specific practical criteria to participate in this study. The criteria are:

1. Each participant must teach in a K-5 music classroom.
2. Each participant must have at least of two years' experience and training on NCAS and *Quaver's Marvelous World of Music* curriculum.
3. Each participant must work for the same overseas military-connected school district.

Ensuring all participants meet the listed criteria strengthens the reliability of the data.

Interpretive Framework

Johanna Moisander and Ana Valtonen clarify that an interpretive framework guides the researcher to interpret the collected data in a particular way. It also assists in determining which methodology and analytical constructs are best for data analysis.[150] David L Morgan characterizes pragmatism as "what works in a given situation" and that pragmatism is a good

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[148] Gary T. Henry, "Practical Sampling," ed. Leonard Bickman and Debra J. Rog, *The SAGE Handbook of Applied Social Research Methods* (Thousand Oaks, CA: Sage Publications, 2009), 82.

[149] Tom Lawson, Anna Faul, and A.N. Verbist, *Research and Statistics for Social Workers*, (Milton: Taylor & Francis Group, 2019): 137. ProQuest Ebrary.

[150] Johanna Moisander and Anu Valtonen, "Interpretation and Interpretive Frameworks," in *Qualitative Marketing Research* (London: SAGE Publications Ltd, 2006), 100. Sage Research Methods-Ebooks.

model for most mixed methods research.[151] According to Morgan, John Dewey was very interested in a pragmatic research approach, and developed a concept of inquiry linking the beliefs and the actions to help in the decision-making process.[152] This applied research study relies on Dewey's five-step inquiry model for mixed methods social science research study. The five steps are as follows and depicted in Figure 3, recognizing a problem, consider the difference it makes to define the problem, develop actions to respond to problem, evaluate actions, and take action to address the problem.[153] The applied study evaluates the effectiveness of applying UDL to *Quaver*'s curriculum.

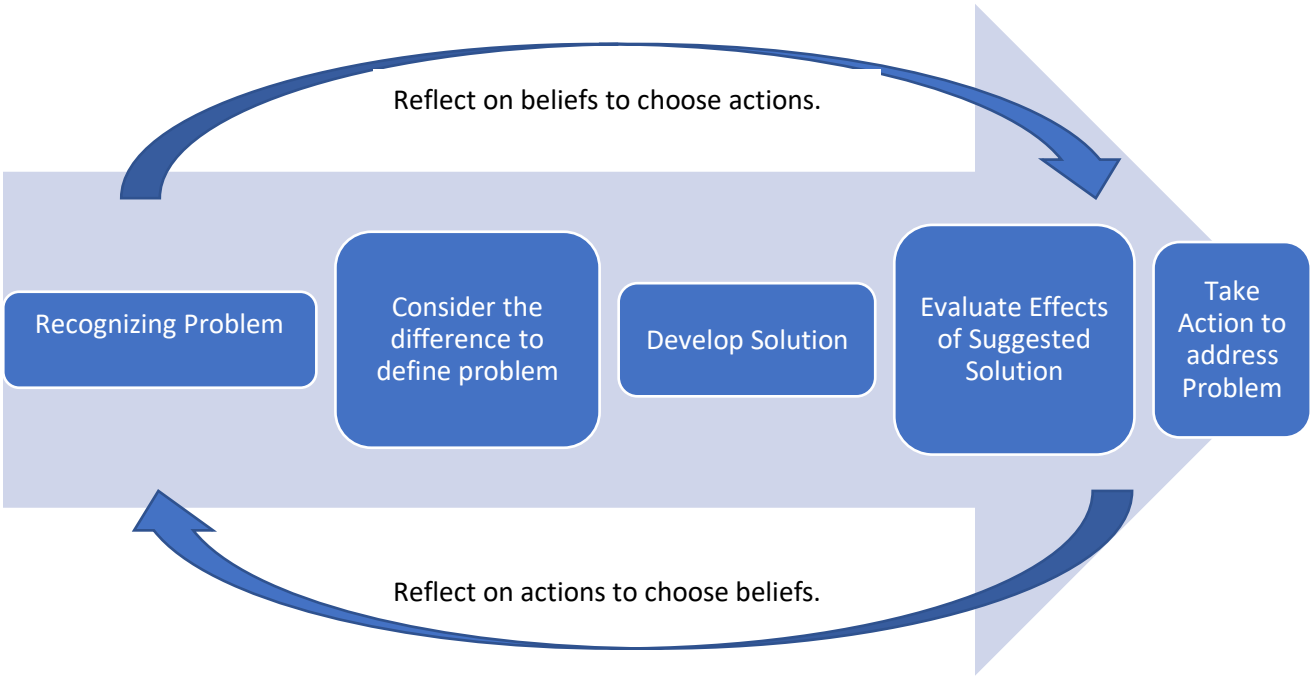

Figure 3 Dewey's Model of Inquiry[154]

[151] David L. Morgan, "Pragmatism as a Paradigm for Social Research," *Qualitative Inquiry* 20, no. 8 (2014): 1045-1053. https://journals.sagepub.com/doi/full/10.1177/1077800413513733.

[152] Morgan, "Pragmatism," 1045.

[153] Ibid., 1048.

[154] Ibid., 1048.

Philosophical Assumptions

Philosophical assumptions are essential to understand research. The philosophical beliefs help the researcher to find the problem and research questions. Creswell and Roth define the three philosophical assumptions and how the three relate to the research study: ontological, epistemological, and axiological. Creswell and Roth explain that each of these philosophical assumptions helps support each process in the research.[155]

Ontological, from a pragmatic researcher's view, seeks to explain the subject of the study from multiple points of view that best enable the researcher to answer the question. The researcher reported other points of view of music education for students with ASD and found positive perspectives on using UDL to engage students with ASD in the music classroom. The researcher assumed ontologically that each teacher familiar with *Quaver's* curriculum could successfully apply UDL frameworks and guidelines to engage, include, and participate not only students with ASD but all students that enter the general music classroom. The researcher did not assume that all participants shared a similar knowledge or background understanding of every UDL principle.

Creswell and Poth go on to explain that epistemological is when the research uses information from the participants and personal experiences.[156] The researcher assumed, epistemologically, that the participant's curricular knowledge of *Quaver's Marvelous World of Music* and applying UDL principles therein, could be assessed and charted based on specific criteria. The researcher evaluated each participant's experiences applying the UDL principles to *Quaver*'s curriculum. The quantitative data collected can reveal what can be known. Then the

[155] Creswell and Poth, *Qualitative Inquiry,* 20.

[156] Ibid., 18.

researcher's qualitative semi-structured interviews with the participants are critical to the overall collection of data. The participant's curricular knowledge, teaching experiences, and backgrounds could be assessed and charted to help the researcher create a solution based on the participant's human perceptions and social experiences as teachers. Qualitative interviews are considered one piece of the mixed methods data collection for the study.

Finally, Creswell and Poth explain that axiology is when the researcher brings their values or beliefs to the study.[157] The researcher must acknowledge their own biases and values in the study. The researcher positions themselves within the research to acknowledge their own historical and personal experiences shape their interpretation of the data and research.[158] The researcher has a master's in special education and is aware of instructional strategies for including students with autism. After much investigation, the researcher found a lack of evidence that applying UDL to *Quaver*'s curriculum will positively engage students with autism in the general music classroom. In response to the need for evidence supporting *Quaver's* claim that the UDL framework will engage students with ASD, the researcher commenced the thesis project. This project produced data for music educators that need a music curriculum that supports the social, communicative, joint attention, and sensory needs of mainstreamed ASD students in their music classroom.

Procedures

Before commencing the study, the researcher obtained authorization from Liberty University Institutional Review Board (IRB) (see Appendix A). Approval was also attained from the private social media group administrator to contact select members to participate in the study

[157] Creswell and Poth, *Qualitative Inquire,* 18.

[158] Ibid., 24.

(see Appendix B). A social media post was placed on the private group to recruit its members for the study (see Appendix C). Each recruited participant received a recruitment email with a link to the demographic questionnaire and participation consent form via Microsoft Forms (see Appendix D). The consent form provided each participant with a summary of the study's purpose, the requirements of the participants, how privacy and confidentially are maintained, and the risk associated with participating in the study (see Appendix F).

Each participant was scheduled for a date and time to complete the qualitative portion of the study. Each participant was sent a copy of the qualitative interview questions before the meeting (see Appendix G). The interviews with the participants lasted approximately thirty to forty-five minutes. During this time, the researcher asked each participant the same six open-ended questions. The meetings were conducted via Microsoft Teams through Liberty University's Microsoft Office suite so they could be recorded and transcribed into Microsoft Word for data collection. Each recording, after transcription, was stored on a password-locked computer and will be deleted after three years in compliance with the agreement of the study.

A twenty-four-question quantitative questionnaire was given to the participants to respond to via Microsoft Forms. (see Appendix H). Microsoft Forms collects, counts, and organizes the data in the completed survey. The questions will help the researcher determine the perceived effectiveness of applying the UDL framework to the *Quaver* curriculum. There was little to no risk to participate in this study. The participants only discussed their perceptions, experiences, and opinions regarding the topic. The option of withdrawing from the study without consequence was given to the participants when they agreed to participate.

Data Collection and Analysis

The researcher utilized methodological triangulation because this applied research study uses a convergent mixed-method research design.[159] Methodological triangulation is used in applied studies to help the researcher converge mixed method data collections on a single topic to validate the conclusion or recommendations better.[160] A systematic review of the literature, qualitative survey, and quantitative survey are all part of the researcher's methodological triangulation for this study. First, the researcher systematically reviewed a variety of literature to demonstrate the benefits of applying UDL to *Quaver's* music curriculum. Second, the researcher conducted qualitative semi-structured interviews with each recruited participant. The researcher recorded each interview via Microsoft Teams. Microsoft Teams application made a recording and transcription of each interview. The transcription was then saved in Microsoft Word (see Appendix I). Using the Delve Tools qualitative analysis program, each interview was analyzed. The program aids in coding, organizing, and analyzing qualitative data in semi-structured interviews. Lastly, all recruited participants received a link to a quantitative survey. It recorded their opinions on the effectiveness of each UDL principle and guidelines to help determine the overall efficacy of applying UDL to *Quaver's* music curriculum: quantitative research analyzes and interprets the information as a result of numbers.[161] The quantitative survey questions will be based on the opinions of the participants. Those opinions will transfer to a numerical value of the data collected. The researcher chose a Likert scale for the survey. A Likert scale is used for

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[159] John W. Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, (Thousand Oaks, CA: SAGE Publications, 2017): 213. VitalSource.

[160] Remco Heesen, Liam Kofi Bright, and Andrew Zucker, "Vindicating Methodological Triangulation." *Synthese* 196, no. 8 (2019): 3067-81, https://doi.org/10.1007/s11229-016-1294-7.

[161] J.W. Check and R.K Schutt, *Research methods in education.* (Los Angeles, CA: SAGE Publications, 2012): 276. Sage Research Methods-Ebooks.

statistical analysis to measure participants' attitudes toward the topic questions.[162] Calculating the mean of the Likert scale was part of the quantitative survey data examination. A bar chart was used to display the survey data results.

Trustworthiness

Trustworthiness in qualitative research includes the following criteria: credibility, transferability, dependability, and confirmability.[163] Adler explains that Lincoln and Guba improved the perception of trustworthiness to include those criteria. They stated that the four areas are essential to parallel the validity and reliability of quantitative assessments.[164] Adler contends that trustworthiness is vital for evaluating qualitative research because unlike quantitative, it is the researcher that is the primary research instrument.[165] Transparency during research must be maintained to ensure the trustworthiness of the researcher.

Credibility

Credibility is created when there is trust placed within the research findings. Nowell, Norris, and Moules write that Guba and Lincoln claimed that a study is credible when readers or co-researchers recognize the 'truth' in the findings.[166] Credibility in qualitative research can be established by triangulation, prolonged engagement on the topic, member checking of the participants' input, and persistent observation.[167] In this research triangulation, and member

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[162] Mertler, *Action Research,* 146.

[163] Rachel Adler, "Trustworthiness in Qualitative Research," *Journal of Human Lactation*, 38, no. 4 (2022):599. doi:10.1177/08903344221116620

[164] L.S. Nowell, J.M. Norris, D.E. White, and N.J Moules, "Thematic Analysis: Striving to Meet the Trustworthiness Criteria", *International Journal of Qualitative Methods,* 16 (2017): 3. Doi:10.1177/1609406917733847.

[165] Adler, "Trustworthiness," 599.

[166] Nowell, Norris, White, and Moules, "Thematic," 2.

[167] Ibid., 3.

checking will be used to ensure credibility.

Transferability

Transferability is done in qualitative research when the results of the study can be transferred to other settings, contexts, and people.[168] In applied research, it is important that the researcher has not generalized the findings but provided detailed, in-depth research on the topic.[169] Readers can compare the findings and implement the suggestions from this research with any chosen music curriculum to help engage students with ASD in the general music classroom.

Dependability

To achieve dependability, the researcher must provide clear, logical, and traceable documentation of the research.[170] It is the responsibility of the researcher to delineate changes to the setting and explain how these changes affect the approach of the study. Allowing readers to examine the research process will create dependability.[171] In this research, the same interview questions and process were maintained during data collection. All processes of data collection were also described in detail to achieve dependability.

Confirmability

Nowell, Norris, White, and Moules explain that confirmability refers to establishing that the interpretations and findings of the researcher are derived from the data. This is done by

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[168] Nowell, Norris, White, and Moules, "Thematic," 3.

[169] Mertler, *Action Research,* 141.

[170] Nowell, Norris, White, and Moules, "Thematic," 3.

[171] Mertler, *Action Research,* 140.

explaining how conclusions and interpretations were reached.[172] The researcher ensured confirmability by repeatedly checking and reviewing data throughout the collection process.

Ethical Consideration

The present research shall adhere to specific ethical protocols. The primary ethical procedure requires that the researcher secure approval from the Liberty University Review Board (IRB) (see Appendix A) and the administrator of the private Facebook group of music educators from whom she is recruiting participants (see Appendix C). The researcher will have participants sign a consent form outlining the study's purpose, requirements, confidentiality/privacy, and potential risks (see Appendix G). The study participants had little to no risk in discussing their perceptions on the topic. Participants were also notified that they could withdraw from the study without facing any adverse consequences.

Electronic copies of all information and data are in a password-protected file. The researcher maintains confidentiality and privacy of the participants by identifying them with numbers. The researcher will destroy all digital data and participant information after three years, as stated in the IRB application and permission form.

[172] Nowell, Norris, White, and Moules, "Thematic," 3.

Chapter Summary

Experts support using the UDL framework in music education to help support students with ASD in the music classroom. Darrow and Adamek recommend applying UDL in the general music classroom and including technology in the lessons to enhance understanding and mastery.[173] Even with *Quaver's* compliance with accessibility guidelines and recommendations of applying UDL to their curriculum. There has been no specific study on the topic. This applied study implemented a mixed methodology.

This applied research study aimed to measure the perceived effectiveness of applying Universal Design for Learning to *Quaver's Marvelous World of Music* curriculum to positively engage and support students with autism spectrum disorder in the general music classroom. The researcher followed ethical guidelines safeguarding the confidentiality and privacy of all participants.

[173] Darrow and Adamek, "Instructional Strategies," 65.

Chapter Four: Presentation of Findings

Introduction

Music education is essential and assists in developing emotions, social connections, and cognitive growth. These reasons make it imperative that students with autism are included in music education to close the gap on their varying deficits in their cognitive, communicative, and social development.[174] This applied research study uses convergent parallel mixed methods design and aims to determine the perceived effectiveness of applying UDL principles to *Quaver's* curriculum to positively engage and support students with ASD in the general elementary music classroom. Tashakkori and Creswell state that mixed methods research collects both qualitative and quantitative data, analyzes, integrates the findings, and then draws inferences using both sets of data for a single study.[175] In gathering quantitative and qualitative data separately a researcher can use the data to triangulate the findings and support the claims that applying UDL to *Quaver's* curriculum does positively engage students with ASD in the elementary general music classroom.[176]

Description of Participants

The researcher used a private Facebook group to introduce and invite participants to the study. They are music educators in the same US military-affiliated school system. Eight educators from the private group responded to the recruitment survey, but only seven of the eight

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[174] Petra Kern and Marcia Humpal, eds. *Early Childhood Music Therapy and Autism Spectrum Disorders: Developing Potential in Young Children and Their Families*. (London: Kingsley Publishers, 2012): 101.

[175] Abbas Tashakkori and John W. Creswell, "Editorial: The New Era of Mixed Methods," *Journal of Mixed Methods Research* 1, no. 3 (2007): 4. SAGE Journals.

[176] Jessica T. DeCuir-Gunby and Paul A. Schutz, *Developing a Mixed Methods Proposal: A Practical Guide for Beginning Researchers*, (Thousand Oaks, CA:SAGE Publications, 2017): 92, https://doi.org/10.4135/9781483399980.

qualified to participate in the study. 100% of the participants had both at least five years of experience teaching elementary music and using *Quaver's Marvelous World of Music* curriculum for the past two to five years. Each of the participants also have students with ASD included in their elementary music classrooms during instruction. Numbers are applied in place of each participant's name to protect their identity.

Table 1 Characteristics of Participants

Participant	**Used *Quaver* for at least 2-5 years**	**Minimum 5 years teaching elementary**	**Years of Experience**	**Highest Level of Education**	**Any specialized training in special education**	**Students with Autism included in music classroom**
#1	Yes	Yes	25	MA	No	Yes
#2	Yes	Yes	12	BA	PD	Yes
#3	Yes	Yes	23	DOM	MA in Music for Sped	Yes
#4	No					
#5	Yes	Yes	22	DOM	PD	Yes
#6	Yes	Yes	26	ED	Graduate Classes	Yes
#7	Yes	Yes	17	MA	No	Yes
#8	Yes	Yes	22	MA	PD	Yes

Results

Mixed-Methods Design requires qualitative and quantitative data collection.[177] The results are presented in three sections. The first section reviews 24 quantitative Likert scale questions presented to the seven participants. The quantitative questionnaire results were divided into four coded sections: "engagement," "representation," "action & expression," and "overall perception of success of using UDL with *Quaver* to engage students with ASD in the music classroom positively." The second section reviews the qualitative questions; six open-end

[177] Creswell and Creswell, *Research Design*, 213.

qualitative questions were discussed with the seven participants. The interviews were transcribed and analyzed. Analysis of the interviews comprised sorting and identifying themes based on deductive codes identified prior to interviews and based on inductive codes from the participants' words, phrases, and sentences. Findings from the literature review then supported these themes and codes. The literature review summary corroborates the results of the qualitative and quantitative data presented in this chapter.

Quantitative Survey Results

The Likert scale is widely used in quantitative surveys in social and applied sciences.[178] These scales measure a range of views, expressions, or opinions about a basic concept that range from negative to strongly positive. Alabi's and Jelili's recent publication states that a scale with approximately 20 questions will have satisfactory reliability. This is because the increased number of questions improves reliability by allowing random measurement errors to average out.[179] Mertler states using mixed methods research is better for applied research studies. A triangulation mixed-methods design allows the researcher to combine the strengths of both qualitative data and quantitative data to understand the research problem.[180]

After each of the seven participants completed the qualitative interview, they were given a 24-question, quantitative Likert scale questionnaire. The questionnaire focused on the participant's perceived perception of applying each UDL guidelines to *Quaver's* curriculum and if they noticed an increase in participation, engagement, and understanding from students with ASD in their elementary music classroom. The questionnaire was developed from a scholarly

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[178] Abimbola T. Alabi and Musibau O Jelili, "Clarifying likert scale misconceptions for improved application in urban studies," *Qual Quant* 57, (2023): 1337, doi.org/10.1007/s11135-022-01415-8.

[179] Alabi and Jelili, *Clarifying*, 1343.

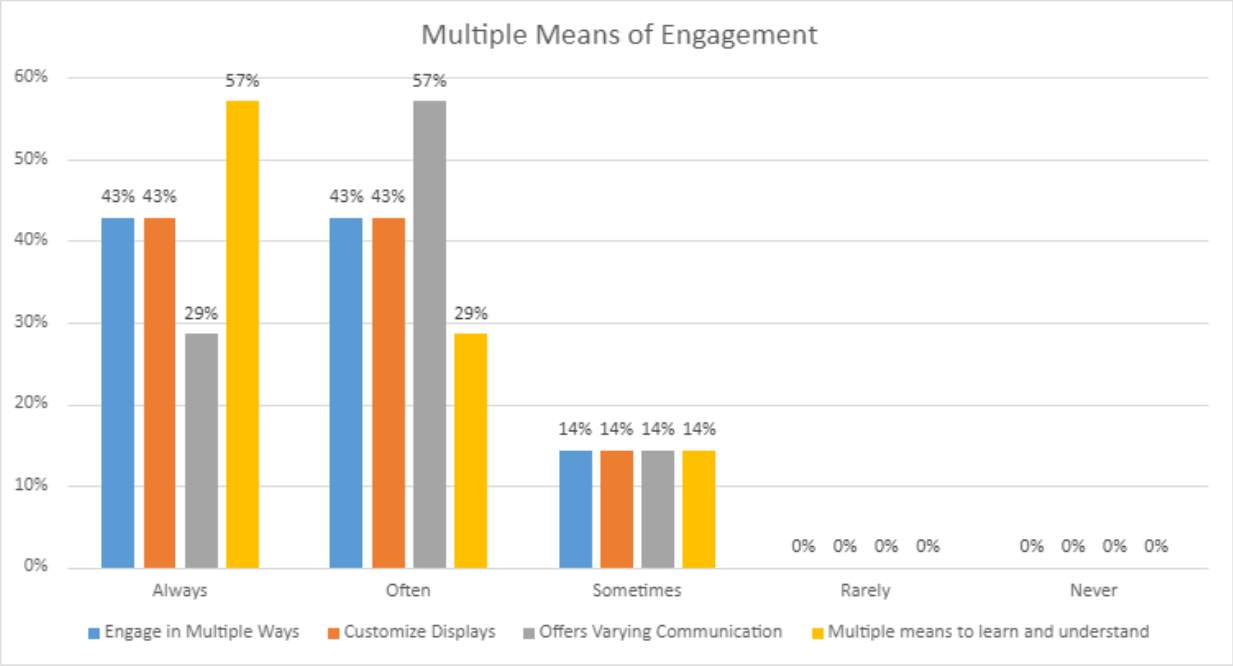
[180] Mertler, *Action Research*,146.

literature review (see Appendix H). Microsoft Excel was used to organize and interpret the data from the collected responses.

Engagement (Questions 3-6)

Questions three through six measured the perceived effectiveness of *Quaver's* curriculum, offers multiple means of engagement in multiple ways, offers ways to customize displays, varying ways to communicate (language, vocabulary, symbols, and multimedia), and that *Quaver* can offer multiple ways for all stakeholders to construct meaning and generate new understandings with each music lesson. The overall average of the four questions concerning engagement was 43% always, 43% often, 14% sometimes, 0% rarely, and 0% never.

Many teachers agreed that *Quaver* could provide multiple means of engagement when following UDL guidelines. Providing multiple means of engagement can spark interest and curiosity and sustain effort.[181] Students with ASD do not all learn in the same way, so providing multiple ways of engagement can encourage learning, interest, and understanding.[182]



[181] "UDL Guidelines Version 2.2."

[182] Darrow, "Applying," 310.

Figure 4 Multiple Means of Engagement

Action & Expression (Questions 7-10)

Questions seven through ten measured the perceived effectiveness of *Quaver's* curriculum offers multiple means of action and expression in physical actions, expression and communication, and executive function (assessments, managing information, goal setting). The overall average of the four questions concerning representation was 32% always, 50% often, 18% sometimes, 0% rarely, and 0% never.

The participants' answers show that *Quaver* can provide learners with different ways to express their knowledge and approach learning tasks differently. *Quaver* offers dancing, instrument playing, singing, technology-based composition, and other action and expression activities that allow students with ASD to learn and express their knowledge of the musical topic.[183] Darrow explains that applying UDL appropriately successfully includes students with

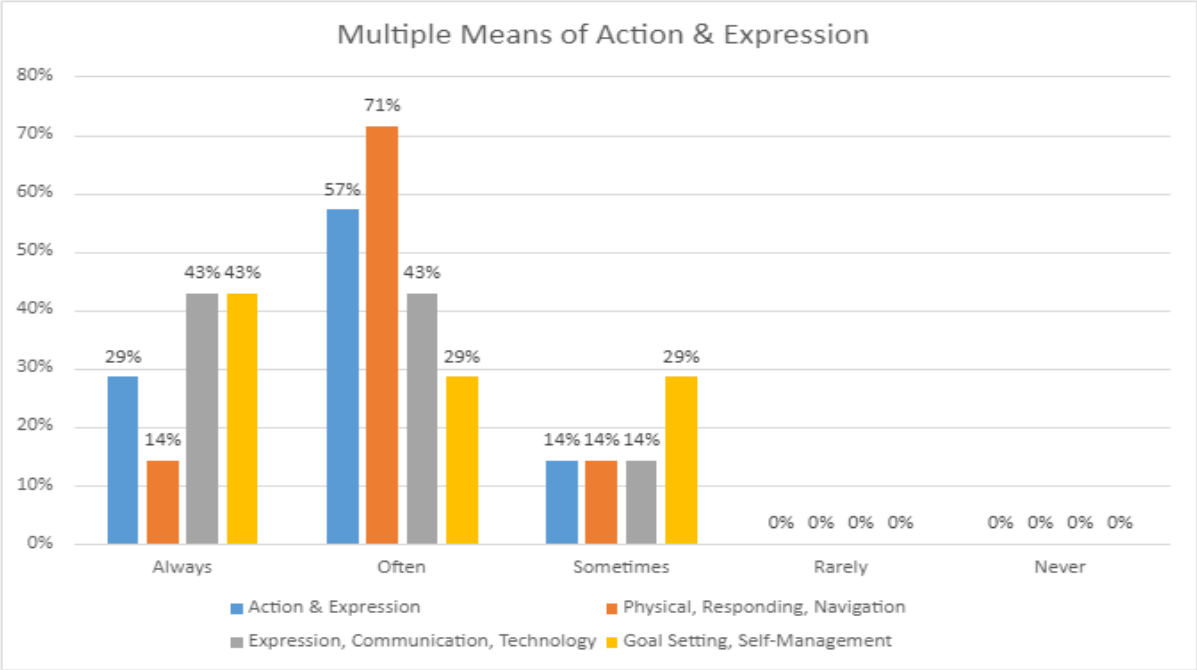


Figure 5 Multiple Means of Action & Expression

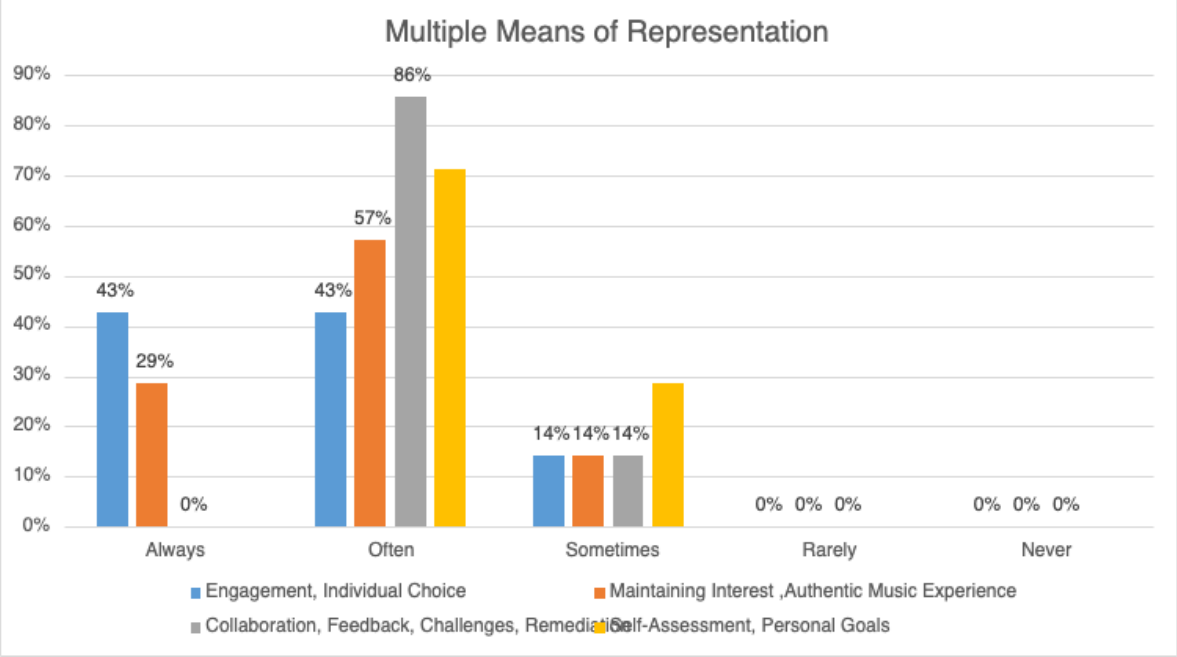
[183] "Quaver's Marvelous World of Music."

ASD without further accommodations.[184]

Representation (11-14)

Questions eleven through fourteen measured the perceived effectiveness of *Quaver's* curriculum, offering multiple means of representation in perception (multiple ways of displaying or customizing information), language and symbols, and comprehension. The overall average of the four questions concerning representation was 18% always, 64% often, 18% sometimes, 0% rarely, and 0% never.

CAST website describes representation as offering learners' different ways to approach the same topic or lesson. Not all persons with ASD have the same physical or mental capabilities to learn. Sensory barriers, language barriers, or physical barriers addressed prior to application can include all learners from the start.[185] The participants in the study agreed that applying UDL to *Quaver* will offer the multiple means of representation needed to include students with ASD.



[184] Darrow, "Applying," 309.

[185] "UDL Guidelines Version 2.2."

Figure 6 Multiple Means of Representation

Overall Perception of Effective (15-23)

Questions fifteen through twenty-four measured the overall perceived effectiveness of applying UDL to *Quaver's* curriculum and if the participants felt an increase in engagement, communication, participation, demonstration of knowledge, and joint attention, and if it was beneficial to the overall education of students with ASD in the elementary music classroom. The overall average of the four questions concerning representation was 21% always, 59% often, 17% sometimes, 3% rarely, and 0% never.

The literature review provided the foundation for the questions in this section. All the participants answered positively with either always, often, or sometimes. The participants felt that students with ASD can engage when using *Quaver,* with over 80% often. Participants also answered that students with ASD had increased joint attention, communication, and social interactions.

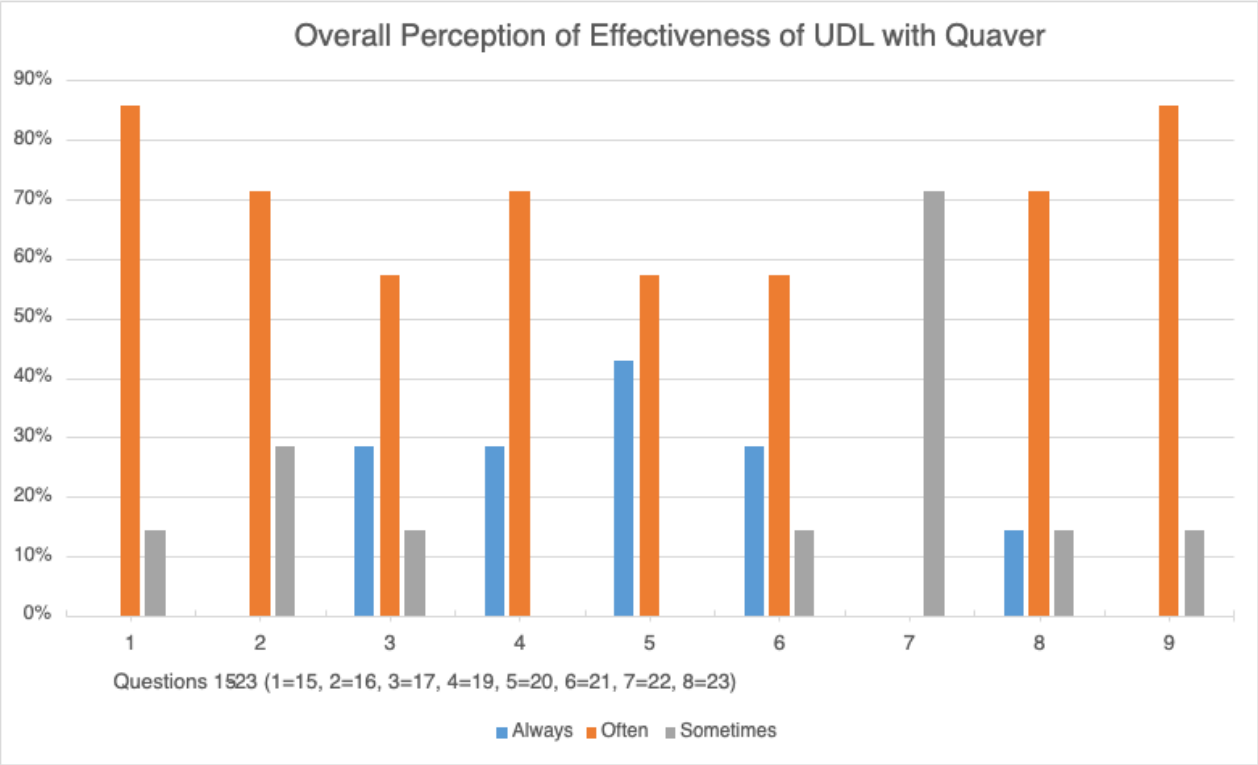


Figure 7 Perception of Effectiveness of UDL (see Appendix J)

The last question of the quantitative questionnaire provided an overall view of the participants perceived perception of applying UDL guidelines to *Quaver's* curriculum. Question 24 asked participants, if overall, "I perceive that applying UDL framework and guidelines to *Quaver*'s curriculum is effective and beneficial for my students with ASD to positively engage in my general music lessons." 100% of the participants either always or often feel that applying UDL framework and guidelines to *Quaver* provides an effective and beneficial way to engage students with ASD positively.

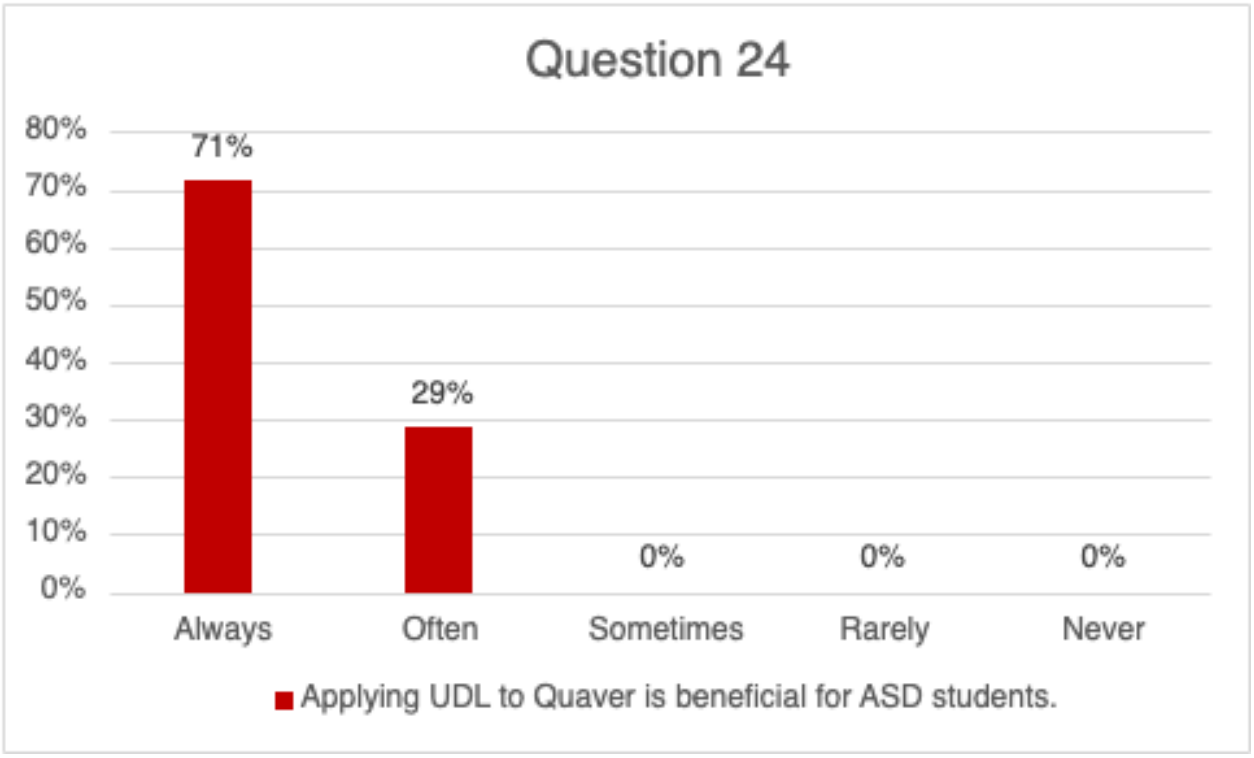


Figure 8 Question 24 Percentage Analysis

None of the participants answered any of the questions with "never." "Rarely" was only chosen in one question by two participants. This question was, "The *Quaver* curriculum is too overwhelming for the sensory processing of some autistic students in your classroom." A similar question was discussed during the qualitative interviews and will be addressed in that section.

Qualitative Survey Interview Results

In applied research qualitative questionnaires are used with smaller populations to help collect content-specific, intense, and rich information aimed at solving a problem or improving a practice on a specific topic or site.[186] Combining qualitative data with quantitative data allows the researcher to solicit information in different formats to gain a deeper understanding of opinions, experiences, and perceptions. This study uses semi structured qualitative questions that

[186] Claxton, *Step-by-Step*, 122.

was created from literature research on applying UDL principles to music curriculums to help engage students with ASD.

The interview transcripts and results were analyzed using Delve qualitative analysis software. Xu and Zammit insist that transcribing is vital to data analysis in qualitative methodology. It allows the researcher to become intimately familiar with the data.[187] Thematic analysis (TA) was used in analyzing the collected data. TA is often used in psychology, health care, and many other fields. Xu and Zammit believe that TA is perfect for educational research, especially for teacher-researchers focusing on research in the classroom settings.[188] TA includes using both deductive and inductive coding to help identify clear themes in the data. Codes were identified and created from the literature review when creating the qualitative interview questions. In reviewing the initial codes further inductive codes were identified, themes were created and named to help produce the final report. These codes and themes were analyzed and finalized into the participants perceived perception of *Quaver's* curriculum (See Figure 9).

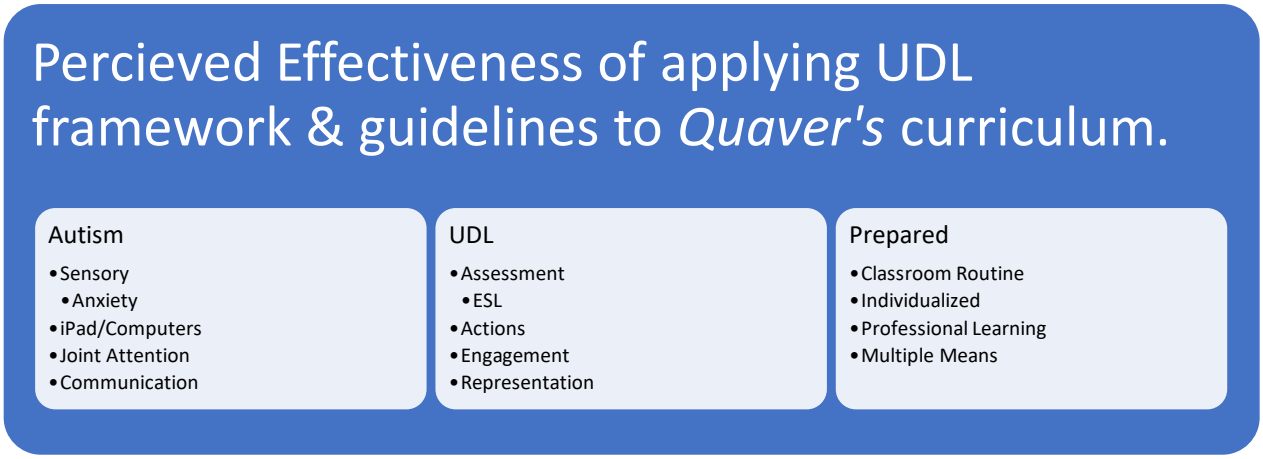


Figure 9 Themes and Codes

[187] W. Xu, and K. Zammit, "Applying Thematic Analysis to Education: A Hybrid Approach to Interpreting /Data in Practitioner Research," *International Journal of Qualitative Methods* 19, (2020): 4. Doi:10.1177/1609406920918810.

[188] Xu and Zammit, *Applying*, 1.

The researcher used the Delve Tools to code and establish common themes from the transcripts. Three main themes were identified, thirteen codes and two sub-codes were identified during the data analysis. The themes were prepared, UDL, and autism. The codes and sub-codes were created both deductively and inductively were sensory, anxiety, iPad/computers, joint attention, communication, assessment, ESL, actions, engagement, representation, classroom routine, individualization, multiple means, and professional development.

Prepared

Classroom Routine

All the participants stated that they use *Quaver* either more than 70% of the time or exclusively only use *Quaver* for classroom instruction. Many of them said that when they first began to use the curriculum they followed the provided lessons, guides, and scope and sequence. After a few years of experience, they began to create their own lesson plans from *Quaver's* resources (Figure 10).[189] Participant #5 said, "once I realized I could do that I started pulling apart the lessons and putting in pieces of my own teaching style and changing what I need to meet the needs of all my students, especially those with autism." The majority of the participants agreed that picking and choosing musical elements, activities, songs, assessments, printables and more allows them to apply the UDL framework when using *Quaver* to engage students with ASD in their classroom. Participant #2 said that she "feels like I do it (teaching) better when I

[189] "Quaver's Marvelous World of Music."

pick and choose and meet what the kids need."

All participants stated that once they became familiar with the resource manager and resource creator that they felt more prepared for any and all lessons and/or students that came

Figure 10 Quaver's Music Resource Manager and Lesson Search Engine. Source:

into their music classroom. Each participant expressed their enthusiasm for Quaver and that since implementing the curriculum they feel more prepared than ever. Participant #7 said, "It (Quaver) has made my life so easy. They have the same scope and sequence as the National Core Arts Standards our district follows. I can use the resource creator to make lessons following the UDL principles and make sure that every time I teach music that I have the tools I need to reach each and every student." Participant #3, who has a master's degree in music education specializing in special education, says "I'm more focused on meeting the learning needs of all students not just my special needs students. The combination of Quaver and UDL framework gives me the power to select a portion of lesson, accomplish goals, pull those Quaver lessons apart and use what I want and use what's going to help the students." Overall, each of the participants agree that using UDL with Quaver's curriculum made them feel more prepared than in years prior to the district

adopting Quaver.

Individualized

The participants expressed that applying UDL to *Quaver's* curriculum does allow them to not only assess students individually but create lessons, reviews, and activities that are individualized towards each of their student's needs or learning. Participant #3 said, "everybody feels like they are doing the same assignment, although they are not. But that's the beauty of UDL is that you're adjusting things for each of the kids, to their level of ability and why they can put out. So that's good." Participant #2 explained, "I would create lessons specifically to include autistic students and I would use all the bells and whistles and everything, but the whole, everybody did everything in the lesson, but it was geared towards making sure that my autistic students were able to participate and play instruments, compose, and all sorts of stuff." Participant #1 said, "I made a special *Quaver* lesson just for him, I taught his aid how to access this program on the iPad and when he comes to music, he logs in. I can check his work and he can demonstrate understanding and mastery by playing with Q beat or other composition activities, save the stuff and email it to me. More of my students with ASD are engaged because I can individualize the assignments for my more severe students that have trouble in the whole group lessons."

Multiple Means

Each of the participants unanimously agreed that *Quaver's* curriculum provides a multitude of resources to effectively engage students with autism. They stated that the students respond to each of the lessons due to the variety in the technology. Participant #8 said, "Post pandemic, it's what students expect in the lessons, even if I am using Orff instruments, using *Quaver* to teach the songs and provide visual support for the Orff portion of the lesson, assist in

engaging my autistic students." Participant #1 said, "a lot of the songs can be presented to the students in different ways to engage them, videos, closed caption, sheet music, or just words. It's great because maybe you have students that can't read but they have the picture representation. I know I can use different ways to get the students engaged and interested in the lessons."

Participant #5 agreed that *Quaver* provides multiple means of engagement, representation of topics, and assessments. However, she added that as well as the program does for autistic students and most students in general, she felt that it lacked in support for her English as a Second Language (ESL) population. In her school there is more of an international population then in other schools in the district. She said "British, Canadian, and French students are not as readily diagnosed as much as American." She goes on to state, "I can adjust the lessons, when I see students are struggling, um like the UDL principles suggest, but I cannot use the *Quaver* assessments if the student doesn't speak or read English very well, you're gonna have a problem."

Professional Learning

One inductive code that appeared in many of the participants interview was professional learning. Each of the participants provided input on the importance of professional learning to help understand applying UDL to *Quaver* better and how professional development could help them be more prepared. Participant #3 said, "I found when I did the professional learning through *Quaver*, I learned how to make my own quizzes. So now my summative assessments are a little bit more reliable to how I'm using and creating my *Quaver* lessons." Participant #6 commented, "the professional learning videos that *Quaver* offers helps us create our own lessons and in turn those lessons give the kids more ownership in their learning because of how we have individualized and created lessons for them. I like that about the professional learning it offers."

Participant #7 stated, “I wish I had more time to sit and really like dig deep into *Quaver*, and there is so much stuff even now that like, I don’t even get to, because I haven’t learned it myself.” Participant #8’s comments were in agreement in that, “*Quaver* create all these new windows, lessons, games, and stuff over the summer, and we have to jump in at the beginning of the year to learn their (*Quaver’s)* new stuff. I don’t think they had added enough professional development on their website.” Eight also expressed, “they recommend using UDL with their curriculum but do not provide much guidance or examples of how to do so. I think I understand that I’m doing UDL anyways by making the individualized and pick-n-choose lessons, but it would be nice if *Quaver* gave us more information on using UDL.”

UDL

Assessment

The participants all discussed both formative and summative assessments within the *Quaver* curriculum. Most of them stated that because of lack of delivery time they perform mostly formative assessments with the students. But they all agree that *Quaver* provides a multitude of ways to formatively assess their students within each activity or lessons, especially when the UDL principles are followed. Participant #6 said, “So there are lots of ways that you can assess the kids in *Quaver,* and I would say that most of the time I find my students, they ace them because they really fully understand the content because there are so many different ways for them (students) to engage in that content.” She goes on to say, “I feel that it (*Quaver)* allows you to not only assess the kids, but also they can, you know, use the knowledge that they’ve learned and really put it into practice with composing, playing, singing, or dancing.” Participant #8 discussed the benefits of UDL assessment guidelines with *Quaver*. She said, “You don’t have to use their (*Quaver*) canned assessments. Sure, you can pick and choose, like, oh, I didn’t cover

that topic in this lesson, so I'm gonna take that question out. But I did cover this or I wanna make sure they understand it. So, I'm gonna ask the same question, but I'm going to ask it in a different way or use a different assessment tool for them to demonstrate mastery." Participant #5 again stated that she enjoys *Quaver* but "I think they could do more with the ESL kids. I think that there should be a lot more pictures and a lot more of picture definitions, closed caption is good but what's on the assessments." Participant #2 stated, "both formative and summative types of assessments are there, I do feel like there are many ways you can assess your autistic kids using *Quaver*."

Actions

UDL guidelines say that learners differ in the ways that they move and participate in the learning environment. Providing options for expression and actions is essential in a UDL classroom so that all participants can learn and demonstrate what they have learned.[190] The participants are all familiar with this guideline and expressed positive opinions on *Quaver's* ability to provide multiple means of action and expression. Participant #5 said, "I noticed that they've (*Quaver)* started to include more of those, like movement videos. So, I think that representation as far as that goes is really good. The action songs are really good, and they have a good variety." Participant #1 said, "All of their *(Quaver's)* composition stuff is great action stuff, even a kid with limited physical abilities can drag and drop portions of the sound bites to compose and create songs. Some of my more severely autistic students have composed really neat things using the composition apps in *Quaver*."

Engagement

The majority of the participants expressed that *Quaver's* curriculum is excellent in

[190] Darrow, "Applying," 310.

providing many ways to engage students with autism. Participant #6 said, “as far as meeting UDL framework, they (*Quaver*) switch it up so much that it’s not boring and they use a lot of jokes, comedy in the videos, you know for the kids it’s a lot different from cartoons, but really engaging.” Participant #3 said, “I can always select songs that are more engaging and with adding movement with them it reinforces whatever it is I’m trying to accomplish.” Participant #8 stated, “So many ways to engage, there are lots of different modes, recorder, xylophones, videos, audios, composing, and more. If one of my autistic kids is struggling with one activity, I can just pull out another one for them to use or engage with.”

Autism

Positive input

Every participant has had autistic students of some level in their general music classroom either currently or in the near past. Two of the participants teach self-contained classes at their schools for the moderately to severe autistic students that attend their school. Participant #1 said, “Kids are more engaged, because you have all those different ways to show them and teach them. My self-contained class has really enjoyed the different ways that *Quaver* presents different musical elements. A lot of the time they request songs or activities. The aides that accompany them say that many times this is the only time of the week these students are focused, active and engaging.” Participant #7 said, “*Quaver* is great for students with autism. I can give them individual lessons that they can pull up on their tablets. I have student that are becoming more engaged the more familiar they become with *Quaver.”* Participant #3 said, “I have had many years of experience teaching music, especially with autistic students, and I can tell you that applying UDL framework to *Quaver* really does help open doors to music for my autistic students. I don’t have to put them in corners or make a separate lesson for them, I can create

lessons in *Quaver* that help include them from the beginning of the lessons rather than accommodating or modifying the lessons for them. The technology is really a magnet for the autistic kids, they feel more comfortable focusing and interacting with technology that is being used."

Sensory

In codifying the interviews many of the participants commented on the ways that their autistic students reacted sensorily to *Quaver* lessons. Sensory input was one of the identified areas in reviewing and analyzing interviews. Participant #1 said, "many times the kids will come with headphones in case the music is too loud, but most of the time they are so focused on the lessons that the volume level doesn't upset them." Participant #7 stated that, "applying UDL guidelines helps me be more prepared for any sensory issues that come up unexpectantly. I have computers in my class and the students can log onto their *Quaver* accounts and continue with the lesson on their own." She also said, "It has been really helpful to know that I can provide ways for the autistic students to continue on with the same lesson and not feel left out. I have had a student that used Q-Grooves to compose a song in AB form, which is what we were learning at the time, he was overwhelmed by the whole class activity but was able to continue on the computer. Later at his next visit to class he was able to share his AB form composition to the class. This not only enabled me to assess his knowledge on AB form, but it gave him a way to connect to the other students on the same topic rather than being left out because he was having a bad day on a prior visit to my music room."

Joint Attention

All participants said that because *Quaver* is engaging, they have noticed and increase in the joint attention among their autistic students. Participant #8 said, "Music creates community.

Which is something that autistic kids, you know, don't have. That's why they look off. *Quaver,* I think, creates that joint attention and then sharing what they've created and showing off their avatars and other things that they can create individually in *Quaver*." Participant #3 said, "I think *Quaver* is good for my autistic student's joint attention development. The short video's, quick quizzes, games, and other activities, I feel like they (the videos) catch their attention and engage them, and because other students are doing the same thing in the class, I can see a difference in some of their joint attention in interacting with their classmates or myself." Participant #1 explained, "in the past I could not get some students with autism to focus on the lessons, but with *Quaver* I do see that they not only look in my direction but will focus on the lessons on the board and even ask to participate when chance is offered." Participant #2 shared a story of a student from her self-contained autistic class. She stated that, "I have one student who'd never color anything with any other colors than black and white. But since I've been teaching a song on *Quaver* that has a rainbow in it, he went back to class drew a picture of the *Quaver* screen with all the colors. He came back on his next rotation and shared his picture with the whole class. I'd say that is definitely an increase in joint attention, engagement, and maybe sensory, if he doesn't like all the colors because they're overwhelming. It was the best day when I saw the drawing."

Communication

The last code identified within the autism theme is communication. UDL guidelines explain that any medium of expression can be considered a form of communication. In *Quaver* that could include, composing, dance, recordings, and using web tools. All of the participants felt that many of their autistic students had an increase in communication when applying UDL framework to *Quaver's* curriculum. Participant #7 said, "I feel my autistic students have more opportunities to communication their understanding of music when they use the different

assessments and different activities in *Quaver*." Participant #8 shared a positive experience with one of her autistic students, "it was great, he was so proud of the personal avatar that he had made for his account. He wanted to share it with everyone and explain why he picked the different accessories when creating his avatar, it was a great example of the different ways his communication increased because of using *Quaver*." Participant #6 shared a similar story about one of her autistic students, "he normally doesn't like to play the instruments, but he can identify and identify all of them by listening to them. He loves to use the different composing application in *Quaver* and will tell the class what instrument combinations that he used in his compositions. He normally does not speak out during class but when he shares his compositions, he is really proud and explains things really well. I would say that my applying UDL framework when I'm using *Quaver* has helped this student find his voice in expressing himself musically."

Literature Review Findings

Prepared

Classroom Routine

Autistic students often seek routines to create a sense of predictability and security in an unpredictable classroom.[191] UDL principles promote both routine and flexibility for students with ASD. This provides students with ASD an opportunity to access, engage, and exhibit their learning through multiple means of engagement.[192] Haroon states that the lack of classroom routines for students with ASD can cause anxiety, sensory difficulties, hyperactivity, and avoidance.[193]

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[191] Harroon, "ABC," 25.

[192] Barbara S. Meier and Kirstin A. Rossi, "Removing Instructional Barriers with UDL," *Kappa Delta Pi Record* 56, no. 2 (2020):83, doi:10.1080/00228958.2020.1729639.

[193] Haroon, "ABC," 26.

Multiple Means

The implementation of UDL in music education enables the music instructor to create a fair and adaptable music session that is reachable for every student to the highest degree possible. To facilitate effective teaching and provide appropriate musical opportunities to all children, Dr. Judith Jellison, an author and music educator, advocates for the use of UDL in the music classroom.[194] Through multiple means of expression, UDL empowers students with ASD to exhibit their knowledge of musical elements. It also prompts students to connect with learning through various modalities, for the benefit of everyone in the classroom.

Individualizing

While individual educational plans are necessary for special education students, UDL creates a curriculum suitable for all students, accommodating their needs and interests. A seemingly individualized plan that takes into account all learners can be created by educators. The UDL principles acknowledge the individuality of every person and arrange abilities into cognition, vision, hearing, speech, body function, arm and hand function, and mobility.[195] Technology can assist teachers in facilitating individual student engagement with course content and their capacity to demonstrate knowledge.[196]

Professional Development

All music curriculums can incorporate UDL principles if music educators have knowledge of them.[197] Darrow states that, by being aware of the range of learner differences in

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[194] Jellison, *Including Everyone*, 209.

[195] Hall, *Universal Design*, 27.

[196] Armes, Harry, Grimsby, *Implementing UDL,"* 47.

[197] Darrow, "Applying," 325.

students with ASD and making use of available resources, teachers can use UDL.[198] Furthermore, her research found that teachers who underwent UDL training were more skilled at developing lesson plans that incorporated ASD students. Professional development with UDL has a positive effect on implementation, planning, and assessment, according to recent research by Craig, Smith, and Frey.[199]

UDL and Autism

Music education provides a multitude of benefits to students with autism.[200] Research has shown that applying UDL to music curriculums can assist in fully including students with autism in the elementary music classroom.[201] Judith A. Jellison has long encouraged including all students within the music classroom. Her research has shown that UDL can help teachers adjust and optimize lesson planning in order to include students from the onset of the lesson rather than having to make accommodations or modifications to lessons to assist students in participating, engaging, and learning.[202] Alice Darrow concludes that any curriculum can apply the UDL principles and promote learning in all children.[203] She states that teachers need to know of the students many learning differences and aware of all the resources available to ensure the curriculum is truly universal.

Applying the UDL framework and guidelines is a process that takes time to complete. The UDL framework can be more of a guide in assisting music educators in creating lessons

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[198] Ibid, 325.

[199] Stephanie L. Craig, Sean J. Smith, and Bruce B. Frey, "Professional development with universal design for learning: supporting teachers as learners to increase the implementation of UDL," *Professional Development in Education*, 48, no.1 (2019): 22, DOI: 10.1080/19415257.2019.1685563

[200] Jellison, Brooks, Huck, *Structuring*, 264.

[201] Darrow, "Applying," 309.

[202] Jellison, *Including Everyone*, 209.

[203] Darrow, "Applying," 325.

accessible to all students. It is a federal law that students with disabilities, including those with autism, have the right to learn in the least restrictive environment along with their peers.[204] Armes, Harry, and Grimsby wrote an article to review the benefits of music teachers applying UDL to music curriculums. They wrote that applying UDL to music curriculums creates a more accessible and inclusive environment for all students.[205] The article lists many examples of how to implement UDL to the elementary music classroom in all areas of the UDL framework. The authors agree that by implementing UDL, the teacher can provide multiple means of engagement that helps students express their knowledge of the topic and learn more by having more than one way to approach the topic.[206] Initially, implementing UDL into a curriculum may seem overwhelming, but using UDL offers several ways that students can access the topic and improve engagement and interactions for all students.

Alice-Ann Darrow, an author, professor, and researcher, strongly supports using UDL in general music education. She has written multiple books and over 80 articles on music education for students with special needs. In her article written with Mary Adamek, they state that UDL is an instructional approach that facilitates inclusion.[207] They recommend focusing on three elements of instruction to implement UDL with any music curriculum. First, use multiple means to present instruction; second, consider multiple ways the students may respond to materials and plan for how students will demonstrate knowledge or mastery; and third, understand what motivates students to engage, and that means to include technology, especially videos, video game like lessons, and modern popular music. They state that using UDL negates the need for

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[204] "History of IDEA."

[205] Jocelyn W. Armes, Adam Harry, and Rachel Grimsby, "Implementing Universal Design Principles in Music Teaching," *Music Educators Journal,* 109, no. 1 (2022): 46. https://doi.org/10.1177/00274321221114869.

[206] Armes, Harry, and Grimsby, "Implementing," 50.

[207] Darrow and Adamek, "Instructional Strategies," 62.

accommodations and modifications to lessons on most occasions. UDL will help the teacher meet the goal of having each student, including those with autism, participate within the music classroom to the highest level possible, demonstrating their strengths and weaknesses and giving teachers an opportunity to build on these abilities.[208]

Sensory

Sheila J. Scott's research demonstrated that applying the UDL principles helps address the sensory issues of a student with ASD in the music room. She stressed that rather than the child adapting to the curriculum, teachers could use the curriculum and adapt it to the child. She said the key to UDL is that the educational supports are initially accessible to all students, rather than post planning.[209] Darrow also explains that presenting options within the learning material will help engage students with ASD and sensory issues.[210]

Social Interactions

Again, Jellison, her co-authors Brooks and Hucks, stated that interactions in the music room provided positive opportunities for social interaction, joint attention growth, and communication development in students with ASD.[211] They stated it was not the proximity or contact in the classroom itself that led to the positive outcome but instead, the music lessons that included both musical and nonmusical skills that encouraged the increase in those development areas.[212] They concluded that designing music lessons that planned to include all types of students prior to delivery was the key to encouraging cooperation, social interactions, and joint

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[208] Darrow and Adamek, "Instructional Strategies," 65.

[209] Scott, *Music Education,* 37.

[210] Darrow, "Applying," 320.

[211] Jellison, Brooks, Huck, *Structuring,* 244.

[212] Jellison, Brooks, and Huck, *Structuring,* 245.

attention. They also stressed the necessity to include technology within each lesson, and it was shown that the inclusion of technology could enhance creative output for all stakeholders.[213]

Chapter Summary

Convergent mixed methods research was used to assess how effective the application of UDL principles to *Quaver*'s music curriculum is in positively engaging students with ASD. To summarize, the results of the semi-structured qualitative interviews and 24 quantitative questions, analyzed the perceptions and experiences of seven elementary music teachers who had

[213] Ibid., 264.

experience with UDL and the *Quaver* music curriculum. Their daily schedule and implementation of *Quaver*'s curriculum were delineated. They offered their perspective on how UDL implementation can help provide various modes of engagement, action, and assessment for students with ASD. The participants furnished data regarding variances they noted in students with ASD following the implementation of UDL with *Quaver*'s curriculum and if there was an upsurge in shared attention, communication, and involvement. Recent research, articles, and professional publications were used to substantiate the themes and codes obtained from the data.

Chapter 5 will examine the perceptions that pertain to each research question within the context of applying UDL to *Quaver*'s curriculum, with the goal of fostering positive engagement among students with ASD in the music classroom. The implications of the findings will be examined to recognize significant issues learned and how these could be implemented in future research and in the application to other music curricula.

Based on the results of quantitative research, teachers think that applying UDL to *Quaver*'s curriculum is an effective way of engaging students with ASD. Additionally, based on qualitative research, teachers perceive that applying UDL principles to *Quaver* can meet the sensory, communicative, and joint attention needs of students with ASD. Recent research has found that applying UDL to any music curriculum benefits students with ASD, and both qualitative and quantitative results support this conclusion.[214]

[214] Armes, Harry, and Grimsby, *Implementing*, 1.

Chapter Five: Conclusions

Overview

There is an increase in the occurrence of autism among children in schools within music classrooms across the United States. For this reason, it was necessary to assess the perceived effectiveness of applying UDL to *Quaver's Marvelous World of Music* curriculum to determine its advantages for students with ASD and their development in the areas of communication, social interactions, and joint attention. The research aimed to determine whether the integration of UDL into a music curriculum would contribute to the improvement of students' engagement, particularly students with ASD in the music classroom. UDL provides a solid framework to provide opportunities for all students to learn, engage, and access music education. By understanding UDL, teachers can create adaptable learning environments, teaching, and assessments that cater to individual learning differences.

The surveys and interviews presented in Chapter 4 encompassed both qualitative and quantitative data. In order to obtain outcomes that address both types of data, it is necessary to use a convergent mixed methods approach. The qualitative data demonstrated the encounters, perceptions, and viewpoints of music instructors in K-5 elementary schools. The qualitative part of the research required that each participant interviewed was given the chance to share their experiences, perspectives, and viewpoints. Participants were then able to convey their perceptions through the quantitative survey without the need for additional clarification, with the numerical data reflecting the results. In order to ascertain the validation of outcomes, the researcher chose to perform convergent mixed methods research, which involved the use of both qualitative and quantitative approaches.

In Chapter 5, the reader will find a comprehensive overview of the study, which includes a discussion on the purpose of the research, a summary of the procedure undertaken, an interpretation of the findings obtained, a conclusive statement, as well as a detailed analysis of the limitations of the study. Finally, the fifth chapter outlines future recommendations based on the findings presented in the fourth chapter. The study is summarized in the conclusion of Chapter 5.

Summary of Study

This study was an applied research mixed-method study. It focused on the perceived effectiveness of applying UDL to the *Quaver* music curriculum to positively engage students with ASD in the elementary music classroom. Studies show that UDL has value in music education, and students with ASD benefit from the application of UDL to music curriculums.[215] This research involved kindergarten through fifth-grade general music educators in analyzing their perception of *Quaver's* curriculum and applying UDL frameworks in engaging students with ASD in the music classroom. The research sought to establish how each of the UDL guidelines effectiveness increased joint attention, communication, and social skills among students with ASD in the music classroom.

Summary of Purpose

The purpose of the research was to find out if applying UDL to *Quaver*'s Marvelous World of Music curriculum could effectively involve ASD students, and demonstrate a rise in social interactions, communication, and joint attention among them.

[215] Darrow and Adamek, "Instructional Strategies," 61-65.

Summary of Procedure

The investigation started with researching UDL and its beneficial application in music curriculums for students with ASD. The researcher interviewed seven elementary music teachers on their experiences, perceptions, and opinions with *Quaver's* curriculum, UDL, and their interactions with students with ASD in their classrooms. Each participant responded to a post on a private social media group of music teachers from an overseas school system. The participants were given a qualitative questionnaire consisting of six interview questions. The interviews were transcribed, and the data collection was used to determine their perception of the effectiveness of using UDL in their classrooms. A quantitative questionnaire was then used to measure the success of UDL in the *Quaver* curriculum for elementary music students with ASD. Both quantitative and qualitative data were analyzed to determine the perceived effectiveness of using UDL with *Quaver's* curriculum.

Summary of Findings

The complete summary of the findings and connections to the research questions is addressed in this section of the study. The guiding research questions are:

Research Question 1 How can applying the UDL principles help modify the *Quaver Wonderful World of Music* curriculum to accommodate the sensory, communicative, and joint attention needs of students with ASD?

Introduction

Teachers believe that implementing UDL principles in the music classroom helps students with ASD, as indicated by the results of the qualitative and quantitative analyses. Teachers felt that the UDL framework and guidelines helped them provide multiple means of engagement, representation, actions, and assessments on each musical topic within the *Quaver*

curriculum. It was the opinion of most teachers that students with ASD are more likely to engage in a music lesson when using *Quaver*. Music teachers felt that they could improve the communication, social interactions, and joint attention of a student with ASD by creating lessons and activities applying the UDL guidelines to *Quaver*.

Flexibility

The implementation of UDL guidelines by a teacher does not require adherence to a checklist or a particular sequence. The design of UDL is intended to provide teachers with the flexibility to choose games, songs, activities, instruments, and dance, that meet the needs and abilities of all students. The principles take into consideration the uniqueness of each human being. The principles of Universal Design for Learning (UDL) emphasize flexibility in lesson planning, presentation, and assessment.[216] Armes, Harry and Grimsby state that flexibility means more inclusion. Offering choices, variety, and multiple representation of content can allow the music teacher to include all students in their instruction.[217]

According to the data, both qualitative and quantitative, teachers enjoy the flexibility of UDL guidelines when applying them to *Quaver*. It was reported by several individuals that they do not follow the provided lesson plan suggestions. Instead, they devise their own scope and sequence within *Quaver* to ensure that they are catering to the needs of all their pupils, with a particular emphasis on those with autism. This ensures they are providing opportunities to increase communication, joint attention, and social interactions within their lessons for students with ASD.

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[216] Hall, *Universal Design,* 27.

[217] Armes, Harry, and Grimsby, 51.

Engagement

According to a study conducted by Stephen Foster, who received his doctoral degree from the Union University School of Education, that *Quaver*'s Marvelous World of Music curriculum can enhance engagement, enjoyment, retention of knowledge, and musical self-efficacy among typically developing elementary students in Southeast United States.[218] He recommended the study of *Quaver* be done under different settings, experiences, and levels. He concluded that it was clear the majority of students, teachers, and administrators agreed that *Quaver* increased engagement.

According to the research conducted by Judith Jellison, the implementation of UDL guidelines can assist music teachers in providing a various means of engagement, leading to increased participation and learning outcomes among students with ASD.[219] To promote the motivation and engagement of ASD students, Darrow and Adamek recommend the adoption of UDL in all music curricula.[220] In addition, their research indicates that students with ASD have a preference for the integration of technology in school; thus, it is recommended to incorporate technology in UDL lessons.[221]

According to the quantitative research, the data indicates that 86% of the participants believed that the implementation of UDL principles in *Quaver* provided numerous opportunities for students with ASD to engage (Figure 4). Along with the quantitative data, the qualitative interviews also captured the participants' perspectives on engagement. Participant #5 agreed that "*Quaver* has plenty of different ways to engage any of my students with ASD." Participant #6

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[218] Stephan Foster, "A Case Study of the Impact of Quaver's Marvelous World of Music on an Elementary School Music Program" (DOE diss., Union University, 2017), 93.

[219] Jellison, *Including Everyone,* 209.

[220] Darrow and Adamek, "Instructional Strategies," 62.

[221] Ibid, 64.

said, “UDL allows me to switch it up, *Quaver* has so much and it’s not boring, they have jokes, comedy, and things for the kids, not just videos but items that offer opportunities to gain deeper understanding of musical topics in many different ways.”

Sensory

It is typical for students with ASD to face challenges with varying levels of sensory input. This is the condition where the brain processes sensory input in an inefficient manner.[222] Music classrooms can be an overwhelming location for students with ASD. UDL is deemed an outstanding planning tool for addressing the needs of students with ASD.[223] Awareness of the reactions to sensory overload can aid a teacher in constructing a safe learning environment.[224] The UDL guidelines promote a diversified approach to representation and provide options for students to perceive through auditory, visual, and tactile senses while they learn.[225]

Based on both qualitative and quantitative data, it has been determined that teachers perceive *Quaver* to possess the capability of addressing the sensory requirements of students with ASD. Participant #7 stated that, “applying UDL guidelines helps me be more prepared for any sensory issues that come up unexpectantly. I have computers in my class and the students can log onto their *Quaver* accounts and continue with the lesson on their own.” Several educators concurred *Quaver* offers numerous alternative activities for students with ASD on days when they experience sensory overload. Furthermore, the majority of participants agreed that the utilization of *Quaver* has reduced the probability of negative reactions to sensory issues among their students with ASD.

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[222] Hourigan, Hammel, “Teaching Students”, 129.

[223] Ibid, 117.

[224] Scott, *Music Education*, 22.

[225] Hall, Meyer, Rose, *UDL*, 13.

Communication

A symptom that frequently appears in individuals with ASD is the impairment of language and communication development.[226] According to Scott, the acquisition of language by students with ASD can be facilitated by music education and learning songs.[227] McMullen and Saffran's research delved into the correlation between music education and language development. They elucidated that language and music share a similar structure and that the patterns in music can facilitate students with ASD in discerning the patterns in speech.[228] Scott contends that the voice is the foremost musical instrument, and the utilization of repetition in melody, meter, and rhythm could facilitate students with ASD to remember the songs and enhance their vocalizations and speech patterns.[229]

Based on the quantitative data analysis, it was found that 100% of the participants reported a positive increase in communication and social interaction among students with ASD. The quantitative data agrees with the qualitative interview data, where all participants expressed that applying UDL framework to *Quaver* had a noticeable impact on the communication skills of students with ASD. Every participant had noted that, on some occasions, students with ASD who are usually non-verbal were keen to communicate about musical topics when using *Quaver*.

Joint Attention

Children with ASD exhibit impaired development of joint attention as another area of concern. The medium of music is employed for the purpose of encouraging and teaching joint attention skills to children with ASD. Scott says, a plethora of music genres can facilitate joint

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[226] Geretsegger et, al., "Music Therapy," 2.

[227] Scott, *Music Education,* 63.

[228] McMullen and Saffran, "Music and Language," 292.

[229] Scott, *Music Education,* 69.

attention and create peer connections for children with ASD.[230] Music therapy researchers Kim, Wigram, and Gold have affirmed that music can serve as a motivator and encourage joint attention in children with ASD.[231] One of the objectives of music therapy is to employ music as a means of instructing joint attention. Comparable to boosting communication skills, the utilization of repetition in melody, meter, and rhythm can enhance joint attention.[232]

As reported by all participants, *Quaver*'s engaging nature has led to an observable increase in joint attention among their autistic students. Participant #1 shared, "It is neat to see students focus and pay attention when I'm using *Quaver*. A lot of times the only time that my students with ASD seem to pay attention is when I use the technology lessons that *Quaver* can offer." The quantitative data further demonstrated that all the participants observed an elevation in joint attention among students with ASD upon implementing UDL guidelines to the *Quaver* curriculum in their music classroom.

Research Question 2 Is there a significant difference in social interaction, communication, and joint attention in music class among students with ASD between those receiving modified *Quaver* music lessons/presentations and those receiving non-modified *Quaver* music lessons/presentations?[233]

This study examined the comprehensive advantages of implementing UDL principles to *Quaver* and the beneficial impact of music education on students diagnosed with ASD. According to the results from the quantitative questionnaire, scholarly literature, and qualitative

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[230] Scott, *Music Education*. 107.

[231] Kim, Wigram, and Gold, "Effects," 1758.

[232] Scholtens, "Using Music," 46.

[233] Mary Crum Scholtens, "Using Music to Encourage Joint Attention for Students with Autism Spectrum Disorder: Attention as a Reciprocal Relationship," *Music Educators Journal* 105, no. 4 (2019): 45-51, https://journals.sagepub.com/doi/full/10.1177/0027432119846954.

interviews, participants overwhelmingly concurred that the application of UDL guidelines to *Quaver* curriculum is advantageous for the enhancement of social interactions, communication, and joint attention skills in students with ASD.

The literature review, qualitative and quantitative data demonstrates the favorable impact of music education on the social, communication, joint attention, and sensory processing of students with autism. The music room in elementary school frequently provides the only fully inclusive environment for students with disabilities. Growth in social interactions, joint attention, and communication can be experienced by students with ASD in the music room.[234] The implementation of music technology may augment musical creativity among students with ASD and cognitive disabilities. Hence, the integration of UDL principles in the Quaver curriculum can foster positive engagement of students with ASD in the elementary music classroom.

Limitations

The research was conducted using an applied mixed-methods research study. Mixed methods often are considered optimal methodology because using both qualitative and quantitative allow the researcher to rely on the strength of both methods while compensating for the limitations or weaknesses of any one method.[235] Nevertheless, this approach presents various limitations in methodical investigations.

The limitation encountered in this study was the small sample size, which only included seven participants. This was addressed by ensuring the participants met the required criteria to participate in the study. Henry states that this will strengthen the reliability of the data.[236] The

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[234] Amanda Draper, "Music Education," 155.

[235] Donna J. Betts and Sarah P. Deaver, *Mixed Methods Research in Art Therapy*, (New York: Routledge, 2019), 148, Taylor & Francis eBook 9781315647081.

[236] Henry, "Sampling," 82.

researcher also made sure each participant was an experienced music teacher familiar with *Quaver* and the basic UDL framework. They also have knowledge of accommodation and modifications for students with ASD without applying UDL. The questions discussed with each participant was relevant to the study and the data collection from both qualitative and quantitative approaches cleared up any issues presented during analysis.

Another limitation is that different participants may be biased for or against using *Quaver* or the UDL framework in teaching students with ASD in the music classroom. Support from the literature review through a critical approach helped address this limitation as the researcher triangulated the data collected. Collecting and analyzing data from multiple methods will strengthen the reliability as well as the internal validity and address this limitation.[237]

Recommendations

The research findings suggest that music education can be advantageous for students with ASD, particularly when incorporating UDL and technology in the music curriculum to enhance their engagement. Music education can be advantageous in promoting life skills for students with ASD, especially with the growing interest in the condition and the abundance of research and information. The power of music lies in its ability to activate brain regions that supports communication, social interaction, and joint attention. Kodaly stated, "with music, one's whole future life is brightened; this is such a treasure in life that helps us over many troubles and difficulties."[238] To enhance the application of UDL guidelines in music education for students with ASD, the ensuing recommendations should be considered.

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[237] Creswell and Creswell, *Research Design,* 208.

[238] Micheal Houlahan and Philip Tacka, *Kodaly Today: A Cognitive Approach to Elementary Music Education,* (Oxford: Oxford University Press, 2015), 19, ProQuest Ebrary.

There is a need for professional development to ensure that UDL framework is properly applied to *Quaver's* curriculum to engage students with ASD in the music classroom. Every participant mentioned the importance of the professional developed provided by QuaverEd.[239] This guarantees that the needs of students and educators are considered in order to improve music education outcomes for students with ASD. The following recommendations should be considered to improve music education for students with ASD.

1. Inadequate tools and resources prevent teachers from appropriately teaching students with ASD. Further research is necessary to ascertain whether professional development on the implementation of UDL in diverse music curriculums would lead to teachers' adequate preparation to instruct learners with ASD.
2. QuaverEd provides three distinct music pedagogies. The pedagogical approaches of Orff, Kodaly, and Gordon in learning music theory. According to research, every pedagogy provides numerous musical advantages for students diagnosed with ASD. To engage students with ASD effectively using UDL guidelines, it is recommended that further research be carried out to determine the most suitable pedagogical approach, if any.
3. Regrettably, the study was restricted in its ability to assess students with ASD in a music class setting. Additional research is recommended to evaluate the perceived effectiveness of integrating UDL principles into music curricula, as perceived by students.
4. The study was restricted in its ability to access the opinions of the paraprofessionals that accompany the students with ASD that participate in music class. Additional

[239] "QuaverEd."

research is recommended to evaluate the perceived effectiveness of applying UDL principles into music curricula to positively engage students with ASD, as perceived by the accompanying paraprofessionals.

Implications for Practice

The Quaver Marvelous World of Music curriculum facilitates the teaching of music in a contemporary elementary music classroom. The *Quaver* resource pages offer a vast array of engaging and educational activities that instruct students on every fundamental aspect of music education. *Quaver's* curriculum provides complete curriculum plans and maps that adhere to the National Core Art Standards for music education and the Federal Rehabilitation Act, Section 508. In addition to providing plans and maps, *Quaver* puts forth efforts to make itself accessible to all individuals with disabilities.

Based on the study, music teachers see a value in using the different components of *Quaver* even if they do not have students with ASD in their general music classrooms. They also recognize the benefit of planning with the UDL guidelines, which helps them be prepared for any type of student that enters their classrooms. Alice-Ann Darrow presented the same reasons the participants enjoyed applying UDL, she stated UDL allows, equitable use, flexibility, simple and intuitive to use, low effort, tolerant for errors and size and space flexibility.[240] Although not all participants were experts in applying UDL, they possessed a fundamental understanding of the principles and guidelines. They reached an agreement that instead of creating instruction for students with typical development and making adjustments and adaptations, when necessary, a teacher who utilizes UDL principles can fashion lessons for students possessing a broad spectrum of abilities, disabilities, language, learning styles, and motivations.

[240] Darrow, "Applying," 44.

Chapter Summary

Music is a powerful tool that educators use to establish a connection with their students. Due to its ability to provide multiple means of representation, expression, and engagement, Quaver is a platform where the UDL principles and framework can be readily applied to cater to the diverse learning needs of all learners. All students can benefit from a music curriculum that utilizes UDL principles, as it provides them with various avenues to explore and comprehend the material in a way that suits their individual needs and strengths. Quaver's Marvelous World of Music has made it their mission to enrich the lives of children, and they are committed to achieving this goal.

The research findings have concluded that the application of UDL guidelines in Quaver's curriculum has the ability to effectively engage students who have autism spectrum disorder. The music classroom has proven to be an effective environment for promoting communication, joint attention, and social interactions among the students. By integrating technology with UDL principles, an inclusive learning environment can be created that fosters joint attention among all students, including those diagnosed with ASD.

Kodaly believed that there was a strong connection between music and language. Throughout his lifetime, his focus was to enhance the quality of music education as he strongly believed that it was the fundamental right of every citizen.[241] The researcher also believes that music education should be provided to all students. This study can provide others an understanding the benefits of applying UDL to Quaver's curriculum, so that more teachers can

[241] Megan M. Sheridan, "The Kodaly Concept in the United States: Early American Adaptations to Recent Evolutions, *Journal of Historical Research in Music Education*, 41, no.1 (2018), 57, doi.org/10.1177/1536600618787481.

feel comfortable teaching music to students with autism. All students will have a complete music education.

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APPENDIX A: IRB Approval Letter &Citi Program Certification

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

June 15, 2023

Whitney Mansell
Stanley Harris

Re: IRB Exemption - IRB-FY2[redacted] Applying Universal Design for Learning to *Quaver*'s Marvelous World of Music curriculum.

Dear Whitney Mansell, Stanley Harris,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(iii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
G. Michele Baker, PhD, CIP
Administrative Chair
Research Ethics Office

APPENDIX B: Permission to Access Membership for Recruitment

Jun 15, 2023

M[redacted] B[redacted]
DoDDS Music Teachers Facebook administrator.

Dear Mr. B[redacted],

As a doctorate student in the School of Music at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The title of my research project is "Using Universal Design for Learning with *Quaver* Marvelous World of Music curriculum" and the purpose of this educational applied research study is to determine if applying universal design of learning principles (UDL) to *Quaver's Marvelous World of Music* curriculum will increase the engagement of students with autism spectrum disorder (ASD) in elementary music classrooms.

I am writing to request your permission to contact members of your Facebook group to invite them to participate in my research study. Participants will be asked to complete a questionnaire and contact me to schedule an interview. Participants will be presented with informed consent information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you choose to grant permission, respond by email to wlmansell@liberty.edu .

A permission letter document is attached for your convenience.

Sincerely,
Whitney Mansell (A.B.D) DME
Fine Arts Teacher
Ansbach Elementary School
Wlmansell@liberty.edu

APPENDIX C: Permission Granted to Access Membership

June 15, 2023

M[redacted] B[redacted]

DoDDS Music Teachers Facebook Group Administrator

Dear Whitney Mansell:

After careful review of your research proposal entitled “Applying Universal Design for Learning to *Quaver* Marvelous World of Music curriculum”, I have decided to grant you permission to access our membership list and invite them to participate in your study.

☒ I grant permission for Whitney Mansell to contact members of the DoDDS Music Teachers Facebook Group to invite them to participate in her research study.

Sincerely,

M[redacted] B[redacted]

DoDDS Music Teachers Facebook Group Administrator

APPENDIX D: Social Media Recruitment Post

ATTENTION DoDDS Music Teachers: I am conducting research as part of the requirements for a Doctorate at Liberty University. The purpose of my research is to determine if applying universal design of learning principles (UDL) to *Quaver's Marvelous World of Music* curriculum will increase the engagement of students with autism spectrum disorder (ASD) in elementary music classrooms. To participate, you must be a member of DoDDS Music Teachers Facebook group, teach K-5 elementary music full time or part time and have some experience teaching with *Quaver*'s curriculum for more than two years. Participants will be asked to fill out a few questionnaires, participate in an interview and sign the consent form, which should take about 10 minutes or less for questionnaires and 30-60 minutes for the interview.

If you would like to participate and meet the study criteria, please follow link [redacted]

You can also email me at wlmansell@liberty.edu for more information. This study will take place between June 2023. I will only contact you at your convenience. Once the questionnaire is digitally sent, please complete it within 3 days. Any interviews will be done on the computer and at a time of day that is convenient for you as the participant.

A consent document will be emailed to you one week before the interview. It will need to be signed and returned to me before you complete the questionnaire or partake in the interview.

APPENDIX E: Email Recruitment Contact Email/Letter

Dear [Recipient]:

As a doctoral student in the School of Music at Liberty University, I am conducting research as part of the requirements for a doctorate degree. The purpose of my research is to determine how can applying the UDL principles help modify the *Quaver Wonderful World of Music* curriculum to accommodate the sensory, communicative, and joint attention needs of students with ASD, and is there a significant difference in social interaction, communication, and joint attention in music class among students with ASD between those receiving modified *Quaver* music lessons/presentations and those receiving non-modified *Quaver* music lessons/presentations. I am writing to invite eligible participants to join my study.

Participants must be a member of DoDDS Music Teachers Facebook group, teach K-5 elementary music full time or part time and have some experience teaching with *Quaver*'s Music curriculum for more than two years. Participants, if willing, will be asked to fill out a few questionnaires, participate in an interview, which should take about 10 minutes or less for questionnaires and 30-60 minutes for the interview. Names and other identifying information will be requested as part of this study, but the information will remain confidential.

If you would like to participate and meet the study criteria, please use the web address below.

[redacted]

You can also email me at wlmansell@liberty.edu for more information. This study will take place between May 2023 and June 2023. I will only contact you at your convenience. Once the questionnaire is digitally sent, please complete it within 3 weeks. Any interviews will be done on the computer and at a time of day that is convenient for you as the participant.

A consent document will be emailed to you one week before the interview. It will need to be signed and returned to me before you complete the questionnaire or partake in the interview.

Sincerely,

Whitney Mansell (A.B.D) DME
Fine Arts Teacher
Ansbach Elementary School
Wlmansell@liberty.edu

APPENDIX F: Recruitment Questionnaire

Introduction to Study

I am Whitney Mansell, a doctoral candidate under the supervision of Dr. Stanley Harris in the Liberty University School of Music Doctoral Studies. The purpose of this study is to determine if applying Universal Design for Learning to *Quaver*'s Marvelous World of Music will positively engage students with autism in the general music classroom.

The title of this research is Applying Universal Design framework to *Quaver*'s Marvelous World of Music curriculum to increase positive engagement of students with autism spectrum disorder in the general music classroom: an Applied Research Study.

The Purpose of the Survey

The Purpose of this survey is to solicit and recruit candidates for my study. There will be 2-3 questionnaires, interviews, and possible focus group.

1. Are you a member of the DoDDS Music Teacher Private Facebook Group?
2. Do you teach k-5 elementary music full-time or part-time?
3. Do you have at least 5 years of elementary music experience?
4. Do you have two or more years' experience teaching with *Quaver*'s music curriculum?
5. Do you have students with autism included in your elementary music classroom?
6. Please provide your last name (only researcher will have access to this information and once the survey is completed, you will be assigned a number for confidentiality purposes.)
    a. Enter your answer.
7. Please provide your private email address. (This will only be used in conjunction with your assigned number and to contact you for possible participation in the study.)
    a. Enter your answer.
6. What region do you currently work in?
    a. Europe
    b. America
    c. Pacific
7. Are you willing to answer required personal, identifiable, demographic questions related to your gender, highest level of education, the school(s) that you received your degree(s), and your degree concentration(s)?
    a. Yes
    b. No

Submit

<u>This survey will be distributed and collected via Microsoft Office Forms application using the Liberty University Microsoft Office 365 suite.</u>

APPENDIX G: Research Consent Form

Consent

Title of the Project: Applying Universal Design for Learning to *Quaver*'s Marvelous World of Music.
Principal Investigator: Whitney Mansell, Liberty University School of Music

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be a member of DoDDS Music Teachers Private Facebook group, teach K-5 elementary music full time or part time and have some experience teaching with *Quaver*'s Music curriculum for more than two years. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to determine the effectiveness of applying the UDL principles to the *Quaver Wonderful World of Music* curriculum to accommodate the sensory, communicative, and joint attention needs of students with ASD, and is there a significant difference in social interaction, communication, and joint attention in music class among students with ASD between those receiving modified *Quaver* music lessons/presentations and those receiving non-modified *Quaver* music lessons/presentations.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following things:

1. Complete a pre-interview questionnaire on your initial and current experiences with *Quaver*'s music curriculum. This questionnaire is multiple choice and short answers and should take approximately 10-15 minutes to complete.
2. Participate in an interview/discussion with Whitney Mansell discussing your experiences, opinions and overall view of *Quaver*'s music curriculum, teaching students with autism, and applying UDL to improve delivery and engagement of lessons.
3. Complete a post-interview questionnaire on your post-interview experiences with *Quaver*'s music curriculum. This questionnaire is multiple choice and short answers and should take approximately 10-15 minutes to complete.

How could you or others benefit from this study?

The direct benefits participants should expect to receive from taking part in this study are access to evidence-based techniques, lessons, and ideas for teaching students with autism using the *Quaver* music curriculum.

Benefits to society include providing students with autism access to a lifelong love of learning music.

What risks might you experience from being in this study?

The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be kept confidential through the use of codes. Interviews will be conducted in a location where others will not easily overhear the conversation.
- Data will be stored on a password-locked computer and may be used in future presentations. After three years, all electronic records will be deleted.
- Interviews will be recorded and transcribed. Recordings will be stored on a password locked computer for three years and then erased. Only the researcher will have access to these recordings.

Does the researcher have any conflicts of interest?

The researcher is a member of the DoDDS Music Teachers Facebook group. This disclosure is made so that you can decide if this relationship will affect your willingness to participate in this study. No action will be taken against an individual based on his or her decision to participate or not participate in this study.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address included in the next paragraph. Should you choose to withdraw, data collected from you will be destroyed immediately and will not be included in this study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Whitney Mansell. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at wlmansell@liberty.edu. You may also contact the researcher's faculty sponsor, Dr. Stanley Harris, at sharris226@liberty.edu.

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515, or email at irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record me as part of my participation in this study. Only for data collection and not publication.

_____

Printed Subject Name

_____

Signature & Date

APPENDIX H: Qualitative Questionnaire

Open-ended Content Questions: Please provide a *detailed* response to each question below.

1. How do you typically use *Quaver* in your class?
2. Does the *Quaver* curriculum help you provide multiple means of engagement, representation, actions, and assessments on a musical topic? Explain.
3. Do you see any difference in the engagement of students with autism better in the music classroom, when using *Quaver* and UDL principles? In what ways? Explain.
4. How do your students react to *Quaver*'s lessons and activities regarding their sensory processing? Explain.
5. Do you feel you are better prepared for teaching ALL and Any students when applying the UDL framework to *Quaver*'s curriculum?
6. Does *Quaver*'s curriculum allow you to evaluate your students' abilities through multiple means (formative and summative)?

APPENDIX I: Quantitative Questionnaire

1. I regularly have students with autism included in general music classroom?
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never
2. I understand the basic principles and guidelines of the Universal Design for Learning framework.
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never
3. *Quaver* curricula offer multiple means of representation for each musical element to help teach content in multiple ways.
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never
4. *Quaver* offers ways to customize displays, provides alternate auditory and visual information, and lessons.
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never
5. *Quaver* offers varying ways to communicate that create shared understanding (language, vocabulary, symbols, multimedia).
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never
6. *Quaver* offers multiple ways for teachers and students to construct meaning and generate new understanding (reviews knowledge, big idea, connecting, transfer knowledge).
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never

7. *Quaver* curriculum provides multiple means of action and expression for all content and lessons.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
8. *Quaver* provides options for physical action, varying methods of responding, navigating and assistive technology (as needed)
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
9. *Quaver* provides options for expression and communication, using multiple media for communication, composition, building musical fluency on various levels.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
10. *Quaver* provides options for goal setting, planning, monitoring progress, managing the web-based resources and lessons.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
11. *Quaver* curricula offers multiple means of engagement for each musical element to help provide individual choices.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
12. *Quaver* provides options for individual choices, recruiting and maintaining interest in musical topics, provides relevant, valuable, and authentic experiences for each musical element.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
13. *Quaver* provides options for sustaining effort, encouraging, collaboration, feedback, varying resources to offer challenges or remediation.
    - Always

- Often
- Sometimes
- Rarely
- Never

14. *Quaver* provides options for self-regulation, self-assessment, personal goals, and manage responses to lessons and musical interactions.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
15. The students with autism are engaged in the lessons when using *Quaver*.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
16. Students with autism are communicating with peers more when using *Quaver*.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
17. Students with autism participate more in music class with *Quaver* than prior to using *Quaver*.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
18. My students with autism are able to demonstrate knowledge of more musical elements when provided with multiple means of representation, expression, and engagement with *Quaver*.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never
19. Applying UDL framework to *Quaver*'s curriculum increase engagement of the autistic students in your music classroom.
    - Always
    - Often
    - Sometimes
    - Rarely
    - Never

20. The professional learning portal trainings help you create more *Quaver* lessons following a UDL framework.
- Always
- Often
- Sometimes
- Rarely
- Never

21. The *Quaver* curriculum too overwhelming for the sensory processing of some autistic students in your classroom.
- Always
- Often
- Sometimes
- Rarely
- Never

22. I have seen an increase in joint attention with students with autism when using *Quaver* in my music room.
- Always
- Often
- Sometimes
- Rarely
- Never

23. I have seen an increase in communication and social interaction with students with autism when using *Quaver* in my music room.
- Always
- Often
- Sometimes
- Rarely
- Never

24. Overall, I perceive that applying UDL framework and guidelines to *Quaver*'s curriculum is effective and beneficial for my students with ASD to positively engage in my general music lessons.
- Always
- Often
- Sometimes
- Rarely
- Never

APPENDIX J: Quantitative Questionnaire Analysis

Q1: asked participants if they regularly have students with autism included in their general music classroom. 72% of the participants either always or often have students with ASD in their classrooms.

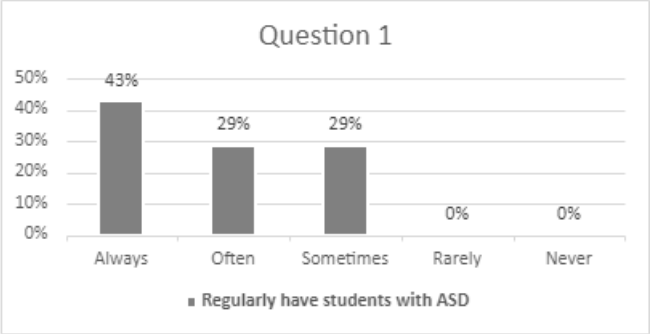

Figure 11 Question 1 percentage analysis

Q2: asked participants if they understood the base principles and guidelines of the UDL framework. 86% of the participants either always or often have a base understand the UDL framework and guidelines.

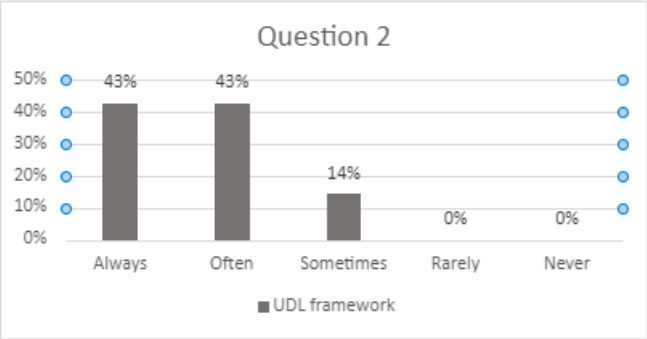

Figure 12 Question 2 percentage analysis

Q3: asked participants, does *Quaver* offer multiple means of representation for each musical element to help teach content in multiple ways. 86% of the participants either always or often feel that *Quaver* can offer multiple means of representation.

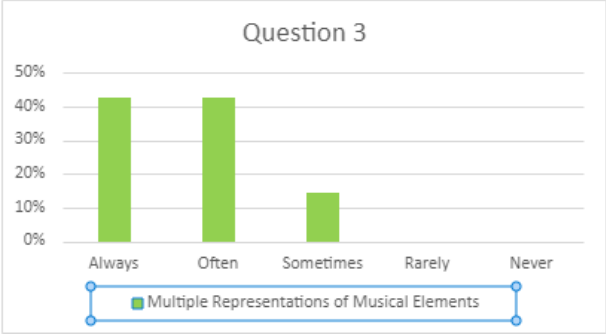

Figure 13 Question 3 percentage analysis

Q4: asked participants, does *Quaver* offer ways to customize displays, providing alternate auditory and visual information, and lessons. 86% of the participants either always or often feel that *Quaver* provides them multiple ways to meet the visual or auditory needs of their students.

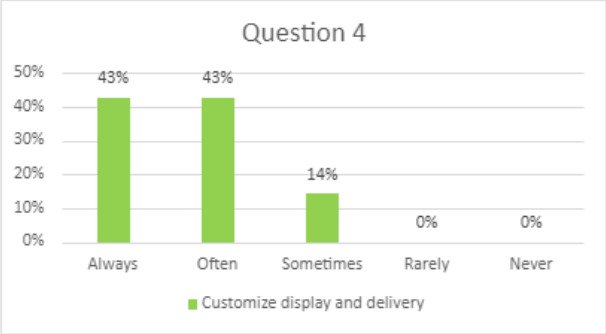

Figure 14 Question 4 percentage analysis

Q5: asked participants, does *Quaver* offer varying ways to communicate that create shared understanding (language, vocabulary, symbols, multimedia).Even though overall 86% of the participants either always or often feel that Quaver provides varying ways to communicate. A few felt that Quaver did not provide variety for the ESL students.

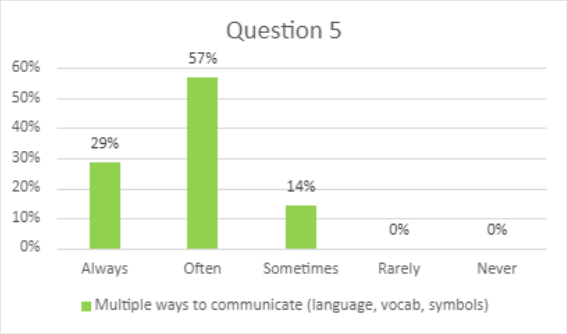

Figure 15 Question 5 percentage analysis

Q6: asked participants, does *Quaver* offers multiple ways for teachers and students to construct meaning and generate new understanding (reviews knowledge, big idea, connecting, transfer knowledge). Participants largely felt that *Quaver* allows for students with ASD to connect and transfer the musical content they are learning throughout the differing lessons in the curriculum.

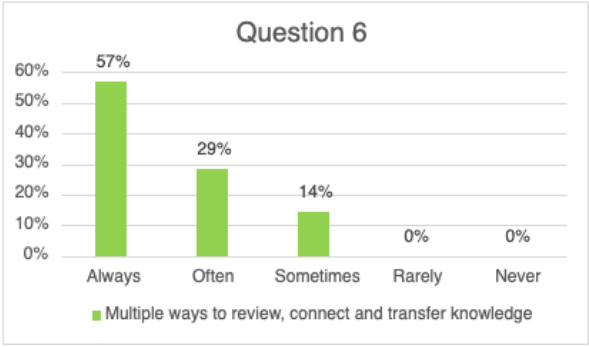

Figure 16 Question 6 percentage analysis

Q7: asked participants, if *Quaver* curriculum provides multiple means of action and expression for all content and lessons. 86% of the participants either always or often feel that *Quaver* provides them multiple means of action and expression for all content and lessons.

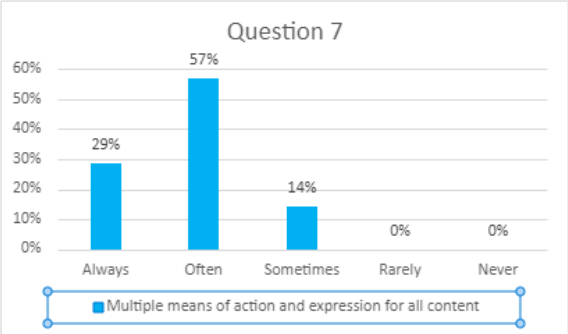

Figure 17 Question 7 percentage analysis

Q8: asked participants, if *Quaver* provides options for physical action, varying methods of responding, navigating and assistive technology (as needed). 85% of the participants either always or often feel that *Quaver* provides options for physical action.

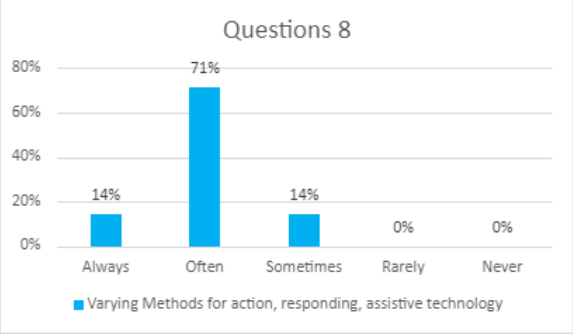

Figure 18 Question 8 percentage analysis

Q9: asked participants, if *Quaver* provides options for expression and communication, using multiple media for communication, composition, building musical fluency on various levels. 86% of the participants either always or often feel that *Quaver* provides options for expression and communication.

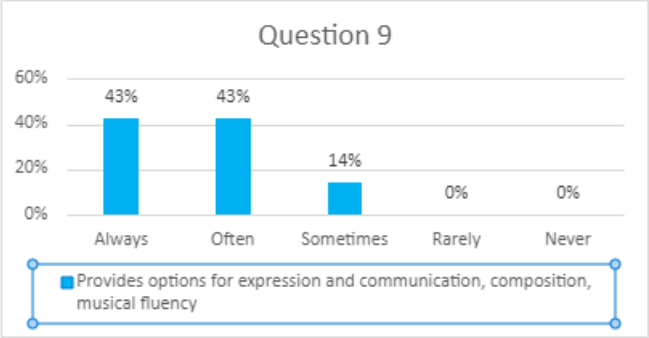

Figure 19 Question 9 percentage analysis

Q10: asked participants, if *Quaver* provides options for goal setting, planning, monitoring progress, managing the web-based resources and lessons. 43% of participants always, 29% of the time often and sometimes felt there were multiple options for goal setting, planning and progress monitoring.

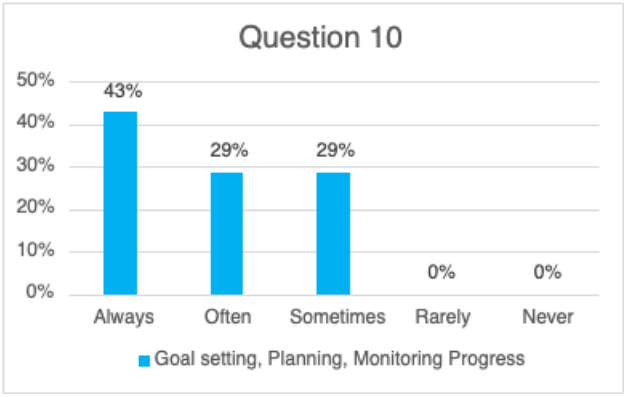

Figure 20 Question 10 percentage analysis

Q11: asked participants, if *Quaver* curricula offers multiple means of engagement for each musical element to help provide individual choices. 86% of the participants either always or often feel that *Quaver* provides multiple means of engagement.

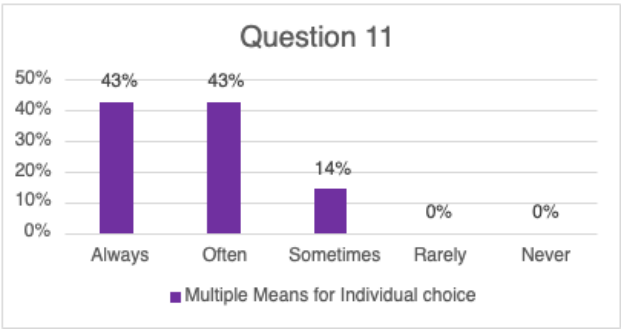

Figure 21 Question 11 percentage analysis

Q12: asked participants, if *Quaver* provides options for individual choices, recruiting and maintaining interest in musical topics, provides relevant, valuable, and authentic experiences for each musical element. 86% of the participants either always or often feel that *Quaver* provides options for individual choices.

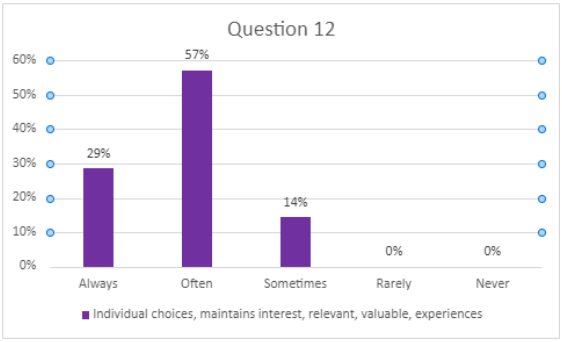

Figure 22 Question 12 percentage analysis

Q13: asked participants, if *Quaver* provides options for sustaining effort, encouraging, collaboration, feedback, varying resources to offer challenges or remediation. 86% of the participants often feel *Quaver* provides options for sustaining effort, encouragement, challenges, or remediation.

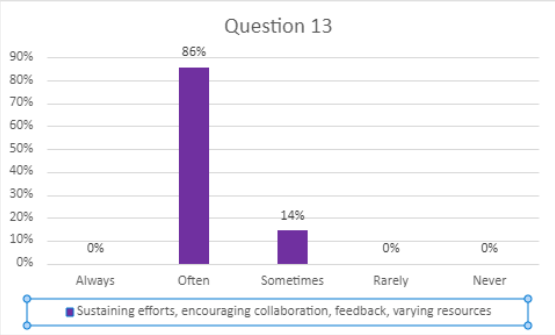

Figure 23 Question 13 percentage analysis

Q14: asked participants, if Quaver provides options for self-regulation, self-assessment, personal goals, and manage responses to lessons and musical interactions. 71%of the participants often feel that *Quaver* provides for self-regulation, self-assessment, or personal goals.

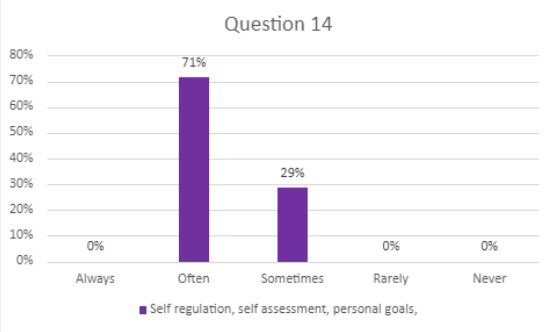

Figure 24 Question 14 percentage analysis

Q15: asked participants if the students with autism are engaged in the lessons when using *Quaver*. 86% of the participants often feel that students with ASD are more engaged when using *Quaver*.

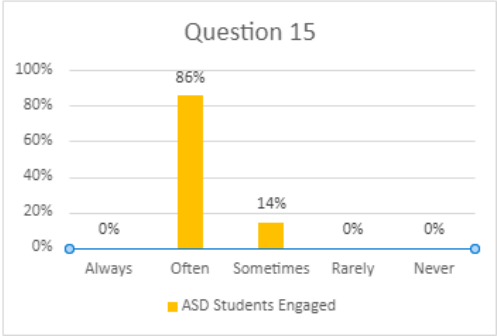

Figure 25 Question 15 percentage analysis

Q16: asked participants if students with autism are communicating with peers more when using *Quaver*. 71% of the participants often feel that students with ASD communicate with peers more with *Quaver* lessons.

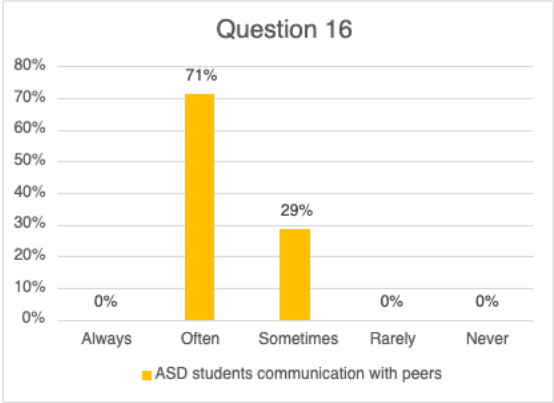

Figure 26 Question 16 percentage analysis

Q17: asked participants, if Students with autism participate more in music class with *Quaver* than prior to using *Quaver*. 86% of the participants either always or often feel that students with ASD participate more in music class with *Quaver*.

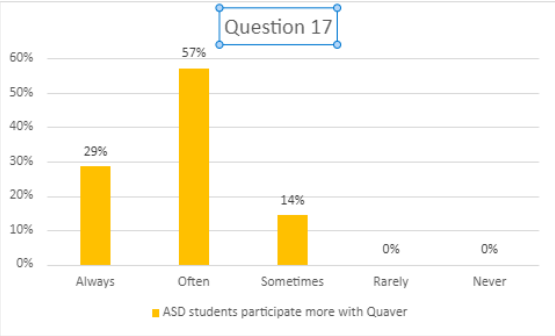

Figure 27 Question 17 percentage analysis

Q18: asked participants, if their students with autism are able to demonstrate knowledge of more musical elements when provided with multiple means of representation, expression, and engagement with *Quaver*. 86% of the participants either always or often that students with ASD can demonstrate knowledge with *Quaver*.

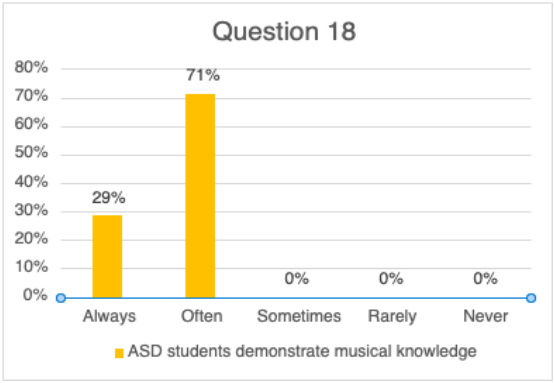

Figure 28 Question 18 percentage analysis

Q19: asked participants, if Applying UDL framework to *Quaver*'s curriculum increase engagement of the autistic students in your music classroom. 86% of the participants either always or often feel that applying UDL to *Quaver* increases the engagement of students with ASD.

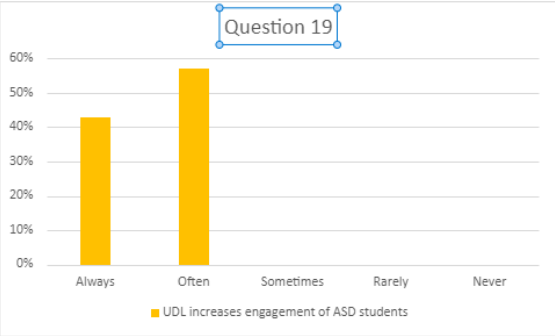

Figure 29 Question 19 percentage analysis

Q20: asked participants, if the professional learning portal trainings help you create more *Quaver* lessons following a UDL framework. 86% of the participants either always or often feel that the professional learning portal allows teachers to create UDL lessons in *Quaver*.

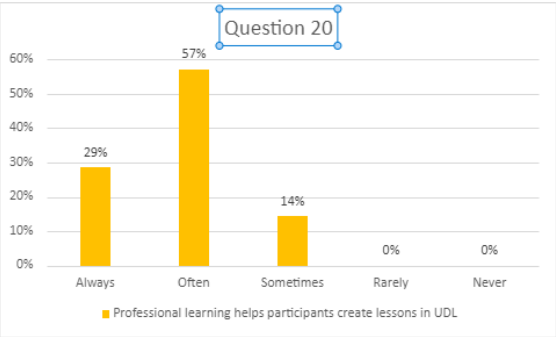

Figure 30 Question 20 percentage analysis

Q21: asked participants, if The *Quaver* curriculum too overwhelming for the sensory processing of some autistic students in your classroom. 71% of the participants feel only sometimes that *Quaver* is overwhelming for students with ASD.

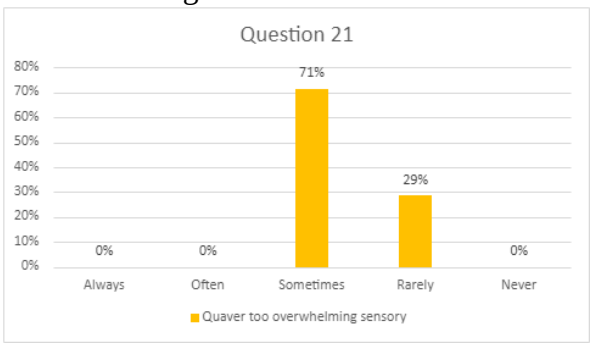

Figure 31 Question 21 percentage analysis

Q22: asked participants, if I have seen an increase in joint attention with students with autism when using *Quaver* in my music room. 85% of the participants either always or often feel that students with ASD demonstrate an increase in joint attention when using *Quaver*.

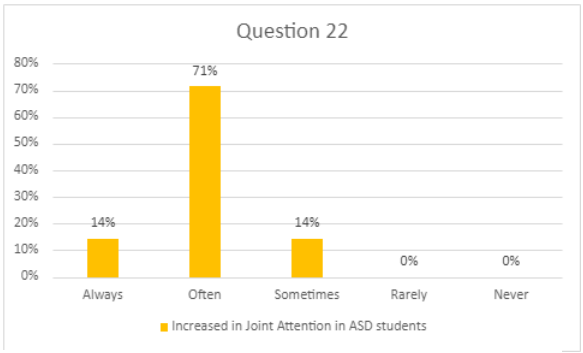

Figure 32 Question 22 percentage analysis

Q23: asked participants, if I have seen an increase in communication and social interaction with students with autism when using *Quaver* in my music room. 86% of the participants often feel that students with ASD demonstrate and increase in communication and social interaction when using *Quaver*.

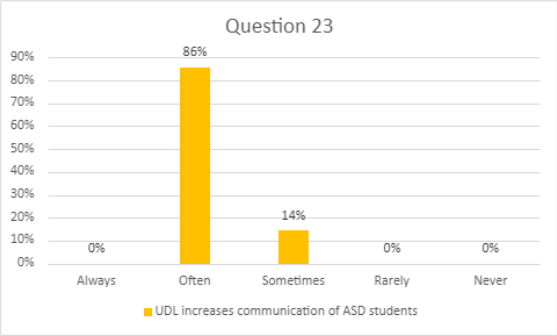

Figure 33 Question 23 percentage analysis

Q24: asked participants, if overall, "I perceive that applying UDL framework and guidelines to *Quaver*'s curriculum is effective and beneficial for my students with ASD to positively engage in my general music lessons." 100% of the participants either always or often feel that applying UDL framework and guidelines to *Quaver* provides an effective and beneficial way to engage students with ASD positively.