Vol. 48 No. 3 September 2022





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Feature

CREATING MUSIC WITH A NEURODIVERSE POPULATION: 3 Strings Is Dismantling Music Education Inequality

By Ruth LeMay



3 Strings methodology is a new adaptive music literacy model that brings neurotypical and neurodivergent individuals together to create music. It provides equal access to music education for groups who are simultaneously overlooked, misunderstood, oppressed, and frequently dismissed, while fostering authentic relationships that build community across racial, socioeconomic, and neurodiverse populations.¹ The methodology works alone or in conjunction with traditional music notation, guitar tabs, or chord symbols to create neurodiverse ensembles (**Figure 1**).

Our beginning story

3 Strings began its existence one brisk fall morning when I arrived to work early as a part-time classroom guitar teacher at a public high school in Minneapolis, Minnesota. I slipped into the back of the auditorium while a Navy jazz band performed Glenn Miller's *In the Mood* onstage. In my effort to be unnoticed, I took the first seat available. After I settled into my seat to enjoy the music, I realized I had placed myself directly behind a row of students from the special education department. Students and SEAs (special education assistants) were seated alternately to provide assistance for students as needed to maintain quiet, attentive behavior. I later learned that a part of SEA responsibilities included helping students assimilate to culture around them by observing neurotypical peers. That was not what I observed that day. I am embarrassed to admit it, but my first response was that I wished I had chosen a different seat. I struggled to identify if the students were enjoying the music or if it was irritating them. There was so much my neurotypical viewpoint did not understand yet.



Figure 1: 3 Strings ensemble Emergence. Photo by Carmen LeMay.

¹ The author respects individual choice in determining person-first or disability-first language. It is a personal choice among the special needs community to determine whether individuals want to be identified as a person first, with a disability, or with disability language as their first descriptor, e.g., a brown-eyed person versus a person with brown eyes. Throughout this article, person-first and disability-first language will be used interchangeably as a gesture of respect for both perspectives.

I was empathetic but uneducated about the world of differently abled people. As the music continued, the intense volume of brass harmonizing created an atmosphere that begged for people to show appreciation through physical movement. Students from the Autism Spectrum Disorder (ASD) and Developmental Cognitive Delay (DCD) programs were thoroughly and freely enjoying the music. They stomped their feet and waved their arms in time with the tempo, jumped up and down out of their seats, vocalized, and even at times got up and danced!

The SEAs were gentle in their approach, but it was clearly evident that the students were not supposed to behave this way. However, their response to the music was not to be contained! They were having a good time! As the music continued, a student vocalized with it and caught my ear. I have a graduate degree in choral conducting, so singing has always captivated my attention. The vocalizing was in tune. Was that accidental? Could the student match pitch? Could she do that again? Yes, she could and did. I was intrigued. The more I focused my attention on the students in front of me, the more fully engaged I became in what was clearly music appreciation. They were not agitated in the least but having a great time! If the music changed tempo, mood, or key, so did their movements and vocalizations. I spent the rest of the performance mesmerized by what I was witnessing, and a new world revealed itself to me.

A short time later I reached out to the ASD teacher, Mr. Tellman, to inquire where his students received their music education. I was quite certain they were not in band or orchestra, nor in my guitar classes. I had not seen them in the choir concerts I had attended, and I wanted to know where music instruction was being delivered. I was genuinely curious and wanted to observe how trained music educators in adaptive music education engaged special needs learners. After all, equal access to a public education is a right guaranteed through the Individuals with Disabilities Education Act (IDEA).² I was certain I was missing something—I wasn't.

I pressed Mr. Tellman for further information about his student's music education and was startled when he responded with a quick retort that he would not put them in my class and that I need not worry. He went on to explain that he brought his students to the concert because they really enjoy listening to music. He further explained that karaoke happened on Fridays, and it was the best he could provide for music education as he was not a musically inclined person. I was confused by his defensiveness. I was seeking his students out, and if they did not have music instruction, I was certain I could do better than no instruction at all. I had an open class to fill that semester



Figure 2: Artisha Knight-Milon, production manager and co-founder of 3 Strings methodology.

and thought perhaps if no adaptive music educator were available, I could try. An adaptive music class would be a fun challenge that I had not yet experienced; if a need for it existed, I was interested. Karaoke is fun, but it is not music education. When Mr. Tellman came to understand my inquiry, his response was heartbreaking. Through his tears, he explained that he had never had a music educator come to his room except to give him reasons why his students could not be in their ensembles. He had never known a music teacher personally that *wanted* to teach his students.

My next semester began with nine students demonstrating a mix of disabilities. I was provided with four SEAs, one of whom was Artisha Knight-Milon (**Figure 2**). Artisha was a former student of mine and had experience as a professional singer with the Grammy-winning ensemble *The Sounds of Blackness*. She sings lead vocals on her own composition "Amazing," available on iTunes, and performs with her family band as a drummer. In addition to her musical gifts, Artisha has experience working in residential facilities for students experiencing trauma. She also has experience as a personal care attendant (PCA) for various families. How fortunate I was to have someone so well equipped for this role!

Together, Artisha and I began a process of trial and error in learning how to adapt guitars and music to the educational and personal needs of our students. We used the resources around us, literally teaching in a storage room. A few different colors of half-inch gaff tape lay on a shelf beside us, so we taped certain frets to help students identify where to place their fingers. The guitars sounded better in dropped-D tuning and were easier for students to play as barre chords.

There were many challenges but none as challenging as discovering that hands have too many fingers, guitars have too many strings, and guitars slide onto laps easily. Eventually we decided to let the guitar lay flat on students'

CREATING MUSIC: (cont.)

laps while they stopped the strings with their left thumb. Two problems were thereby solved, but a new one was created: their thumbs were too short to reach across six strings. We exhausted every possible solution we could imagine. There simply were too many strings. One day, in exasperation, Artisha and I looked at each other as though we had rehearsed the moment and simultaneously said, "Cut some off!" One thumb, three strings, and we were making music! It was our first official 3 Strings day.³

At the end of the first semester, our nine students had dropped to seven, but those that remained had learned to play bass guitar, drum set, three-string guitar, and sing. The students performed "My Girl" by the Temptations and "Sugar, Sugar" by the Archies at our spring concert. The lead singer for "My Girl" was a young man who had been diagnosed with nonverbal autism when he was two; however, singing that song made the words flow effortlessly for him. I knew music was powerful, but this was beyond anything I could have imagined. At the close of the last song, the audience leapt to their feet with thunderous applause, hearts bursting with joy, eyes filled with tears and pride.

Students and staff also navigated trial-and-error pathways to adapt instruments and communicate musical meaning via the written page. Little did we know that a gesture toward inclusion for one semester would lead to years of adaptive music instruction and the creation of an adaptive method of music literacy. 3 Strings methodology is applicable in multiple situations. Young and old, disabled and neurotypical, onstage or in a living room, 3 Strings has application. It is currently used in select K-12 schools, senior care facilities, private studios, and homes across the United States. It is still being developed to bridge students with learning disabilities into the world of traditional music notation. A student who wants to play a traditionally notated ensemble literature, but needs an alternative approach for understanding traditional music notation, could achieve that goal through the 3 Strings notation method. Training opportunities in this method of instruction are available to educators through 3strings.org.

3 Strings is music education, not music therapy

An important distinction is that 3 Strings is an adaptive music methodology, not music therapy. Music is, by nature, therapeutic; however, music therapy uses music to achieve a nonmusical outcome, such as speaking. Music moves throughout our brain globally and therefore can be an excellent tool to "rewire" the brain subject to disability or injury. Music connects within the brain through processes that neurologists have been studying for decades. A powerful example can be seen in the video *Gabby Giffords Finding Voice Through Music Therapy*, which features US congresswoman Gabby Gifford of Arizona five weeks after the assassination attempt on her life in 2011.⁴ With the rapid growth of technology within the field of brain research, our understanding of the effects that music has on the brain has grown exponentially.

It is common for students in the 3 Strings band to improve speech through singing, fine motor skills through keyboard playing or bass guitar playing, and social interaction overall. Although no scientific data has been collected, families report that after spending six to nine months making music in the 3 Strings ensemble, their musician demonstrated markedly improved social and problem-solving skills, and an overall enhanced quality of life. Some have even reported an increase in academic success.

NAfME Invitation

An invitation to the National Association for Music Education (NAfME) was the opportunity of a lifetime! The 3 Strings were chosen to perform at the Keynote Address for the 2019 National Conference as an ensemble featuring adaptation and inclusion. It was the twentieth anniversary of Vision 2020, which was created by the Housewright Symposium on the Future of Music Education in 1999, hosted by NAfME. Vision 2020 was a publication that projected where the future of music education should be in twenty years. Point one: "All persons, regardless of age, cultural heritage, ability, venue, or financial circumstance deserve to participate fully in the best music experiences possible."5 The uniqueness of a 3 Strings ensemble is best understood by watching them perform, which you can do at www.youtube.com/results?search_query=3+strings+-+orlando+Performance.

The 3 Strings methodology often invokes a visceral response when hearing its results for the first time, especially in live performance. A fifteen-member rock band comprised of musicians that play in tune, who are multi-instrumentalists, and have Down syndrome, Autism, Williams syndrome, and other comorbidity diagnoses? How is that possible? Perhaps, one has never stopped to consider what abilities

³ 3 Strings, Inc. is now a 501(c)(3) non-profit corporation and has a current member of our band on the Board of Directors, Enrique Vivas-Vaquero.

⁴ Viewable at www.youtube.com/watch?v=tiJ9X_wLSWM&list=RDtiJ9X_wLSWM&start_radio=1.

⁵ https://nafme.org/my-classroom/journals-magazines/nafme-online-publications/vision-2020-housewright-declaration.

people with disabilities possess. What are the other abilities we do not even consider within the special needs population? For many of us, our preconceived ideas need questioning.

Bringing awareness to one's personal journey helps us realize the multiple factors in each person's developmental years that play a significant role in the adult he or she becomes, positively and negatively, and yet are completely out of one's control. Spend a few moments with the graphic "When Did You Choose?" shown in **Figure 3**, and consider the impact these factors played for you. Have you ever



Figure 3: When did you choose?

considered all the pieces that shaped your development that were never yours to decide? When working as an educator it is crucial to consider these elements and how your students are positively or negatively impacted, with or without disabilities, by their own experiences that are not within their power. Certainly none of us chose our own brain, and yet the social constructs around how we think and learn have a tremendous impact on each of us.

A way in

Being a music educator requires a large tool box of teaching strategies regardless of the age or ability of the student musician. As music educators, we study, prepare, practice, instruct, reflect, revise, reteach, and are in a constant state of honing our own musicianship, advancing our teaching methods, and monitoring our students' growth. Each musician brings gifts and challenges to the studio or classroom, and the instructor is responsible for planning out the methods that improve musicians' expertise. This is excellent teaching.

Furthermore, through playing assessments and formal auditions, educators evaluate student musicianship to create leveled playing ensembles. This process is well established and expected in the field of music. Equally important to instruction, if not more so, is the student-teacher relationship. Our human connection to each other cannot be over emphasized in its importance nor can the strong effect it has on the overall musical ability of the person as well as the entire well-being of a person. As Maya Angelou said, "I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel."⁶

It is in this vein of thinking that the mystery of success in education lies. When the whole person is a part of the instructional process, we have achieved exemplary teaching. We all have at least one educator in our memory that had a great deal of information to impart to our mind, but the biggest memory we have is not the information retained but more the effect that person had on our total well-being. Whether positive, negative, or some of both, instructors impact our lives beyond the music. Many times music instructors maintain learning relationships that last for years-the longer the relationship, the longer the potential for the instructor to make a lasting impact. It is the approach to the whole person that makes an educator ready to be welcomed into the world of special needs learners. All too commonly this population of learners is dismissed by the majority of humanity and seen as a community that can't learn, or in some cases, to be pitied. Nothing could be further from the truth. If you are a neurotypical person that is privileged enough to be welcomed into a community of disabled persons, you will learn your position is one to be envied.

It is vital when working with special-needs students to build an atmosphere of safety and learning. A delicate balance of content instruction, personal needs, patience, social guidance, and adaption flow fluidly throughout rehearsals. It requires a personal commitment to understanding terminology, acronyms, Gardner's Theories of Intelligences,

⁶ Lindsay Deutsch, "13 of Maya Angelou's Best Quotes," USA TODAY Network, May 28, 2014, www.usatoday.com/story/news/nation-now/2014/05/28/maya-angelouquotes/9663257.

CREATING MUSIC: (cont.)



Figure 4: Howard Gardner's Theories of Multiple Intelligences.

developmental disabilities, and other strategies that help the educator and student achieve success. 3 Strings relies heavily on the principals from Universal Design for Learning.⁷

Depending upon the graduation date and major of an educator's undergraduate degree, she or he may or may not have received training on how to instruct a student with special needs. Unfortunately, the philosophy "I don't know how to teach special needs learners; I don't want to do anything wrong so I should not teach them at all" still exists across many American schools, including music departments, or perhaps especially in music departments. Considering the data from the National Center for Education Statistics (NCES), the ratio of students with special education services was 15 percent in 2020–21, or four-and-a-half students in a classroom of thirty. Music ensembles frequently number higher than thirty in a classroom.⁸

Statistics this high should create the question: "How many students with special needs will be in my classroom?" Not: "I wonder if a student with special needs is in my classroom." If special needs students are not in the music classroom, then where are they? Are they receiving music education? What do you feel your musical responsibility is to these students?

Howard Gardner's Theory of Intelligences

Unfortunately, the myth still exists that people with disabilities are incapable of learning. So little time is given to helping us understand that many people need to receive information multiple times in multiple ways in order to gain comprehension, with or without disability. What is your least favorite subject? Is it perhaps because you struggle to understand the concepts? Why is it that some people show strength in one area and weakness in another? Howard Gardner's Theory of Multiple Intelligences sheds light on the reality that we have specific areas of intelligence (Figure **4**).⁹

The method

3 Strings methodology is based on early childhood literacy and numeracy. Employing concepts typically learned in early childhood, it builds complex music skills using pre-K foundational skills. 3 Strings methodology has five elements to teach melody, harmony, and rhythm:

- 1. Color schema. 3 Strings guitars are color coded chromatically with twelve different colors. Brightest colors are diatonic to C major (**Figures 5a–c**).
- 2. Shapes. Common shapes such as squares, rectangles, triangles, and circles symbolize basic rhythmic patterns.
- *3. Prosody.* Rhythm in vernacular language naturally creates rhythmic patterning too complex to represent with symbols.
- 4. *Number trains*. Numbers 1–10 indicate melodies, countermelodies, bass lines, and other music patterns.
- 5. *Idiosyncratic icons*. Images placed strategically indicate where a particular riff/sound bite or sound interjection should be placed.

⁷ https://udlguidelines.cast.org.

⁸ https://nces.ed.gov/programs/coe/indicator/cgg/students-with-disabilities.



Figure 5a-c: 3 Strings guitar, bass, and keyboard with color schema.

The five elements create music in any key or genre and can be performed simultaneously with traditional notation, guitar tablature, or chord symbols.

Not all of the elements are as simple as the 3 Strings acoustic guitar. The method scaffolds into more challenging music when combinations of numbers and colors can be sequenced together to provide complex chord progressions or multiple voices. A musician that has music intelligence can be comparable to their neurotypical peers once the information has been given in a format that makes sense. Musicians also have the opportunity for improvisation, considered to be one of the most difficult of musical challenges to conquer.

3 Strings music

Music is displayed on a television screen placed in front of the band, where all musicians can see it. The conductor leads from the side of the TV, which is connected to a laptop where *songslides* are displayed (**Figures 6a–b**). Songslides are built from the model of plainchant choral music of the Middle Ages, when multiple singers would read from one large piece of parchment paper. Similar in size, students all follow the images on the screen together as the conductor leads them through the songslides. Songslides typically have four measures per screen and can vary significantly in their visual appearance. Score order is established bottom to top with text, bass, rhythm



Figure 6a-b: Songslides.

guitars, lead guitars, rhythm keyboard, and lead keyboard. Percussion rarely appears on the slides except for an indication of a specific fill, intro, or ending.

Community

Music builds community. The universal language that unites people from myriad backgrounds is one of the gifts that music beautifully gives to us as musicians. When the neurotypical music community blends with the special needs music community, tremendous joy abounds! The beauty of community that becomes available through the flexibility of adapted instruments and music is the heartwarming creation of ensembles of varying abilities. 3 Strings methodology opens a whole world formerly closed off to a large population of people. The creation of the acoustic 3 Strings guitar has already achieved success in reaching out to individuals that need it most, as well as for individuals wanting to improve their quality of life. The human experience of helping someone be successful is gleefully palpable at times in our rehearsals. Together we celebrate, work, practice, and hold each other up to create the best possible performances we can provide.

Initially, I presumed my neurotypical guitar students and their daily interaction with special needs musicians and instruments would be something I would need to be vigilant in observing and interceding. I was thrilled that my



CREATING MUSIC: (cont.)

presumptions were absolutely incorrect. It was wonderful to watch all guitar students, regardless of ability, celebrate the creation of a music program that embraced anyone that walked through the front doors of our school. Students in DCD programming and International Baccalaureate Diploma candidates sat side by side making music together. Guitar department students took great pride in this achievement, and soon students that were not a part of the guitar program would stop in and ask questions as well as offer praise. It is a point of notoriety to be the only department in our school that has a place for everyone. I believe most people like to be seen in a positive light and like to help. Neurotypical people come to 3 Strings with the positive intent to help others be successful. In my experience, very few enter with the expectation of how enriched their own life will become.

The mutual admiration was almost immediate as our NAfME All-National Honor Guitar Ensemble, songwriters, and other students within the department expressed their jealousy over 3 Strings band members' ability to "go all in" onstage. 3 Strings musicians are effervescent before audiences and perform with great abandon, as though there isn't a nervous bone in their body. Likewise, 3 Strings students are quick to praise the success of musicians in the guitar program that are growing in their skills and impressing their listeners. Beyond the music, authentic friendships form. I often hear casual conversations among students as they organize outside social activities in neurodiverse groupings. This vision is perhaps the greatest teacher of all. The unifying factor of neurodiverse friendship is common interest, in this case music.

What started as a class is now fully embraced by the community of our school system and neighborhoods. In

the words of Artisha Knight-Milon, "I believe the 3 Strings method has the potential to become a universal lifestyle. It has already stood the test of time and continues to be adaptable across numerous barriers. I see it in the homes and lives of every person who loves someone who loves music." Figures 7a–b show our classroom today.

"Nothing About Us Without Us"

Disability oppression is a daily occurrence in the lives of most of my musicians and their families. Disability awareness is constant work for a population that is so frequently dismissed and undermined. Musician voices have an integral role in our 3 Strings ensemble. Musicians learn how to choose quality music to build our setlists and have a voice throughout our selection process. Musicians are encouraged to advocate for themselves regarding instrument choice and are guided to the best fit for them and the benefit of the band.

Other communities benefit from 3 Strings methodology beyond the classroom and beyond youth. There is a beginning 3 Strings ensemble focused on the geriatric community. The neurological benefits of music and the brain are abundant throughout life for myriad reasons. A 3 Strings ensemble was introduced in a South Dakota senior living community, where residents enjoyed the time learning how to make music, many for the first time. The adaptability of the method was clearly demonstrated when two friends, Naomi and Donna, discovered that neither of them could play alone but together they could play one guitar! Naomi lives with macular degeneration and Donna had recently had a stroke. Naomi was capable of strumming to the rhythm but couldn't see the colors. Donna could see the colors but couldn't move her right arm to strum. Together they had a great time, making music! Everyone deserves music.



Figure 7a-b: Our classroom.



Hear 3 Strings musicians, volunteers, and guitar players speak about inclusion and what it means to be involved in 3 Strings in the video *Voices of 3 Strings Musicians: "Nothing About Us Without Us*," viewable on YouTube.¹⁰

Family voices

Families have a great deal to say about the impact that adaptive music has made for their family member. Below is a link to a NAfME submission wherein a 3 Strings lead singer's mom explains how 3 Strings made her son's world bigger. The second link is to the 3 Strings website, where additional testimonials from family members and board members can be viewed.

- nafme.org/bigger-life-open-letter-from-3-stringsunlocked-southwest-parent
- 3strings.org/about

ADDITIONAL RESOURCES

Websites

3 Strings, Inc., https://3strings.org. 3 Strings methodology training.

Autism Society, https://autismsociety.org. Parent and family resources for a multitude of issues.

Autism Speaks, **www.autismspeaks.org**. Parent and family resources for a multitude of issues.

Center for Disease Control, www.cdc.gov/ncbddd/ developmentaldisabilities/about.html. Discusses early identification and tracking of disabilities.

National Center for Education Statistics, https://nces. ed.gov. Information about various aspects of education in America.

National Down Syndrome Society, **www.ndss.org**. To further understanding and assistance for people with Down syndrome.

Parent Center Hub, www.parentcenterhub.org/keytermsspecialed. For learning more about disabilities.

Universal Design for Learning (UDL), https:// udlguidelines.cast.org. Breakdown of UDL and its educator approach for various learners.

Books

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Videos

Collins, Anita. *How Playing an Instrument Benefits Your Brain*, www.youtube.com/watch?v=R0JKCYZ8hng.

KARE 11 News. *How a Music Teacher at Southwest High School Is Changing the Tune of Learning*, www.youtube.com/watch?v=_8GDYur23vA.

Moore, Shelley. *Five Moore Minutes*, fivemooreminutes.com, www.youtube.com/watch?v=rO3_UYaz1HE.

National Center for Biotechnical Information. *Neuroplasticity Following Traumatic Brain Injury*, www.ncbi. nlm.nih.gov/books/NBK326735.

Ruth LeMay, president and founder of 3 Strings, Inc., served as Director of Guitar Education at Southwest High School, Minneapolis Public Schools for the past eight years. In 2020, she became the first recipient of the annual NAfME Council for Guitar Education Award, based on her dedication to students, contributions to local and regional guitar activities, service to the field of guitar education, and advocation for continued growth of guitar education. Ruth has now moved into online music education to be more available for guest lecturing and teacher training regarding 3 Strings methodology. Ruth welcomes questions and comments: go to ruth@3strings.org.



¹⁰ www.youtube.com/watch?v=Sw3cQPbOo-Y.