

Good afternoon! I want to thank you all for joining me. My name is Julia Avery, and I am a Masters student here at the University of Tennessee. My research focus is on creating inclusive spaces in public school ensembles for people with disabilities. Today, I will be focusing on saxophonists who have a disability in their hands or fingers.

****** This presentation was inspired by the work of Dr. David Nabb at the University of Nebraska at Kearney. Some of you may be familiar with his work, but I want to start by giving a brief overview. In 2000, Dr. Nabb had a stroke (UNK OHW) that paralyzed his left hand. Since he was already a saxophone professor and was playing full time before his stroke, Dr. Nabb worked with a local instrument builder named Jeff Stelling to create a one-handed saxophone. If you look closely at this photo of Dr. Nabb, you'll notice his left hand grips a handle that helps balance the horn and provide a placement for his hand that was affected by his stroke. All notes that would be covered in the left hand are now covered in a series of toggle systems in the right hand/ This Toggle-Key saxophone was presented in 2001, and Nabb has been using one ever since (David Nabb, YouTube, 2020). This video shows multiple closeups of Nabb's right hand, and if you look closely, you can Nabb's fingers moving across the toggles to play the Heiden Diversion. There are currently four toggle-key saxophones in existence (Nabb, 2024) and multiple people have used the Toggle-Key Saxophones created by Nabb and Stelling. As amazing as these saxophones are, Dr. Nabb does acknowledge that there is one large problem with these instruments: the cost. A Toggle-Key Saxophone costs about \$25,000 to make (Nabb, 2024). While there have been fundraising opportunities throughout the years in order to build another model, this is not a feasible price for most musicians, let alone a musician with a disability.

****** One thing we must acknowledge is the financial limitations of someone with a disability before we can continue forward. There is an extremely strong connection between a person's disability and the chance they live at the poverty level (Lubet, 2018). This can be due to mounting medical bills from numerous doctors and hospitals, a parent not being able to work in order to act as a caretaker, or the limited supplements they will receive from the government and are allowed to have individually as adults. As a disabled child, their family may not have the money, or the time to take off work to advocate for their child's needs in band or afford private lessons. Not only this, but many items usually geared towards people with disabilities are sold at luxury prices (Williams-Roberts, 2024). Combine this luxury pricing with the lack of standardized technology and labor to create adapted instruments, and this results in extreme amounts of labor to create these products (Nabb, 2023). As a result, these instruments are considered out of reach for musicians with disabilities. This price can also be strenuous to expect a band program to pay for, so a student may be discouraged by a lack of a feasible instrument. With no affordable means to allow the student to play and participate, then the student remains on the fringe or excluded from music programs. Therefore, this presentation focuses on cost-effectiveness, which means that the modification is a more achievable price and will still provide a strong gateway for the musician with disabilities to learn and play. Specifically, the purpose of this presentation is to share cost-effective saxophone modifications that can be

utilized by younger students, whether they be products, adjustments to the horn, or resources that can help guide a student's musical journey.

** A good definition of assistive technology can be found in the 2004 Individuals with Disabilities Education Improvement Act: "an item, piece of equipment, or product system, whether acquired commercially off the shelf, modified or customized, that is used to increase, maintain, or improve functional capabilities of children with disabilities" (IDEIA via Watts et. al, 2016). Many interpretations of this definition across schools and districts also include various learning technologies in this definition, such as iPads. Therefore, based on this line of thinking, these modifications or replacements to the traditional saxophone would fall under this definition. This is vital because these technologies can then be seen as fundamental to the student's success and can be subsidized, which we will discuss later on in this presentation (Watts et. al, 2016).

** First, I will discuss the products that have already been made and are commercially available. These are instruments that are already designed for musicians with disabilities (Davanzo & Avanzini, 2020) and include ones such as Dr. Nabb's Toggle-Key Saxophone. However, the downside is that these products are not made to meet individual needs but are aimed towards generalized disability. Therefore, there is a chance that modifications will have to be made to these products or they may not work at all for your student (Nabb, 2024). Still, it is important to discuss these products and recognize the opportunities they could provide for your students. These products can also be a good starting point as one begins to research possible options.

** There are some more affordable one handed saxophone options that already exist. The Adaptive Travel Sax from Odisei Music is a lightweight and diverse option for the one handed student. This saxophone weighs less than one pound, and can be mounted to a stand or table. There are 3 pre-programmed fingering systems: a traditional saxophone system, flute, and a one-handed system. You can switch between each system with ease using a foot pedal. If your student also struggles with their breathing, then the Adaptive Travel Sax has customizable breath sensitivity, and relies on sound to come from a mobile app. You can change the channel for which air flows through the horn, and can also customize the air pressure minimum and maximum thresholds. This product is \$643.33. And here is a quick demonstration video. (mybreathmusic.com)

** The Aerophone from the Roland Corporation is also lightweight and simple for a one handed musician to use. The fingering system is based on that of the recorder, so you will need to adjust the fingerings charts accordingly. The keys are also close together and require little force to press. It is sensitive to air, so it will make sound with little effort (Roland.com). This video does not share a saxophone sound, but this demonstration shows how the horn plays. This instrument can be purchased on Amazon for about \$538 (Amazon.com).

** The JSax is similar to the Adaptive Travel Sax and the Aerophone in that it is lightweight and easier to hold. However, the JSax only uses the saxophone fingering system, but since the keys are closer together and do not require a lot of force to press, this would be beneficial for the

student with limited movement in one or both hands. This product can be purchased for \$99. (westmusic.com)

** This Electronic Saxophone Interface was created by Simon Moxon, a one handed saxophonist who we can see playing here. You'll notice that the bottom hand is electronically powered. These are done by solenoids, a magnetic coil powered by a converter. The convertor is programmed to respond. The solenoids turn the electricity from the convertor into movement, such as pressing down a key. One thing to note is that Moxon does not have the use of his right hand, so opposite to Nabb, Moxon's horn triggers the solenoids by pressing keys and activators in the left hand. The instructions for creating this interface can be found for free at sitamoxon.com/onehandsax.php. I will provide a link to this site at the end of the presentation. There is no set price for this system; solenoids can be bought for less than \$20 online, but you may require the labor of an expert to understand and put together the interface.

** When a student has a hand disability, one problem can be how to hold the instrument. A traditional neckstrap may not provide enough support. Instead of using a regular neck strap or harness, the saxophone stand takes the weight of the instrument so the student does not have to try and manage the weight on their own ([Woldendrop & VanGils, 232](#)). All three stands seen here: The Hercules Stand, Sax Support, and the Bariflexx brace the bell and base of the horn and used a tripod set up to create a stable stand on the floor. These are also great for a student who struggles with their grip and students with back problems. The bariflexx is currently sold out, but the Hercules Stand would be \$68.99 (Herculesstands.us) and the SaxSupport (saxsupport.com.au) would be \$89.

** If your student can not hold and navigate any of the previous products, there are a multitude of different apps on an iPad that are available for free or low price. Many of these do not feature a saxophone sound, but still allow the student the chance to perform and improvise using touch or icons. They can also be used in an ensemble application. These apps include Soundrop, Pitch Painter, SoundBrush, Garageband, iKaosilsator and AirVox ([Stras, 186; Watts et. al, 96; McHale, 113-114](#)). Many students in the Special Education programs have access to iPads, which would be an easy option to include students in the music making process. However, you have to be mindful and attentive to this application, as students may be distracted by the iPad and go to different apps during class.

** Another electronic application to consider is the Jamboxx. This is a hands-free application that can be carried or put on a stand. It is based off the design of a harmonica. In the middle of the harmonica, there's a straw-like tip where notes are controlled by "sipping and puffing" the nodule. The pitch can be changed by sliding the tip back and forth across the row. It connects to a Mac or Windows computer program like a synthesizer. The program can customize aspects of playing such as the instrument sound and the threshold of air required to make a sound. There are two versions available: the Pro Version is \$399, while the Music Therapy or Special Needs version is \$279. It would be worth seeing if you can apply for this latter option. (jamboxx.com)

** If none of these products can be molded to fit your student's needs, then another avenue would be to create some of these modifications on your own. This is also better for a limited

budget, and can be completely original. The following ideas are ones that I came up with on my own through the course of researching this topic.

****** One rapidly growing option is to create rigid supports for the weaker hand using 3-D printing. 3-D printers are becoming more accessible and affordable for schools and private use. If you do not have access to a 3-D printer, however, there are companies who will take your design and print it out for you (Williams, 2024). However, this option does require an understanding of coding and designing products for a 3-D printer, which can be time consuming to learn. Some ideas I have had is that we could 3-D print braces that attach to the saxophone and allow the student to grasp with a non-functional hand (similar to Dr. Nabb's hand grip on his saxophone). This bracing could also be used to hold the solenoid and convertor for the electronic saxophone in place. A supportive cast could be created for the lower hand if the student struggles to raise their arm enough to play the keys on the lower stack, and connect the cast to the chair or floor. With time, perhaps extensions to hands and fingers could be made as well to help the saxophonist reach all keys. However, this would require a deeper understanding of the dexterity 3-D printing allows that I honestly have yet to wrap my mind around. I encourage all of you to allow your imaginations to run wild, and see what could be 3-D printed for your student.

****** Another option is to adjust the key heights on a saxophone if your student does not have a big enough hand to wrap around the saxophone without hitting side keys (Culp & Jones, 46). Your local instrument technician may have some ideas on how to change the exact heights in order to assist your students. There are also products such as the Rulon Alto Sax Palm Key Removal Kit, which can remove the palm keys on the top hand and plug them in order to create better access for the student as seen here(keyleaves.com). There is also the Rulon Thumb Rest, which adjusts the height and direction of the thumb to make it easier for the right hand to reach higher keys.

****** Finally, there are some other important things to consider when undergoing the modification process.

****** One important thing to consider when teaching saxophone to a student with a physical disability is the fact that our traditional pedagogy may not be suitable for the student. The pedagogy was created for an able-bodied musician with two working hands, and your student will not fit that mold so some aspects may not work or may even be painful for the student. While our tradition has been the work of many generations, insisting on using it can lead to frustration and may lead the student to feel as if the instrument is being valued over their own needs (Williams, 2019). Therefore, we must be willing to bend the pedagogy to the needs of the student, which may mean some technique or fundamentals may be done in an unorthodox manner or in a way we have been taught is 'wrong'. However, this will all be to benefit the students' musical success.

****** If your student has an Individualized Education Plan or an IEP, then you should be aware that each student with this paperwork has an allotted amount of funding for their educational needs (Papas, 2024). As their teacher and as someone who is actively working to help your student succeed in your class, you have a right to request that some of this funding be used to help pay for the assistive technology or adaptive instrument. Since it is federal law that the student's

accommodations be met in the classroom, you have a fair chance that this funding will be granted (Chriswell, 19), especially since this is a purchase that will be used for multiple years after the initial payment. One large way to make this happen is to attend your student's IEP meetings. As their teacher, you are part of the team that helps the student succeed, but the other members of the IEP team may not have ever considered the importance of music or the needs the student may experience when playing an instrument. Therefore, your presence in these meetings is vital to advocate for the importance of music, to request allotted funding, and to work with other teachers and the student's parents on helping them succeed.

****** One of the most important things you can do during the accommodation creation process is to listen to the student and their family. Your student lives with their disability on a day-to-day basis and will have a good idea of what they can and cannot do. Therefore, they should have a voice in the conversations (Culp & Jones, 44). Parents should also be allowed a voice, as they will also have a strong perspective on what their child will need on a day to day basis (Chriswell, 19).

****** If you are unsure of the specifics of a student's disability or are having trouble accessing the required technology (Culp & Jones, 44), the Special Education teachers at your school should be able to help you (Hammel & Hourigan, 66). They are experts in the field of Special Education and are a strong resource. They can help you understand any paperwork a student may have and provide advice on how to include students in music making and the ensemble community (ibid).

****** One possible avenue to consider is to reach out to STEM and Engineering programs at local colleges and universities. Within their last few years, many Engineering students are encouraged to undertake projects that benefit the community. For example, a team from Tennessee Tech created prosthetics for a young percussionist who had no arms (CNN.com). If you reach out to one of these programs, a student will more than likely be willing to assist in your journey to help your student.

****** Adaptive Equipment Companies usually focus on mobility and occupational habits, but that doesn't mean they can't be a good resource for Do It Yourself adaptations. These experts may have specific ideas on how to help adapt the saxophone to your student. One specific website I found was especialneeds.com. This website provides access to a wide variety of products, and while none are directly geared towards music, they can be adapted to meet the individual needs of the student. You can also find local adaptive equipment companies in your area.

****** Music therapists frequently work with children with special needs and have developed their own methods and exercises to help them (Hammel & Hourigan, 22; Pappas, 2024). They can provide insights on accommodations, adaptive equipment, and exercises that can be incorporated into a student with one hand's practice and class routine (Hammel & Hourigan, 22). Some schools have hired music therapists, but if your school does not have one on staff, you can find one in your area in the online directory at musictherapy.org.

****** And most of all: don't be afraid of trial and error. You will not find the perfect solution on the first try, and that's okay. I assure you that your students care that you are even trying to help improve their saxophone experience (Culp & Jones, 44).

** This last slide is a Linktree I have made. It contains links for the products I have presented today and various resources I have found during my research that can provide further assistance with creating accommodations, along with creating an inclusive environment for the student. I will leave this up so you can scan the QR code.

Thank you so much for coming today, and please feel free to come up and ask any questions you may have!