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### A Teacher's Companion For The Emerging Electric Orchestra

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A TEACHER'S COMPANION FOR  
THE EMERGING ELECTRIC ORCHESTRA

By  
RACHAEL GREENMAN

A RESEARCH PAPER

Submitted in partial fulfillment of the requirements for the degree of  
Master of Music in Music Education  
in the School of Music  
of the College of Music and Performing Arts  
Belmont University

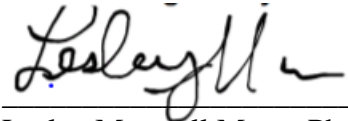
NASHVILLE, TENNESSEE

December 2021

Submitted by Rachael Greenman in partial fulfillment of the requirements for the degree of Master of Music in Music Education

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## **Chapter 1: Setting up Your Electric Orchestra**

Venturing into the world of electric string playing for the first time can seem overwhelming. The following questions can serve as a guide for discerning how to establish an electric strings ensemble within your program:

- a. What brand of instruments are available, and what are the advantages of each brand?
- b. What method of amplification is appropriate (best fit) for your program?
- c. What is the cost of each of these components, and how should the teacher prioritize their budget?

The following chapter will present information to help teachers make informed decisions regarding each of these questions.

### **Instruments**

There is a vast array of electric instruments that exist today. Since the 1930s and 1940s, violin players have been “electrifying” their instruments for a variety of reasons: whether it be to compete with the guitar players in the world like Jimi Hendrix and Eddie Van Halen, or to venture into the gigging scene and be heard over the top of an entire band when playing a fiddle solo. However, not all electric instruments are created equal. These instruments have varying price points and correlating qualities to them just as their acoustic counterparts do. Just as one would not start a beginner on an advanced acoustic instrument, a teacher would not start a beginner player on an advanced level, and priced, electric instrument.



The well-known music brand, Yamaha, makes electric violins as well as other instruments. Their YEV-104NT (Figure 1.1) electric violin resembles a traditional violin more than some other options on the market in terms of its shape. Their website claims that the instrument is “priced for the entry level market” around \$600 which is around the standard price that one would pay for a beginner electric instrument. The pickup in the instrument is a dual-piezo pickup that produces a natural and resonant tone similar to one that would come from an acoustic instrument. The volume knob is located on the back of the instrument near the neck for easy access and has a locking switch so a performer can set a specific volume and lock it in place for a performance. This model of violin can be ordered with four or five strings, making it accessible for all violin and viola players. Yamaha is also able to outfit the cello section of an electric ensemble.



Figure 1.1. Yamaha Electric Violin (Yamaha, n.d.)

The Yamaha SVC-50 (Figure 1.2) is their most affordable electric cello, and costs about \$1,800. It has detachable knee supports so it can be played sitting down like a traditional cello or standing for a more rock and roll appearance. It also has a chest

support so it rests against the musician's body like a traditional cello would. In addition, it comes outfitted with a volume knob, reverb knob, and piezo pickup. This instrument is also able to run off batteries in "silent mode" which means a player can plug headphones directly into the instrument, turn it on, and practice as if they were playing through an amplifier (Yamaha, n.d.).



Figure 1.2. Yamaha Electric Cello (Yamaha, n.d.)

NS also makes reliable electric string instruments. The WAV Electric Violin (Figure 1.3) is their "beginner" level electric instrument and costs between \$700 and \$850 depending on how many strings are requested and the finish. This instrument has a very different appearance from a traditional violin and from the Yamaha electric instrument; it is essentially just the fingerboard and a body with the bouts of the instrument removed. There is no scroll, and there are no peg tuners, only fine tuners which is made possible by their patented "self-clamping tuning system," which could make it easier for students to tune their own instruments as peg tuners are harder for young students to manipulate. The WAV is outfitted with a custom shoulder rest that can

be molded to a player's shoulder and chest to help them best support the instrument when playing. These instruments have what NS calls the "Polar™ Pickup System." This kind of pickup is said to be optimized for string playing in that it adjusts depending on which way the strings are vibrating—horizontally when played arco or vertically when played pizzicato. The WAV Electric Violin can be purchased with five strings, so it can be played as a viola also; however, NS makes a viola specific instrument as well.



Figure 1.3. WAV Electric Violin (NS, 2020)

The CR Electric Viola (Figure 1.4) has all the same features as the WAV Electric Violin, except for its length of twenty-three inches and viola strings instead of violin. This may be preferred by some teachers, because handing a beginning student a five-string instrument can be daunting and many young students will try to avoid playing an instrument with five strings. However, it takes relatively little time to adjust to the new bow angles between the strings on a five-string instrument as they are not drastically different from a four-string.



Figure 1.4. CR Electric Viola (NS, 2020)

As for cellos, the WAV Electric Cello (Figure 1.5) is the best option for a beginner group. It costs between \$1,200 and \$1,300 depending on the number of strings—it can be made with four or five—and the finish on the instrument. These cellos also have the “Polar Pickup System,” however instead of automatically switching between arco and pizzicato like the WAV Electric Violin does, the WAV Electric Cello is outfitted with a toggle switch to change back and forth between the two. This allows the player to differentiate between their pizzicato and arco, which tends to be more noticeable on a cello (NS, 2021).



Figure 1.5. WAV Electric Cello (NS, 2020)

Wood Violins instruments meet a number of criteria making them suitable for entry-level groups: they are high quality, durable, and on the low end of the cost spectrum. The Wood Violins Stingray SVX (Figure 1.6) gets its name from the shape of the body, which resembles the marine animal. It is made with the Wood Tru-Tone bridge pickup and can be purchased with either four or five strings from \$700 to \$900 and can be upgraded to an SVX Pro for a fee. This upgrade allows for the choice of a custom finish on the instrument and the addition of a better pickup. The Barbera pickup has two transducers per string allowing it to better capture the sound of the instrument. The base of the instrument also fits a standard violin shoulder rest so there is no need to purchase additional materials for it, students can simply use their personal shoulder rests to support the instrument. This is another option that will work for violinists and violists.



Figure 1.6. Stingray Violin (Wood Violins, 2021)

The Wood Violins cello is called the Cobra (Figure 1.7); this instrument is very different from a traditional cello. The Cobra is worn over the shoulders with an attached harness, which has adjustable chest and stomach supports. These instruments can be made with between four and seven strings, fretted or fretless, and with a variety of custom finishes. The price on these typically ranges from \$3,700 to \$5,700 depending on what specifications are selected and if it has to be custom made. All Cobra Cellos come with a Barbera pickup that gives them their vast variety in tone.



Figure 1.7. Cobra Cello (Wood Violins, 2021)

Another violin and viola option from Wood Violins that gives players more freedom and variety, similar to the Cobra, is the Viper Violin (Figure 1.8). This instrument is shaped like a flying V guitar and makes use of Wood Violin's patented self-supporting system. They can be custom built with between four and seven strings, frets, phantom frets (fret markers on the fingerboard that are not raised), or fretless, and with a wide variety of custom finishes. These instruments range between \$3,700 and \$5,700 depending on the specifications, however they are more versatile than the Stingray SVX. As mentioned earlier, this would be an example of an advanced or professional level electric violin, not necessarily recommended as entry level instruments (Wood Violins, 2021).



Figure 1.8. Viper Violin (Wood Violins, 2021)

There are a host of different electric violin brands. Yamaha, NS, and Wood Violins are just a few of them. They all have reasonably priced instruments that would work well for a new electric string ensemble, and a teacher would be able to outfit their entire ensemble with instruments from any one of them. I recommend only purchasing instruments from one brand, rather than mixing instruments from different brands. Because these instruments are all very different and unique, bringing in too many different instruments would inevitably cause confusion and more work for the teacher as more instruments mean more technology to learn and explain to your students. Some instrument companies also provide discounts on large purchases or purchases made by schools. For example, Wood Violins has packages for starting electric ensembles that include Stingrays, amplifiers, and cables at a discounted rate.



## Amplification

After selecting the instruments, the teacher has to then choose a style of amplification. There are two common ways of amplifying electric ensembles: using individual amplifiers for each student, or using a public address (PA) system. There are challenges that come with each of these methods as well as benefits. Control of the overall sound of the ensemble, balance, and tone are some of the variables that will be affected depending on which amplification method the teacher chooses.

There are three different kinds of amplifiers: Tube Amplifiers, Solid-State Amplifiers, and Modeling Amplifiers. Each of these has its own strengths and weaknesses as outlined below

Tube amplifiers are powered by a series of glass “tubes” located in the unit. Deninson describes the “basic concept” of tube amplifiers: “A small heater in the base of the tube warms up a small, gate-like mechanism that opens and closes. Electrical energy is created as the heat goes through the ‘gate.’ Tube slots are ‘biased,’ which determines the voltage (Deninson, 2012).” This process of heating the tubes creates a rich, natural sound that is different from solid-state and modeling amplifiers. However, it takes a while for the tubes to warm up, so the amp cannot be used right when it is powered on, unlike solid-state and modeling amplifiers. In addition, these amplifiers are extremely fragile, typically heavy, and require maintenance. They are based on older technology first made popular in the 1970s when the transistor became more common and affordable. Because of this, when the tubes fail, they can be expensive to replace. Some performers are fond of the very natural-sounding distortion that is brought on by one of the tubes in a

tube amplifier failing; however, for the purposes of an ensemble where all players should have a similar sound, these amplifiers are best avoided.

Solid-state amplifiers emerged onto the market in the late 1960s and became serious competitors for tube amplifiers. The tubes were replaced with smaller, solid-state electronics which in turn made the amplifiers lighter, more portable, and more durable. The factor that makes these amplifiers less desirable to musicians is their predictable tone. When comparing tube amplifiers to solid-state amplifiers, tube amplifiers have a naturally warm sound whereas solid-state amplifiers can sound too precise, or dry, an undesirable trait for some musicians. However, in a situation with a group of students new to electric string playing, a precise, dry, and *reliable* tone will provide students with more consistency in their sound (Deninzon, 2012).

Modeling amplifiers use digital processing to simulate popular tube amplifiers, cabinets, and microphones. These amplifiers are usually priced similarly to solid-state amplifiers and can also be recorded directly into a computer without using a microphone. In contrast, when recording a solid-state or tube amplifier the recording engineer places a microphone in front of the speaker on that amplifier to capture the sound being produced by the amplifier. Students will enjoy experimenting with the various sounds on these amplifiers and they have the added benefit of a “clean” setting for use when playing with an ensemble. When deciding between solid-state and modeling amplifiers, teachers may choose based on personal preference for the sound of the amplifier. Many musicians will go to local music stores and plug into several amplifiers to evaluate their sound (Deninzon, 2012).

## Public Address (PA) System

A PA system provides another option for amplifying a group of students. This method involves a more extensive knowledge of live audio setup, mixing, and audio equipment. Each student playing an electric instrument will require an in-ear monitoring system. This system will allow them to hear exactly what they are playing from their instrument amongst the master mix of all of the instruments which is what will be heard by the audience. Two options for mixing a student group include: a single fader for each section of the orchestra, or an individual fader for each student. The size of the ensemble and the size of the mixer will determine this choice.

The required equipment for a PA setup is as follows: PA speakers, a mixing board, a monitoring amplifier for each student (in my example I use the Rolls PM55P), headphones for each student, a wireless transmitting system (again one per student playing an electric instrument—for my example I use Shure BLX wireless transmitters), and quarter inch cables. To assemble each in-ear monitoring system (Figure 1.9), the teacher will insert one end of a quarter inch cable into the instrument, and the other end into the input on the Rolls Personal Monitoring Amplifier labeled “Monitor Input.” Next, connect another quarter inch cable to the wireless transmitter for the Shure system and plug the other end of that cable into the output on the Rolls Monitor that says “Phones.” That transmitter will send the signal from the electric instrument to the receiver which will be connected to the mixing board. The last step of setting up the in-ear monitor is to plug the headphones into the eighth inch output next to the quarter inch output that says “Phones.” Plugging the headphones in there will allow the students to hear what they are

playing. All of these components will be secured in a fanny pack that the student will wear during rehearsals and performances.



Figure 1.9. Wireless Pack Setup (Amplifier Image from Rolls Website, Violin Image from Wood Violins Website, Wireless Receiver Image from Sweetwater Website)

The other end of the PA system is where the mixing of all the students' sound occurs; that is where the mixing board, PA speakers, and Shure System receivers are required and set up.

There are several different ways that these components can be set up, it just depends on the gear purchased.

The first option would include the following pieces of gear: a mixer, the rack of wireless receivers, a separate amplifier, and a set of speakers. This set up requires the

addition of an amplifier, because the audio level coming out of a mixer is only at line level, and it requires an amplification device to boost the signal before it is sent into the speakers. To set up the PA system this way, start at the mixer. Take all of the receivers from the wireless system and, using XLR cables, go from the outputs in the receivers to the inputs in the mixer. There will be one XLR cable per student. This will allow the teacher to control the volume level for each individual student with the faders assigned to each channel on the mixer. Next, locate the “Mains” on the mixer, typically on the back of the mixer. Take two XLR cables and go out from the mains and into the inputs on the amplifier. This step takes the line level signal from the mixer and feeds it into the amplifier so it can get processed into a level that will be heard. Finally, take two more XLR cables and go out from the amplifier and into each of the speakers.

The other set up option is slightly simpler. To avoid having to buy a separate amplifier, an instructor can purchase either an amplified mixer or a set of amplified speakers, and those will amplify the line level signal. The setup is the essentially the same as above. Go out from the outputs on the wireless receivers into each channel on the mixer, one XLR cable per student and per channel. This is where XLR cables would be connected to the amplifier, however in this case, the XLR cables just go straight from the mixer into the speakers. It is important to note that this set up should not include both an amplified mixer and amplified speakers. If the signal is amplified twice, once by the mixer and again by the speakers, the speakers will be damaged.

A PA System allows for the most control over the blend and volume of an electric ensemble. Being able to stand behind a mixer and actively raise and lower the volume of students or equalize the tone of a certain instrument in real time will yield the best overall

result. However, this system does require more knowledge of audio engineering and live mixing, and is a bigger investment on the front end. In the long run, a PA system allows for greater control than separate amplifiers for each student.

### Hybrid Ensemble

Instruments, amplifiers, PA systems, and monitors all come at a price. Can your school afford it? It is possible that when starting an electric string program, purchasing amplifiers and instruments for every one of the students in a program will not be feasible. To compensate for those struggles, I offer an alternative mixed ensemble, a hybrid electric ensemble of sorts.

At the Mark Wood Rock Orchestra Camp, electric and acoustic students play together in large groups for enormous concerts. One highly successful way to mix a small number of electric strings in with a primarily acoustic ensemble is by taking one student from each section and forming a quartet of electric instruments across the whole group, rather than trying to outfit an entire orchestra with electric instruments. This brings the cost down considerably. In this model, students can rotate using the electric instrument for each concert or for a certain number of rehearsals; that way all of the students get to practice on and learn about the electric instruments. The tables below (1.1 and 1.2) compare the price of completely electric ensembles to hybrid ensembles. It is made evident in these tables that whether an ensemble uses individual amplifiers (1.1) or a PA system (1.2) the hybrid ensemble is less expensive.

While both budget and learning curve involved with outfitting students with the necessary gear for electric play seem steep, the payoff is rich. Electric ensembles open opportunities to explore style and genre, expand repertoire and critical thinking

opportunities in expressivity, and expand technique. In the next chapter we will explore technical pedagogy unique to electric instruments.

Sample Budgets:

Table 1.1. Electric Ensemble Using Amplifiers

Item	Full Sized Ensemble (21 Students)		Hybrid Ensemble	
	Number	Price	Number	Price
Stingray SVX Violin 4 Strings	11	(700ea) \$7,700	1	\$700
Stingray SVX Violin 5 Strings	4	(800ea) \$3,200	1	\$800
Cobra Cello	4	(3700ea) \$14,800	1	\$3700
Electric Bass	2	(200ea) \$400	1	\$200
Violin/Viola Amplifier (Roland CUBE 10-GX)	15	(150ea) \$2250	2	\$300
Cello/Bass Amplifier (Roland CUBE 60 XL Bass Combo Amp)	6	(400ea) \$2400	2	\$800
1/4 Inch Cables	30	(10ea) \$300	10	\$100
<b>Total</b>		<b>\$31,050</b>		<b>\$6,600</b>

Table 1.2. Electric Ensemble Using PA System

(Assumes twenty-one students—standard size chamber orchestra)

Item	Full Sized Ensemble		Hybrid Ensemble	
	Number	Price	Number	Price
Stingray SVX Violin 4 Strings	11	(700ea) \$7,700	1	\$700
Stingray SVX Violin 5 Strings	4	(800ea) \$3,200	1	\$800
Cobra Cello	4	(3,700ea) \$14,800	1	\$3,700
Electric Bass	2	(200ea) \$400	1	\$200
Rolls PM55P Monitor Amplifier	21	(81ea) \$1,701	4	\$324
Headphones (Maybe have students provide their own?)	21	(10ea) \$210	4	\$40
1/4 Inch Cables	50	(10ea) \$500	10	\$100
Shure BLX Wireless System	21	(300ea) \$6,300	4	\$1,200
PA Speakers	2	Varies	2	Varies
Mixing Board	1	Varies	1	Varies
<b>Total</b>		<b>~\$34,811</b>		<b>~\$7,064</b>



## **Chapter 2: Adapting Playing Techniques for Electric Instruments**

Electric string instruments and acoustic string instruments have some similarities as well as differences when it comes to pedagogy. One of the most important factors in developing beautiful tone on an electric instrument is proper bow technique, which acoustic players also spend a considerable amount of time developing. There are also additional pedagogical factors to address when learning to play an electric instrument. One of those is adapting to a self-supporting instrument like the Wood Violins Viper or Cobra. The Vipers and Cobras can also be made with different kinds of frets, and the type of frets selected require different finger placement. Lastly, instruments like the Viper and Cobra can be made with anywhere from four to seven strings and the Stingray can have four or five, which requires the player to adapt to the new bow angles associated with additional strings.

Amplification is not discriminatory, resulting in magnified successes as well as mistakes. Everything speaks louder on an electric instrument: the crunch of setting the bow on the string, the attack of each articulation, and the noise from hitting other strings are all amplified. This makes proper bow technique imperative on an electric instrument and the cornerstone of keeping those extra sounds under control. Holding the bow properly, with a curved thumb and pinky finger, all other fingers softly gripping the bow to allow for clean bow changes and a good three-part bow arm that makes use of the upper arm, forearm, and hand, while driving the movement from the back and shoulder blade will minimize excess ringing, crunch, and other noise from the instrument.

## Self-Supporting Instruments

One of the first places where a student will have to adapt to something new with an electric instrument is with the Wood Violins self-support systems. The Viper has a strap that goes around the body and a chest support that allows the instrument to be fully self-supporting. Mark Wood created this support so he could “run around the stage like guitar players” without having to worry about holding onto his violin. In Figure 2.1 the Strap, indicated on the left, wraps around the body and connects to the Viper in the front. The Chest Support, indicated on the right of the figure, is placed against the rib cage on the left side of the body and tightened into place so that the Viper sits in a comfortable playing location.



Figure 2.1. Viper Violin Self-Support System (Wood Violins, 2021)

The Cobra electric cello is another self-supporting instrument from Wood Violins. The Cobra’s harness system allows the player to stand and play with complete freedom to move around while they are performing. Figure 2.2 shows the Cobra’s harness system. The harness goes over the player’s shoulders. The Chest and Abdomen Supports connect

to the back of the Cobra with ball and socket joints to allow the player to adjust the instrument into the optimal playing position.

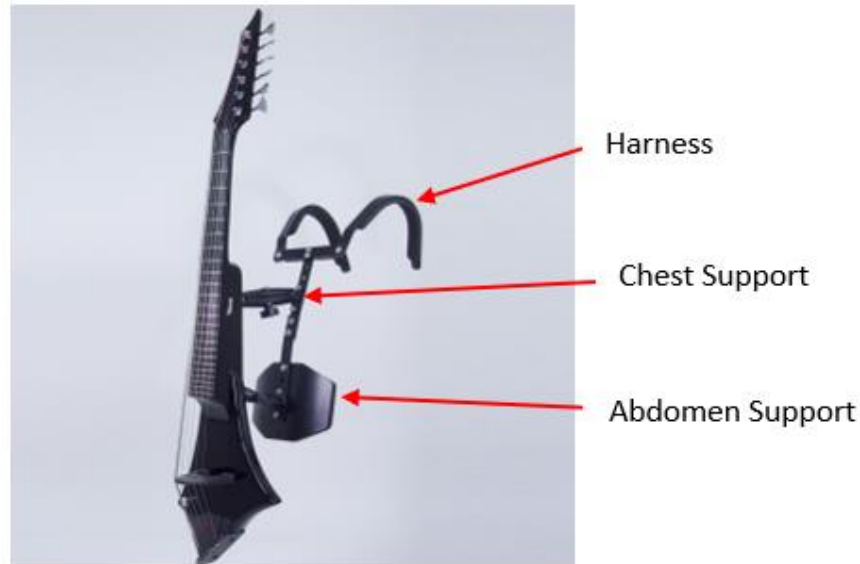


Figure 2.2. Cobra Cello Self-Support System (Wood Violins, 2021)

Adapting to self-supporting instruments does take time as it can be uncomfortable for some students. However, it can alleviate some of the physical tension caused by the posture of holding acoustic instruments. Typically, when acoustic violins and violas are held incorrectly, there is significant strain placed on the neck, shoulders, and lower back. The Viper eliminates all of the tension that comes with a player scrunching up their neck and shoulders to hold the instrument. The Cobra allows for the same sort of posture correction: acoustic cellists can get into the habit of slouching forward when they play. When playing the Cobra, the metal armature of the harness prevents slouching. Alternately, these instruments open up additional posture challenges. For example, if the harness on the Cobra is not set up correctly for the player wearing it, that can lead to bad posture.

### Instruments with Additional Strings

New challenges arise for players as they begin to play on instruments with more than four strings. As noted earlier, Stingrays can be made with five strings, and Vipers and Cobras with up to seven. These additional strings pose new challenges when reading sheet music and especially with bow angles while playing. Students often are hesitant to play instruments with more strings than they are used to; however, it opens up what Mark Wood describes as “the range of an entire orchestra on one instrument” and gives students opportunities to explore playing other parts like rhythm, bass, or melody lines.

As an electronic instrument can play the full range of an orchestra, the question arises, what clef should music for this instrument be written in, and on what staff? In an orchestra where each section plays a fixed range, the music can appear on a single staff in whichever clef is appropriate. For example, if a teacher has their violin students learn techniques for playing bass lines and they play on the F and B-flat strings of the Viper, those notes should appear in bass clef. This creates opportunities for students who typically only read in treble clef to become more fluent in alto and bass clef. If a solo instrumentalist is playing and making use of all of their strings, the music may be written in a variety of ways: on a grand staff in treble and bass clef or on one staff line with clef changes where they occur. The decision to use one of these methods over the other comes down to personal preference of how a player best reads their music. I prefer my music all on one staff line, but someone who has a background in piano playing may prefer to have their music on a grand staff.

The challenge of bow angles begins as soon as the player picks up the new instrument. From the beginning, they will have issues hitting additional strings when they

try to change strings quickly because their muscle memory is adapted to an instrument with four strings. There are many exercises that can be used to work on this and help develop the muscle memory for an instrument with more than four strings. One is to have the player look at themselves in a mirror as they perform a long bow on each string so they can watch their body as they cross the strings. This allows the player to take note of how their wrist, elbow, and arms—both left and right—move as they cross the strings. Once the player gets more comfortable with that exercise, practicing scales with increasing accelerations allows them to continue to think about all of their body movements while getting to play something other than open strings. Students will be surprised by how quickly they adapt to having more than four strings, and then it will not be long before they are excited by the vast array of opportunities those additional strings provide them.

#### Varying Fret Options and Accompanying Techniques

Many electric instruments can be made with frets of various kinds. These can be advantageous to players of all levels. Frets allow players to precisely identify where to place their fingers when playing, reminiscent of the “Don’t Fret” stickers that can be applied to the fingerboard of an instrument to identify note positions that many beginners use. Frets can be useful as a player is just beginning on an instrument, because oftentimes they do not remember where to put their fingers. They can be helpful for advanced players as well. For instance, in case of catastrophic in-ear monitor failure during a performance, frets can guide the player to be sure their playing is in tune. Electric instrument manufacturers, notably Wood Violins, incorporate two styles of frets. Each of these styles require different playing techniques.



Figure 2.3. Standard Frets (Wood Violins, 2021)

Traditional frets are one of the options that Wood Violins has available for their Vipers and Cobras; they function just as traditional frets on a guitar. These frets are raised above the fingerboard so there are noticeable bumps as the player traverses the instrument (Figure 2.3). When playing on an instrument with traditional frets, the player needs to place their finger right behind the fret, not on top of it as one would with a sticker or tape to mark the location of a pitch on a beginner's instrument. This concept may be confusing to some students who remember the early days of putting their fingers right on top of the tapes that their teacher put on their instruments. The choice to use traditional frets over the alternative is a matter of personal preference.



Figure 2.4. Phantom Frets

The other fret option is what Wood Violins calls Phantom Frets. These frets are similar to the “Don’t Fret” sticker mentioned earlier, because they are filed down to be flush with the fingerboard (Figure 2.4). This means as the player moves up and down the neck of the instrument, they will not feel any bumps from the fret markers, but they still have the visual cues. With Phantom frets, the player places their finger directly on top of the fret marker, not behind it like the traditional frets. Players with extensive classical training may choose Phantom frets, as the playing technique will more accurately mimic the acoustic instrument and eliminate the barrier of a foreign finger placement. For example, experienced players will confidently play in tune in lower positions and may appreciate using Phantom frets as a guide for higher positions. Player history and personal preference can determine which style of fret is most pedagogically appropriate. Teachers choosing instruments for shared usage would most likely select Phantom fretted instruments because they are the most similar to the acoustic instruments that students are familiar with, and thus will not create unnecessary barriers to success.

Fretless instruments are an option as well. The Stingray, Viper, and Cobra all can be purchased without any frets. However, for students who may still be struggling with intonation, frets can help them become more secure in their playing.

The pedagogies of electric and acoustic instruments are different in many ways, but not so different that electric instruments should be avoided. The challenges that arise around posture from the self-support systems are ones to which students will quickly adapt. Frets and Phantom frets on instruments often are highly beneficial to students and help them improve their intonation. Lastly, the most challenging pedagogical difference, adjusting to an instrument with more strings, can be done with step-by-step practice that helps the student be aware of their body movement as they traverse the new number of strings and explore the new bow angles.



### Chapter 3: Additional Gear

The world of electric string instruments is not just limited to the instruments themselves or the amplifiers. Electric instruments invite additional technologies to enhance and expand timbres as well as playing capabilities. When it comes to purchasing gear, the vast possibilities might overwhelm new teachers. Foreign terminology and the sheer abundance of pedals with minute functional differences can result in a steep learning curve for teachers and players new to electric musicianship. The following chapter will serve as a primer on function and musical possibilities of effects pedals.



Figure 3.1. Stomp Box Pedals (Audified, n.d.)

The first big difference in kinds of effects pedals is the method of activation: most pedals are either a stomp box or have an expression pedal. A stomp box pedal utilizes an activation switch that the player triggers by stepping or stomping, hence the name stomp box (Figure 3.1). An expression pedal utilizes a rocker pedal which provides the player volitional control over a given effect by rocking it forward for more effect, or backwards for less (Figure 3.2).



Figure 3.2. Expression Pedal (Digitech, 2021)

### Effects Pedals






In addition to the difference in triggering system, each pedal applies a different effect or sound to the instrument. It is important when shopping for effects to be diligent when researching, as buying a pedal based on name recognition or even reviews may result in a player not getting the sound they want for their instrument. It is recommended that players shopping for effects pedals go to a local instrument store and try any pedals that they are considering purchasing, that way they can hear how their instrument will sound with the pedal. Effects range from distortion, chorus, and reverb to flangers, delay, and phasers. Table 3.1 defines some of the most common effects terms and describes what kind of sound they would give to a player's instrument. Table 3.2 shows some industry standards for the most common types of effects pedals, their price range at the time of the publication of this paper, and what kind of effect they give to an instrument.

The five pedals here are provided as an entry point for teachers developing a program: they are reverb (Landlord FX Banging Hangover Reverb), wah (Dunlop GCB-95 Crybaby Standard Wah), overdrive (Ibanez TS9 Tube Screamer Overdrive), EQ (MXR M109S Six Band EQ), and volume (VOX V860 Hand Wired Volume). These kinds of pedals are going to give students a variety of sounds to explore and are also some of the most common to appear on a professional player's pedal board. A more detailed list is included in Appendix C.

Table 3.1. Effects Descriptions (PMT, 2020)

Effect Name	Sound Description
Chorus	Mimics a variety of different instrumentalists playing the same things as the performer, but with different instruments (i.e., different violins) and slightly out of time. Makes the performer sound “warbly.”
Delay	Takes the player’s original signal, delays it, and plays it back exactly how the pedal heard it the first time. Can play the original signal back once or multiple times depending on the setting of the “feedback time.”
Distortion	Takes the signal from the instrument and adds volume, crunch, and sustain to provide for a distorted, crunchy contrast to the instrument’s natural tone.
Reverb	Gives an echo to the player’s sound and also adds some open and airy qualities.
Flanger	Similar to chorus and often confused with phasers, this effect adds a whooshing sound that makes the signal rise up in pitch and then sink back down.
Phaser	Similar to a chorus pedal, because it thickens the sound of the instrument, but also adds a sweeping effect – as if the speaker inside the amplifier was spinning around or moving up and down.
Wah	Creates a sweeping sound as the player presses their foot on the rocker pedal that varies the tone and pitch of the signal.
Overdrive	Similar to but different from distortion. This effect drives/pushes the signal harder rather than changing the sound completely like a distortion pedal does. Overdrive will retain a lot of the original sound, but push the amplifier harder to output a heavier, thicker signal.
Fuzz	Provides an extreme amount of distortion that is much heavier than regular distortion pedals. Resulting sound is as if the player is overdriving the amplifier to the point of damage. Sounds heavy, fuzzy, and extremely noisy.
Boost	Increases the strength of the signal going into an amplifier. Provides a fatter signal without adding the crunch that a distortion pedal will.
EQ	Allows the player to tune certain parameters of their sound like the bass, middle, and treble frequencies.
Compressor	More of a tool than an effect – takes all of the performer’s playing and modifies all signal entering the pedal to the same volume.
Tremolo	Takes the signal and chops it up, making it sound like the volume is dropping and then reappearing very quickly. (Not the same definition of tremolo in classical playing.)
Volume	Allows the player to adjust the volume as they apply pressure to the rocker pedal.
Noise Gate	More of a tool than an effect – cuts out all unwanted buzz coming from amplifiers or many pedals chained together.
Octave	Listens to the note being played and adds an octave above or below, some pedals add two octaves as well.

Table 3.2. Common Effects Pedals (PMT, 2020) (Simon, 2018)

Pedal Name	Effect	Stomp or Expression	Price	Image
Landlord FX Banging Hangover Reverb	Reverb	Stomp box	\$70-90	
Dunlop GCB-95 Crybaby Standard Wah	Wah	Expression pedal	\$80-100	
Ibanez TS9 Tube Screamer Overdrive	Overdrive	Stomp box	\$90-110	
MXR M109S Six Band EQ	EQ	Stomp box	\$80-100	
VOX V860 Hand Wired Volume	Volume	Expression Pedal	\$50-70	

Effects pedals can be used in a class to explore different tone colors and ways to enhance repertoire. Teachers can discuss the different timbres the effects pedals create including the attack, decay, sustain, and other tonal qualities that change when the effects are applied. If several students were playing electric instruments in an ensemble setting and they were using effects like reverb, volume, or EQ, then all of the students could dial up settings into their pedals. However, if students were using effects like overdrive or wah, it is most likely that only one student would have control of the effect, because several different overdrives or wahs would likely sound confused and overwhelming. Overdrive and wah should be used more in a solo setting, or exploratory setting in the classroom.



Figure 3.3. Boss RC-1 Loop Pedal (Boss, 2014)

### Looping Pedals

The final pedal we will discuss is a looping pedal, often referred to as a “looper”. A looper is not an effects pedal, but rather a tool that allows a player to record chord changes or other segments of music that can then be played back repeatedly when the pedal is activated. Loopers range from very simple to highly advanced. The industry standard for looping pedals is the Boss RC-1 Loop Station (Figure 3.3). This stomp box-style loop pedal is recommended as a starting point for developing electric instrument players. Each time you activate the pedal, it records another track and layers the

recording over the previously recorded “loop.” These pedals allow performers to accompany themselves by building an entire song from the bottom up in layers.

Loopers could be used to meet the national standards for composition like MU:CR2.1 which in summary states that “students will be able to make expressive and intentional musical choices during passages of improvisation or composition” (NAFME, 2021). The process of improvisation is simply composition in real time. Students can use looping pedals to practice pieces written in canon, pieces with ostinatos, or improvisation of various styles. Loopers also provide an avenue for students to work in small groups on projects. Teachers could split students into groups and task them with creating a looped arrangement of a simple song with a bass line, chords, rhythm, and melody. This kind of project allows students to work in an ensemble that is different from the standard orchestra setting, which gives them unique opportunities to learn.

Effects pedals and looping pedals can greatly advance the sound and opportunities available to electric string players. They provide an avenue for exploration, experimentation, and learning that is exciting and interesting. With direction and guidance, even beginners can navigate the extensive world of effects for electric instruments.

## **Chapter 4: Repertoire**

Though not commonly known, there is a plethora of repertoire for electric string instruments, both solo and ensemble. Groups like the Trans-Siberian Orchestra and Mannheim Steamroller have been performing since the 1970s, and some of their scores are available for purchase. There is also a good amount of solo music available for purchase written by composers like Lindsey Stirling, Mark Wood, David Wallace, and Joe Deninzon. In addition, many performers have adapted classical repertoire for their electric instruments, and teachers have the ability to do the same for their students. Teachers can use techniques like altering the register of passages to make use of the lower strings that electric instruments have. They can think of the piece in another style rather than classical such as jazz, hip hop, rock, or pop. Incorporating extended techniques like improvisation, strumbowing, and looping can also make classical repertoire more suited to electric instruments. Lastly, experimenting with articulation to accomplish the sound that is desired will bring new life to a piece.

### **Repertoire for Electric Strings**

The simplest way to start students on electric strings repertoire is to purchase pieces written specifically for their instruments. Much of Trans-Siberian Orchestra's sheet music can be purchased on websites such as JW Pepper or Amazon with various grade level scores available. Mark Wood also sells scores on JW Pepper and through LudwigMasters Publications for various levels of string ensemble. Additionally, Wood



offers clinics through his *Electrify Your Symphony* program where he and other members of his team will visit a school and work through his arrangements with a group of students. These clinics focus on incorporating movement into playing, memorizing music so that students do not have to be glued to the page, and having fun.

Solo music is even more widely available for electric string players. Lindsey Stirling, a prominent figure in the world of electric strings today, publishes much of her music for purchase on [lindseystirling.com](http://lindseystirling.com) and Amazon. In addition, players like Joe Deninzon and David Wallace of the Berkley Strings Department write and publish music for extended range electric instruments. Some of this music may be a little harder to procure and will likely be more advanced than the average high school player is capable of playing but it demonstrates the vast array of music available for these instruments.

#### Classical Repertoire Adapted for Electric Strings

There are unlimited ways to adapt classical repertoire for electric string instruments. A player is only limited by their creativity and imagination. As a starting point, one may begin with altering the register of specific passages, interpreting the piece in another style, incorporating extended playing techniques, and experimenting with articulation. I incorporated each of these techniques into a reinterpretation, that I created with the help of my professors, of the Courante from Bach's Sixth Suite for Cello; a marked score can be found in the Appendix.

Initially, I altered the register of certain passages to make use of the additional strings on my Viper. This historically-informed adaptation pays tribute to the original composition, written by Bach for a five-string cello. In certain sections, I altered the

register to bring out bass notes specifically. In other sections, I would take whole passages down an octave or two.

Figure 4.1. Altered Bass Notes in Bach Courante (Bach, 1717)

Figure 4.1 shows the method of moving the bass notes down in register. The passage with the notes circled in red show the original score. The green notes portray the octave transposition. Personal preference will dictate notation style. I chose to use clef changes, because seeing the clef in the part is a very bold signal that there is a change coming up. For students who do not read in multiple clefs, a teacher could simply illustrate in color that a section is going to be played an octave lower, like in Figure 4.2 below, if that whole passage were being played an octave lower.

Figure 4.2. Clef Change Indication (Bach, 1717)

Figure 4.3 is an example of where I altered an entire passage down an octave. The section bracketed in red is the original, and the section bracketed in green shows the passage after being transcribed down an octave. This alteration brings the entire passage from the G, D, and A strings, onto the F, C, and G strings of the Viper.



Figure 4.3. Altered Passage in Bach Courante (Bach, 1717)

After altering the register of the piece, I began to make stylistic choices. Historians commonly consider Baroque music as the jazz of the era, so I decided to look at this Courante through the lens of a jazz player. Jazz players tend to play in a less ‘precise,’ or more improvisational, manner, rather than treating all eighth notes with the same length and weight. I removed Bach’s symmetrical slurs and added in my own to create a shuffle pattern that is very typical of jazz music. Then I added a brush stroke, similar to a longer spiccato stroke in classical music, in order to accomplish a more laid-back sound. Lastly, I added a delay from one of my effects pedals. This delay serves dual purposes. First, it acts as a metronome. The delay pedal is set to a specific tempo of 70 beats per minute, and to delay exactly by one eighth note, so I can play to the delay like a metronome to keep in time. Second, the delay arpeggiates everything I play an eighth note after I play it, creating dissonances in the piece to provide a particularly jazzy sound. I do not use the delay throughout, as the delay can be overwhelming, making the music

sound muddy and unclear. Therefore, the passages chosen were carefully selected to have the delay accentuate Bach's writing.



Figure 4.4. Reverb Pedal Notation in Bach Courante (Bach, 1717)

Figure 4.4 shows a selection where I engage the delay pedal, notated with the piano pedal indicator to show where to engage and disengage the delay pedal. Teachers may choose a bolder marking, such as large yellow brackets, to draw attention to these new techniques.

Adapting a piece of music in this manner by making intentional stylistic choices, allows a player to develop a relationship with the piece. This is reminiscent of score study that conductors undertake when preparing to rehearse a piece with an ensemble, going through the piece over and over again, each time taking care to notice different details. By the time the player is satisfied with the alterations, they have a deeper understanding of the piece. This process would be highly valuable for teachers and students alike, giving students the opportunity to be creative and turn repertoire that might feel historically removed from their own lives into something they feel ownership of. Teachers could give students a simplified excerpt from a piece of classical music and a list of simple alteration techniques like the ones I have outlined above, and then assign the students to work through the excerpt to change the piece as they wish. After choosing their alterations, they can perform for or with the class. Finally, requiring students to justify their musical choices adds an element of critical thinking to the task.

Repertoire is a crucial part of a student's experience in an ensemble. Playing electric repertoire or taking classical repertoire and adapting it for electric instruments is highly engaging for students, both by adding a sense of current style and individual ownership over their playing. Such personal investment in the music will invite students to return to their craft repeatedly, a noble pursuit for any teacher.

## **Chapter 5: Extended Playing Techniques**

Playing on an electric string instrument opens up a vast new realm of playing techniques for students to explore. Improvising, strumbowing, and looping are just a few of the possible extended techniques that are commonly performed on electric string instruments. Improvising gives students the opportunity to compose in real time. Strumbowing changes the student's role from playing melody or harmony to playing rhythm. These techniques are not ones that a student would typically experience on an acoustic instrument and they greatly expand the student's relationship with their instrument.

### **Improvising**

Musical improvisation is the act of creative and immediate musical composition that includes communication of emotions, performance, and spontaneous response to other musicians (Wikipedia, 2021). Allowing students the opportunity to improvise from an early age is crucial in developing their ability to perform this skill with confidence. Creating short games that give students a chance to improvise one or two notes in a pattern and then work on longer phrases is a great way to get them started without making them nervous. Under the "Creating: Imagine" section of NAfME's National Standards for Music Education in an Ensemble, every section from Novice to Advanced mentions improvisation. Satisfying this National Standard can be difficult in traditional Western Classical orchestral music. Electric instruments provide a rare opportunity for students to practice and hone this skill.

Improvisation can be easily incorporated into lessons. Technology makes it easy to access a variety of backing tracks that students can practice improvising over. With Lesson Plan Two in Appendix A, teachers have an avenue for successful implementation of improvisation in their classrooms, even if they are not experienced with it themselves. Starting simple is important, and going over the basic concepts will help students understand what notes are used during certain chords and why. As the students gain a deeper understanding of the simple concepts that make up improvisation, they can move into more complex improvisational ideas involving non-chord tones like passing tones, appoggiaturas, and escape tones.

### Strumbowing

Strumbowing is a method of playing rhythm passages on string instruments. It compares to playing rhythm guitar, in that the performer continuously strums the smallest subdivision of the beat and accents the notes that they want to come through the strum pattern. Strumbowing includes additional extended techniques such as *ghosting* and *chopping* to accent the notes that create the main rhythm pattern in a passage. Ghosting is the process of the player lifting their finger off the string, but not all the way, to almost create a harmonic or airy sound while still moving the bow in the smallest subdivision of the beat. This allows the player to pulse their finger and press down on only the notes that they want to be heard.



Figure 5.1. Strumbowing Passage from Side by Side (Silverman, 2018)

A great example of ghosting is in this excerpt from the second violin part of Side by Side. The smallest subdivision in this piece is the sixteenth note, so the second violinist is going to strum constant sixteenth notes. They will ghost notes on any value that is longer than a sixteenth note. In Figure 5.1, the notes that have X's for heads illustrate when the player would ghost by lifting their finger and just touching it to the string. The regular notes are ones where the player would press down all the way and also accent with their bow.

Strumbowing also has very particular bowing patterns that go along with it. Since the player is keeping a consistent strum of the smallest subdivision going throughout the passage, any down beats are going to be down bow and any off beats are going to be up bows. This bowing practice is crucial to the strumbowing method.



Figure 5.2. Strumbowing Passage in Side by Side with Partial Bowings (Silverman, 2018)

Looking at the same measures from Side by Side, the bowing would be played as seen above. While this bowing may seem strange and uncomfortable at first, once the player incorporates the strum and actually plays all of the ghosted notes, it becomes very natural.





Figure 5.3. Strumbowing Passage from Side by Side with Complete Bowings (Silverman, 2018)

In Figure 5.3, the ghosted bowings appear in green. This shows the full strum pattern with the ghosted notes and continuous sixteenth notes that the performer would play; the round note heads and black bowings are the ones that would be accented as the “heard” rhythm.

Chopping is another technique involved in rhythmic playing, that often shows up in strumbowing. A chop is when the player takes their bow and throws it down on the string at an angle with the hair facing away from them, allowing it to scrape for a moment, that creates a percussive, crunch sound. There are three kinds of chop strokes: the down stroke, the up stroke, and the compound stroke. The down stroke is done as described above, the player throws their bow down on the strings and allows it to scrape. From the string the performer can play an up stroke by lifting the bow and creating a percussive sound (<https://www.youtube.com/watch?v=hpHHuVmdoFk> – Tracy Silverman Simple Chop). The compound chop incorporates the first two strokes and a rest stroke as well. Silverman refers to this as a power stroke and a rest stroke ([https://www.youtube.com/watch?v=qX\\_PaiNWi9Y](https://www.youtube.com/watch?v=qX_PaiNWi9Y) – Tracy Silverman Compound Chop). Silverman outlines the five rules of the simple chop in these videos:

1. Be all the way at the frog of the bow

2. Turn the hair away from you so the bow can skid away
3. Keep your hand loose so that the bow can skid
4. Dampen the strings of the instrument, you do not want to hear ringing
5. Leave the bow on the string, do not pick it off, because then you cannot move directly into an up stroke

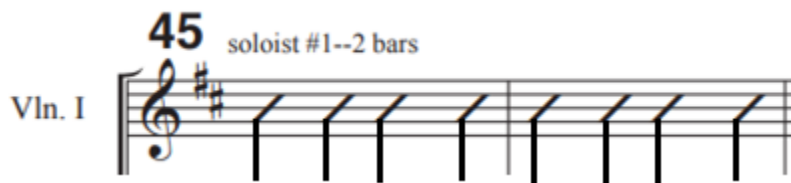


Figure 5.4. Chop Notation from Side by Side (Silverman, 2018)

Chops can be added to rhythm parts by the performer to help keep a group in time, or they can be written in music explicitly. Figure 5.4 is an example of chopping in Side by Side. This is during the solo section of the piece where the first and second violin are trading solos. When they are not actively soloing, the players take turns providing the rhythmic structure by chopping. The slashes dictate to chop on all four beats; however, the performers have a little bit of leeway and creative freedom with their chopping pattern.

Playing rhythm in the way that a guitarist does is something that orchestra musicians hardly ever get to do. By providing students the opportunity to play as if they were a rhythm guitarist, teachers are broadening those students' skills into other musical areas. Additionally, this kind of work helps students build their internal metronomes and become better at keeping a tempo and subdividing in an orchestral setting.

There are various ways a teacher could incorporate strumbowing into their lessons. Starting with simple patterns, like Silverman outlines in his strumbowing method book, teachers can follow the “GPS Method” that Silverman refers to and have their students speak the rhythms out loud, strum the rhythm in the air, say the bowing out loud, and then try to play it. This sequence of exercises helps the students internalize the rhythm that is supposed to be accented and focus on the strum pattern and strumbowing bowings rather than trying to play these rhythms as they come.

## Strum Etude 17B

### Swingin' the Chop

Tracy Silverman

Swing the 16th's

An - o-therone chops the dust Chop! An - o-therone chops the dust Chop! An -

o-therone chops an - o-therone chops an - o-therone chops the dust Chop!

Figure 5.5. Strumbowing Etude (Silverman, 2018)

Figure 5.5 illustrates a great example of the GPS Method from Silverman’s Strum Bowing Etudes book. To practice the GPS Method with the students for this exercise, the teacher should have them speak the words in rhythm “Another one chops the dust, chop!” While they speak that in rhythm, they should also be moving their bow hands in a constant sixteenth note strum, because the sixteenth note is the smallest subdivision of this example. Then together, figure out what the strumbowing bowings should be for this

excerpt (the pickup should be on an up bow, beat one a down bow, beat two a down bow like is printed, and then again, the pickup into the next measure an up bow). Next, have the students speak the bowings in rhythm while they strum, “Up, down, up, down, down, down, up.” This step is crucial because it helps students internalize the bowing so they do not have to think about which notes are accented in the pattern. Finally, have the students pick up their instruments and play the rhythm while speaking either the words or the bowing out loud to continue to reinforce the accented notes.

### Looping

Looping is the process of recording layers of musical material that then repeat over and over to create a song. Looping projects in the classroom would satisfy the “imagine” as well as the “plan and make” sections of the NAfME national standards, because such projects would incorporate improvisation, composition, as well as development of musical ideas.

Having loopers in a classroom would provide many learning experiences for students that are different from traditional orchestra ensemble playing. A teacher could break students into small groups, give each group a looping pedal, and task them with creating a looped accompaniment and some solo parts to play over top of that. Or the teacher could have them improvise over a chord change that they layer into the looping pedal.

Tracy Silverman’s looped rendition of Billie’s Bounce appears in Appendix B. When performing this piece I used the BOSS RC-300 loop station, a more advanced looper than the BOSS RC-1 mentioned in chapter three (Figure 5.6). The RC-300 has three different foot triggers that give the player the ability to record loops on

three independent switches. It also has the ability to quantize loops. Quantizing is the process of synchronizing loops that are slightly off tempo from each other. So, if a player sets a tempo in the loop station, and then as they record, they are a little bit off from the tempo, the loop station will do its best to adjust what they played to the proper tempo, and all following loops will lock in to that original loop. In addition, this loop station comes with a built-in drum machine, effects, among other features.



Figure 5.6. Boss RC-300 Loop Station (Boss, 2011)

While these are just a few extended playing techniques that are possible on electric instruments, the possibilities provide endless opportunities for creativity. These three techniques represent a good entry point for students, because they are engaging, fun, and relatively easy to achieve success. These techniques also reinforce skills students use on their acoustic instruments and in regular ensemble settings, so they are beneficial to many aspects of a student's development and playing.

## **Conclusion**

The possibilities of an electric string ensemble are limitless. While this truth is exciting, it can also feel equally overwhelming. Hopefully, this guide has helped narrow the focus for things to consider when first embarking on this journey. Teachers should always remember that it is perfectly normal and acceptable to be learning alongside their students. Let this be an opportunity to do just that.

## Appendix A: Lesson Plans

### Lesson Plan One: Technical Considerations for Electric Instruments

- Objectives:
  - Execute a scale without hitting additional strings on the electric instruments.
- Materials:
  - Electric Instrument
  - Scale backing tracks (these make scales more fun to play) → find an example of this.
    - <https://www.youtube.com/watch?v=Whi0-Z1C3Ms>
  - Scale exercises (printed sheet music)
- National standards:
  - MU:Pr5.3.E.5a Use self-reflection and peer feedback to refine individual and ensemble performances of a varied repertoire of music.
- Procedures:
  - Working with C major scale since everyone has a five-string instrument.
  - Model a C major scale for them starting on C string, without the track so that they can hear it. The Teacher will model each new rhythm or number of octaves.
  - 
  - Start by playing long bows, four counts each (at 70bpm), without the play along track with the group just one octave to start. Count them in and play.
  - Then play half notes at 70 with the play along track. Count them in and play together. Again, just one octave.
  - Next move on to two octaves, half notes at 70, with the track. Count them in and play together.
  - Next, play that same two octave scale using quarter notes. Model this for them. Count them in and play with the track.

- Now let's do that two-octave scale using eighth notes. Model, count them in and play.
  - Next play three octaves (involves a shift), half notes at 70, with the track. Model, count them in and play
    - After this do quarter notes for three octaves, followed by eighth notes.
- Assessment:
  - Assign a playing quiz in a future class and assess based on this single point rubric.

Areas for Growth	Achieved	Exceeded Expectations
	Student played at 70bmp	
	Student played correct pitches in the C major scale for all three octaves	
	Student played equal value quarter notes	
	Student played equal value eighth notes	
	Student had minimal noisy neighbors while playing the scale	



## Lesson Plan Two: Improvising a Melody

- Objectives:
  - Students will Improvise rhythms on **chord tones** over the 12-bar blues within parameters of quarter note, quarter rests, and paired eighth notes.
  - Students will Define and play **passing tones** while Improvising over 12-bar blues.
- Materials:
  - Electric Instrument
  - Improvising backing track (can be found on YouTube) – simple, four chords <https://www.youtube.com/watch?v=y1ueWz4-Hkk&list=TLPQMTEwMzIwMjFleKCZSdRAfg&index=2>
  - Chord chart for improvisation backing track
- National Standards:
  - MU:Cr1.1.E.5a - Compose and improvise melodic and rhythmic ideas or motives that reflect characteristic(s) of music or text(s) studied in rehearsal.
  - MU:Pr6.1.E.5a - Demonstrate attention to technical accuracy and expressive qualities in prepared and improvised performances of a varied repertoire of music.
- Procedures:
  - Start by playing the backing track and improvising over top of it to get students engaged.
  - Talk about improvising and some strategies/techniques.
  - Go over backing track chords (talk about 12 bar blues)
    - A D A A      D D A A      E D A E
    - Outline the chord tones that will work with these chords
    - A (C#, E)      D (F#, A)      E (G#, B)
  - Start by having the students play just the root note of each chord along with the track a couple times through the progression.
    - They can vary the rhythm, but should stick with paired eighth notes, quarter notes, and quarter rests.

- Next have them play the third a couple times through the progression.
- Then have them play the fifth a couple of times through the progression.
- On the next pass through the progression tell the students to pick the root, third, or fifth, and only play quarter notes.
- Assign each student four measures until each section of the 12-bar blues is assigned, repeating the 12-bars as necessary.
  - Within their four measures, students will play two chord tones per measure.
  - Students may choose to play quarter notes only, or vary the rhythm.
  - Use the think/pair/share method to alleviate the potential stress of improvising in front of the class.
  - First give the students two minutes to practice on their own. The cacophony of all students playing simultaneously takes the pressure off of anyone listening to them.
    - Shave and a haircut, two bits\*
  - Next give them two minutes to break into pairs and play for each other.
    - Shave and a haircut, two bits
  - Finally, have them improvise one at a time in front of the class.

#### Define passing tones

- Instruct students to add one passing tone per measure into their improvisation.
- Repeat the Think Pair Share Procedure.

*\*Shave and a haircut, two bits* is a stopping signal to end the cacophony of sound that will ensue when students are released to practice all at the same time. In 4/4 rhythm it is quarter, eighth eighth, quarter, quarter (played by the teacher – shave and a haircut), and then the students play quarter quarter (two bits) and immediately take their bows off the strings. Practice using this stopping signal with the students. Have them play anything. When the teacher plays shave and a haircut, students respond with two bits, and all sound

will stop. Practice students immediately removing bow from strings upon completion of “two bits,” to ensure complete silence with this attention prompt.

- Assessment:

Areas for Growth	Achieved	Exceeded Expectations
	The student correctly identified and played the root of each chord while improvising	
	The student correctly played the third and fifth of each chord	
	The student played varied rhythms	
	The student added one passing tone per measure into their improvisation	

## Lesson Plan Three: Gear

- Objectives:
  - Differentiate between the sounds produced while using the MXR Analog Chorus.
  - Critique how the sound of the electric instrument is altered by the MXR Analog Chorus.
  - Identify measures in repertoire to utilize the MXR Analog Chorus pedal and justify choices with musical vocabulary.
- Materials:
  - Electric instruments
  - MXR M234 Analog Chorus Effects Pedals
  - Sheet Music for a piece the group has already been rehearsing
  - Worksheet for “Expression with Effects” project
- National Standards:
  - MU:Cr2.1.E.5a Select and develop draft melodic and rhythmic ideas or motives that demonstrate understanding of characteristic(s) of music or text(s) studied in rehearsal.
  - MU:Cr3.1.E.5a Evaluate and refine draft compositions and improvisations based on knowledge, skill, and teacher-provided criteria.
  - MU:Cr3.2.E.5a Share personally-developed melodic and rhythmic ideas or motives – individually or as an ensemble – that demonstrate understanding of characteristics of music or texts studied in rehearsal.
  - MU:Pr4.3.E.5a Identify expressive qualities in a varied repertoire of music that can be demonstrated through prepared and improvised performances.
- Procedures:
  - Hand out the “Expression with Effects” worksheet
  - Introduce Chorus pedal functions
    - What do each of the dials do?
      - Top row:
        - Low – low cut filter, cuts out low frequencies
        - High – high cut filter, cuts out high frequencies

- Bottom row:
      - Level – how much output the effect has in the instrument’s mix
      - Rate – the speed of the modulation effect
      - Depth – the amount of pitch shifting the effect will produce.
    - The teacher will demonstrate what happens to the sound while turning each of the dials on the pedal
    - Ask students to describe how the sound changes in real time (raise of hands, talk in the class)
  - Explain the objective of using effects pedals to add an expressive element in the piece you’ve been rehearsing
  - Model how to hook up the violin/cello to the pedal
  - Release students to begin experimenting with sound
  - At the end of class, they come back and present what they’ve done with the piece by playing it for the other students.
- Assessment:
  - Use expression with effects worksheet and student responses on here as assessment
    - Do students justify their choices using musical vocabulary?



## Expression with Effects

What is the function of each of the dials and the button on the MXR Analog Chorus pedal shown above? Fill in the spaces provided above.

- How does the sound change as we adjust the **level** knob?
- How does the sound change as we adjust the **rate** knob?
- How does the sound change as we adjust the **depth** knob?
- How does the sound change as we adjust the **low** and **high** knobs?



The image shows a blue MXR Analog Chorus pedal with several controls. At the top, there are two knobs labeled 'CUT' and 'FLAT CUT'. Below them are two more knobs labeled 'LOW' and 'HIGH'. In the center, there are three knobs labeled 'LEVEL', 'RATE', and 'DEPTH'. At the bottom, there is a large footswitch labeled 'analog chorus'. On the left side, there are two switches labeled 'MONO' and 'THRU'. On the right side, there is a switch labeled 'INPUT'. The pedal is surrounded by six empty rectangular boxes with horizontal lines, each with an arrow pointing to a specific control on the pedal.

There are six empty rectangular boxes with horizontal lines for writing, each with an arrow pointing to a specific control on the pedal:

- Top-left box: points to the 'LOW' knob.
- Top-right box: points to the 'HIGH' knob.
- Middle-left box: points to the 'LEVEL' knob.
- Middle-right box: points to the 'RATE' knob.
- Bottom-left box: points to the footswitch.
- Bottom-right box: points to the 'DEPTH' knob.

### Assignment:

Using the music we have been rehearsing in class, make some expressive changes to it using the MXR Analog Chorus Pedal. Justify your choices below using musical language.

#### Idea Bank:

- Locate repeated passages and use pedal to change repetitions
- Locate unique melodic material and add an effect
- Locate unique rhythmic material and add effect
- Locate a section that doesn't already have melodic or rhythmic interest, for example passages of whole notes, and add an effect to make it more interesting

#### Effect 1

Measures: \_\_\_\_\_ through \_\_\_\_\_

Describe Chosen Effect:

- Dial \_\_\_\_\_
- Setting \_\_\_\_\_

Justify Choice with Musical Language:

#### Effect 2

Measures: \_\_\_\_\_ through \_\_\_\_\_

Describe Chosen Effect:

- Dial \_\_\_\_\_
- Setting \_\_\_\_\_

Justify Choice with Musical Language:

**Effect 3**

Measures: \_\_\_\_\_ through \_\_\_\_\_

Describe Chosen Effect:

- Dial \_\_\_\_\_
- Setting \_\_\_\_\_

Justify Choice with Musical Language:

**Was it harder or easier than you thought to make expressive choices?  
Why?**



### Lesson Plan Four: Repertoire/Score Study

- Objectives:
  - Have students Generate stylistic changes in a piece of music using a bank of musical techniques in order to develop a deeper understanding of that music through a process similar to score study.
- Materials:
  - Projector
  - Piece of music for use as a class
  - Piece of music to work on individually for the assignment
  - Assignment worksheet with instructions
  - Pencils
  - Electric Instruments (In order to be able to play through their edits during in class work - or simply use a scoring program like MuseScore or NoteFlight to play a midi recording of the edits).
- National Standards:
  - MU:Pr4.1.E.5a Select varied repertoire to study based on interest, music reading skills (where appropriate), an understanding of the structure of the music, context, and the technical skill of the individual or ensemble.
  - MU:Pr4.3.E.5a Identify expressive qualities in a varied repertoire of music that can be demonstrated through prepared and improvised performances.
  - MU:Re8.1.E.5a Identify interpretations of the expressive intent and meaning of musical works, referring to the elements of music, contexts, and (when appropriate) the setting of the text.
  - MU:Cn10.0.H.5a Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music
- Procedures:
  - During the first class of the week, do this score study type of assignment with a piece of music they won't be assessed on, together as a class.
  - Hand out the music to the students and also have it pulled up on the board.

- Have the students volunteer ideas for ways that we can edit certain parts of the piece.
- Make the edits, play through them for the students, see if we like the way the changes sound.
- Use the whole class time to go through the piece making edits so students understand the variety of things that they can alter and how the process works.
- At the end of class, hand out the piece they'll be working on themselves.
- Tell them that they have until the end of the week to work on editing this piece, and then we'll be presenting the edits to the class.
- Assessment:
  - Presentation of edits to the class at the end of the week.
  - What edits did the student make?
  - Did they use the knowledge that they learned from our score study editing lesson on the first day of the week to influence their decisions?
  - Do their edits make musical sense?
  - Did they justify their choices using musical language?
  - Did they follow the instructions on the worksheet?

## Score Study Repertoire Worksheet

### Bank of Alterations to use in the Music

Change Octaves

Change Bowings

Add Delay Effect

Change Articulation

Add or Remove Slurs

1. Identify a section in the piece where some stylistic change could be applied.
2. Select a type of alteration from the bank above and justify why you applied it to that section.

Repeat this process for **at least four** passages in the piece, and be prepared to present your score and perform the changes you made for the class on (insert appropriate date).

- **\*\*Look for sections that repeat themselves, often times these lend well to some kind of change so that there is differentiation between the repeats.\*\***

### Lesson Plan Five: Extended Playing Technique – Strumbowing

- Objectives:
  - Students will be able to Execute the rhythmic playing technique of strumbowing
- Materials:
  - *The Strum Bowing Method* by Tracy Silverman
  - Printed strumbowing exercises
  - Electric instruments
  - Projector
- National Standards:
  - MU:Pr6.1.E.5a Demonstrate attention to technical accuracy and expressive qualities in prepared and improvised performances of a varied repertoire of music.
  - MU:Pr4.2.E.5a Demonstrate, using music reading skills where appropriate, how knowledge of formal aspects in musical works inform prepared or improvised performances
  - MU:Pr4.1.E.5a Select varied repertoire to study based on interest, music reading skills (where appropriate), an understanding of the structure of the music, context, and the technical skill of the individual or ensemble
- Procedures – most likely going to be a “lesson unit” over the course of several classes
  - Class 1 Part 1: Introduction/Overview of Strumbowing
    - Start by playing a strumbowing passage to get students engaged
    - Define strumbowing: playing like a rhythm guitarist, physicalizing the subdivision so you can lock to the rhythmic grid of a piece
    - Talk about the important techniques involved in strumbowing
      - Loose wrist
      - Dampening strings
      - Ghosting
  - Class 1 Part 2: Simple ghosting
    - Model how ghosting works

- Lightly press your finger to the string so that you get an airy sound
- Have students try to mimic the sound
- Call and response with easy ghosting patterns
  - Make up simple rhythmic patterns that involve ghosting and play them back and forth with the class (start with something simple; quarter note played, quarter note ghosted, quarter played, quarter ghosted and progress with the difficulty from there)
  - Pass out simple ghosting exercises worksheet
    - Play through them together and tell the students to practice them for homework
- Class 2: Complex Ghosting (only move on to this once the students have mastered simple ghosting – See pages 28-31 in *The Strum Bowing Method* for complex ghosting exercises)
  - Start with call and response again, but make the ghosting rhythms more difficult
  - Pass out complex ghosting exercises worksheet
    - Before playing through these exercises, have the students speak the accented rhythm. (Silverman's GPS method of learning – if you can say it you can play it)
      - Speak the rhythm
      - Speak the bowing
      - Speak the rhythm while physicalizing the subdivision (so if the subdivision is sixteenth notes, strum sixteenths in the air and speak the rhythm or bowing)
      - Have the students physicalize the beat by marching in place, while they strum in the air, and say the rhythm.

- Once the students can speak and physicalize at the same time, then have them play the exercise Play through these exercises several times
  - These will be tricky for students; if they have problems playing them, have them put their instruments down and go back to physicalizing and speaking
- Assessment:
  - Can the students play the passages correctly?
    - Dampening the strings
    - Consistent strum
    - Correct rhythm

## Treble Clef Simple Ghosting Exercises



Four staves of music in treble clef, 4/4 time, key of D major. Each staff contains a sequence of notes with 'x' marks indicating ghosting. The exercises are numbered 1, 5, 9, and 13.

Staff 1: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed above each note.

Staff 5: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed below each note. Above each note is a 'V' mark.

Staff 9: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed above each note. Above each note is a 'V' mark.

Staff 13: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed below each note. Above each note is a 'V' mark.

## Alto Clef Simple Ghosting Exercises



Four staves of music in alto clef, 4/4 time, key of D major. Each staff contains a sequence of notes with 'x' marks indicating ghosting. The exercises are numbered 1, 5, 9, and 13.

Staff 1: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed above each note.

Staff 5: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed below each note. Above each note is a 'V' mark.

Staff 9: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed above each note. Above each note is a 'V' mark.

Staff 13: Notes D4, E4, F#4, G4, A4, B4, C5, D5. Ghosting marks (x) are placed below each note. Above each note is a 'V' mark.

## Bass Clef Simple Ghosting Exercises





## Appendix B: Recital Repertoire

Drowsy Maggie, Traditional (For Guitar and Electric Violin)

Drowsy Maggie

Print  
Drowsy grum  
rhythm patternz

Don't let E be flat

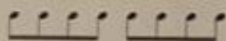
6-STRING

# 14) DROWSY STREAM

CELTIC

*Be able to improv a rhythm part with wick*

8TH NOTE SUBDIVISION



Musical notation for measures 1-8. Chords: Em, D, Em, D, Em, D, Em, D. Includes a treble and bass clef staff.

Musical notation for measures 9-16. Chords: D, A, D, D, A, G, D, A, D, D, Bm. Includes a treble and bass clef staff.

Musical notation for measures 17-24. Includes a treble and bass clef staff. Chords: Em, D, Em, D, Em, D. Includes a 'SIMILE' marking. Handwritten rhythm numbers: 2 4 2 1 2 4 2 1 2 4 2 1 2 4 2 1.

Musical notation for measures 25-32. Chords: D, A, D, D, A, G, D, A, D, D, Bm. Includes a treble and bass clef staff. Handwritten rhythm numbers: 1 2 1 2 1 2 1 1 2 1 1 2 4 4.

Billie's Bounce, Charlie Parker, Arr. Tracy Silverman (For Electric Violin and Loop Pedal)

Start w/ octave Pedal on  
Start w/ volume low

### Billie's Bounce

Charlie Parker

click loop

pizz

click loop

intonation

octave off

click loop

volume up

37

The image shows a handwritten musical score for guitar, consisting of four systems of notation and a chord chart at the bottom. The notation is in treble clef with a key signature of one flat (Bb).

- System 1 (Measures 42-47):** Features a melodic line in the treble clef with various rhythmic values and accidentals. A handwritten 'I' with a vertical line is above the first measure. A 'v' is written above the fifth measure.
- System 2 (Measures 48-52):** Includes a 'drop going' annotation under the first measure and 'into solos' below the bass line. A 'SOLO IMPROV' section begins with a 'click effect' annotation above the staff.
- System 3 (Measures 53-57):** Continues the melodic line with various rhythmic patterns.
- System 4 (Measures 58-62):** Ends with a 'pizz.' (pizzicato) instruction. A red scribble and the text '[STOP LOOP]' are written over the final measures.

**F Minor Pentatonic Chord Chart:**

Bb	C	Eb	F	Ab	Bb	C					
0	1	3	0	↓2	3	0	↓2	3	↓1	↓2	3
Eb			F			C			G		
Eb	F	Ab	Bb	C	Eb	F	Ab	Bb			
↓1	↓2	4	↓1	↓2	4	↓1	↓3	4			
D			A			E					

Courante from Suite No. 6, J.S. Bach (For Viola and Electric Violin)

Measure = 44 bpm

### Suite No. 6

Courante Viola

# ROSIN

Bach

Balance Point vib m n  
less bow low bow

7

cresc. ----- mp

13

I V I V  
mf f mf mp

17

p

21

ff

Bow 3

sp 1/2 cresc.

3 2 4 3 2 1

4 2 3 4 2 4 1 2 0

25

(cresc.) ----- ff

wind up + elbow rotate more w/hw

# Suite No. Six

## Courante Viper

Bach

This image shows a handwritten musical score for the piece "Courante Viper" from Suite No. Six by J.S. Bach. The score is written on a page with a dark border. It consists of eight staves of music, with various handwritten annotations in orange and blue ink. The annotations include "Pedal down" and "Pedal up" with arrows, "DRIVE ->" with an arrow, and "1/2 position pedal up" with an arrow. There are also circled notes and a circled Roman numeral III. The score includes fingering numbers, a circled note with "Don't be flat" written above it, and a circled note with "DRIVE" written below it. The piece is in 3/4 time and the key signature has one sharp (F#).

DIG INTO 1/2 position  
STRING off string

UP I BOW accents?

4 3 2 1 2 4 1 4 2 1 4 3 3 2 1 4 1 3 4 3 0 3 2 1

-scooping

pedal ↓

3 1 2 3 2 1 2 2

c string

1/2 position






pedal ↑

The image shows two staves of handwritten musical notation. The top staff is in treble clef and contains a sequence of notes with fingerings: 4 3 2 1 2 4 1 4 2 1 4 3 3 2 1 4 1 3 4 3 0 3 2 1. Above the staff, there are handwritten notes: 'DIG INTO 1/2 position' and 'STRING off string' with an arrow pointing to the first few notes. Further right, 'UP I BOW accents?' is written above a bracketed section of notes. Below the staff, there is a bracket labeled '-scooping' under the first six notes. The bottom staff is also in treble clef and contains notes with fingerings: 3 1 2 3 2 1 2 2. Above this staff, 'pedal ↓' is written with a downward arrow. Below the staff, 'c string' has an upward arrow pointing to the first note, and '1/2 position' has an upward arrow pointing to the second note. At the end of the staff, 'pedal ↑' is written with an upward arrow. The paper is aged and has some faint, illegible markings.




## Appendix C: Supplementary Tables and Figures

**Tables:**

### Electric Instrument Features

Brand	Model	Price	Features	Suitable for (beginner, intermediate, etc.)	Images
Yamaha	YEV-104NT Electric Violin	~\$600	Dual Piezo Pickup, Locking volume knob, 4-5 strings	Beginners	
Yamaha	SVC-50 Electric Cello	~\$1800	Dual Piezo Pickup, silent mode, detachable knee supports, volume knob, reverb knob	Beginner	
NS	WAV Electric Violin	~\$700-850	Polar™ Pickup system, self-clamping tuning system, custom molding shoulder rest, volume knob, 4-5 strings	Beginner	
NS	CR Electric Viola	~\$1600-\$3000	Polar™ Pickup system, self-clamping tuning system, custom molding shoulder rest, volume knob, 23 inches in length	Intermediate – Advanced	
NS	WAV Electric Cello	~\$1200-1300	Polar™ Pickup System, removable knee supports, volume knob, 4-5 strings (High to Low A D G C F, or E A D G C upon request), tripod stand for seated or standing play	Beginner	






Wood Violins	Stingray SVX	~\$700-900	Wood Tru-Tone bridge pickup, 4-5 strings, red or black finish, volume knob, shoulder rest required, can be upgraded to SVX pro (includes a pickup upgrade and choice of additional custom finishes)	Beginner	
Wood Violins	Cobra Cello	~\$3700-5700	Barbera pickup, 4-7 strings ( <b>E A D G C F B flat</b> ), Frets and phantom frets available, custom finishes available, volume knob, harness support system	Beginner-Advanced	
Wood Violins	Viper Violin	~\$3700-5700	Barbera pickup or Tru-Tone pickup available, 4-7 strings ( <b>E A D G C F B flat</b> ), frets and phantom frets available, custom finishes available, patented self-supporting system (no shoulder rest required).	Advanced	

\*Additional strings available in bold

## Amplifier Features

Type of Amplifier	Pros	Cons	Cost
Tube Amplifiers	Rich, warm sound Natural distortion Ideal for concerts and recording studio settings	Big and heavy, tubes can go bad (leads to the distortion), VERY fragile, typically expensive, take a while to warm up the tubes (cannot be used right when they are turned on)	Cheapest ~\$400
Solid-State Amplifiers	Compact and lightweight, inexpensive, durable, good for travel (or students who might bump things)	Predictable sound (guitarists might not like this, however this might be ideal for a group of young musicians), not versatile	Cheapest can be <\$100
Modeling Amplifiers	Loud, small and lightweight, multiple effects, relatively inexpensive, can be recorded directly into a computer without a microphone	No great weaknesses, they just do not sound as great as tube amplifiers do	Cheapest can be <\$100

## Effects Pedals Table:

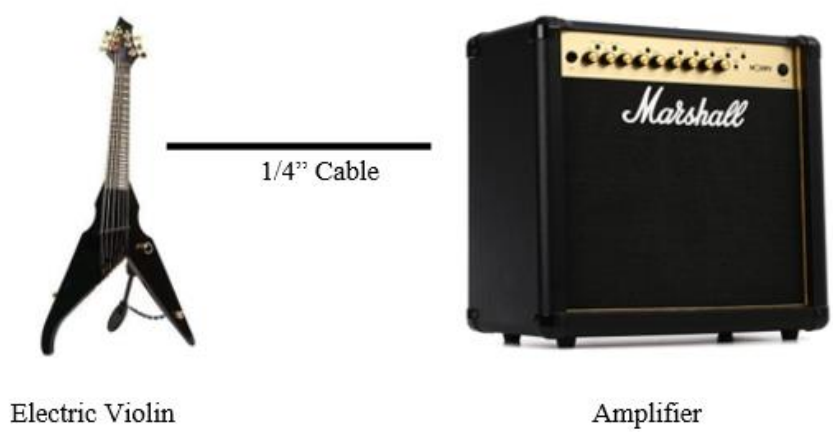
Pedal Name	Effect	Stomp or Expression	Price	Image
Boss DS-1	Distortion	Stomp box	\$40-60	
Landlord Fx Banging Hangover Reverb	Reverb	Stomp box	\$70-90	
Dunlop GCB-95 Crybaby Standard Wah	Wah	Expression pedal	\$80-100	

Ibanez TS9 Tube Screamer Overdrive	Overdrive	Stomp box	\$90-110	
Strymon Timeline	Delay	Stomp box	\$450-500	
Electro-Harmonix Big Muff Pi USA NYC Fuzz	Fuzz	Stomp box	\$90-110	
MXR Micro Amp	Boost	Stomp box	\$70-90	
Electro-Harmonix Small Clone	Chorus	Stomp box	\$80-100	
MXR M101 Phase 90 Orange	Phaser	Stomp box	\$70-90	
Boss BF-3 Flanger	Flanger	Stomp box	\$150-180	
MXR M109S Six Band EQ	EQ	Stomp box	\$80-100	

MXR M102 Dyna Comp	Compressor	Stomp box	\$70-90	
Boss TR-2 Tremolo	Tremolo	Stomp box	\$90-110	
VOX V860 Hand Wired Volume	Volume	Expression pedal	\$50-70	
Electro-Harmonix Silencer	Noise Gate	Stomp box	\$60-80	
Boss OC-3 Super Octave	Octave	Stomp box	\$130-140	

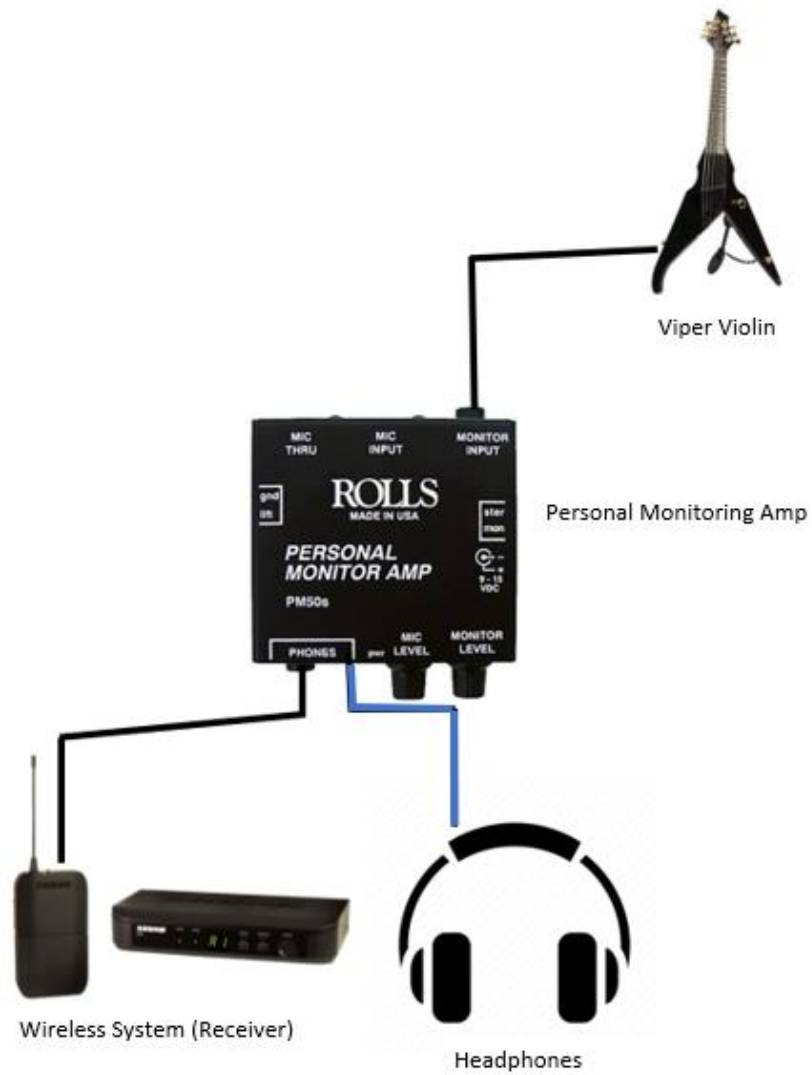
**Figures:**

How to connect an electric instrument to an amplifier



(Violin Image from Wood Violins Website, Amplifier Image from Marshall Website)

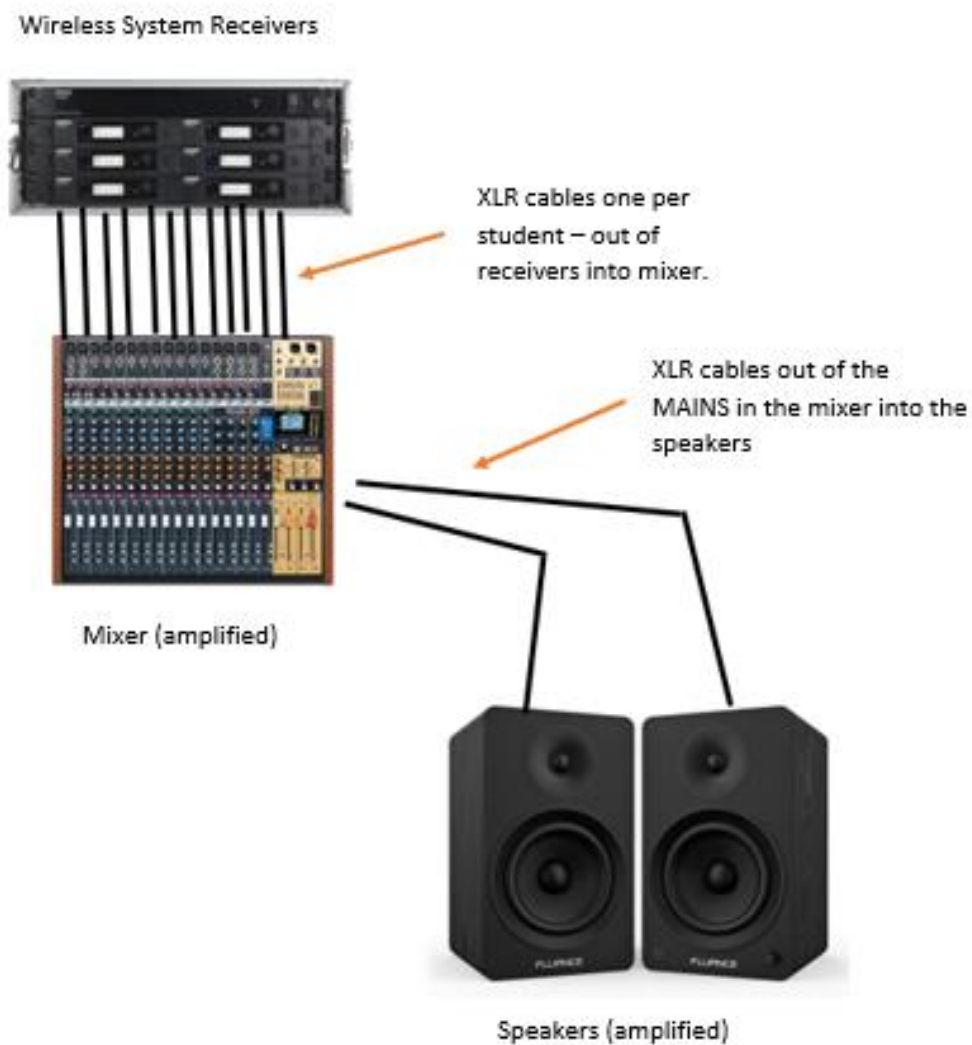
## In-Ear Monitoring System Set Up



(Violin Image from Wood Violins Website, Amplifier Image from Rolls Website, Wireless System Image from Sweetwater Website)

\*Black lines indicate quarter inch cables; Blue lines indicate eighth inch cables

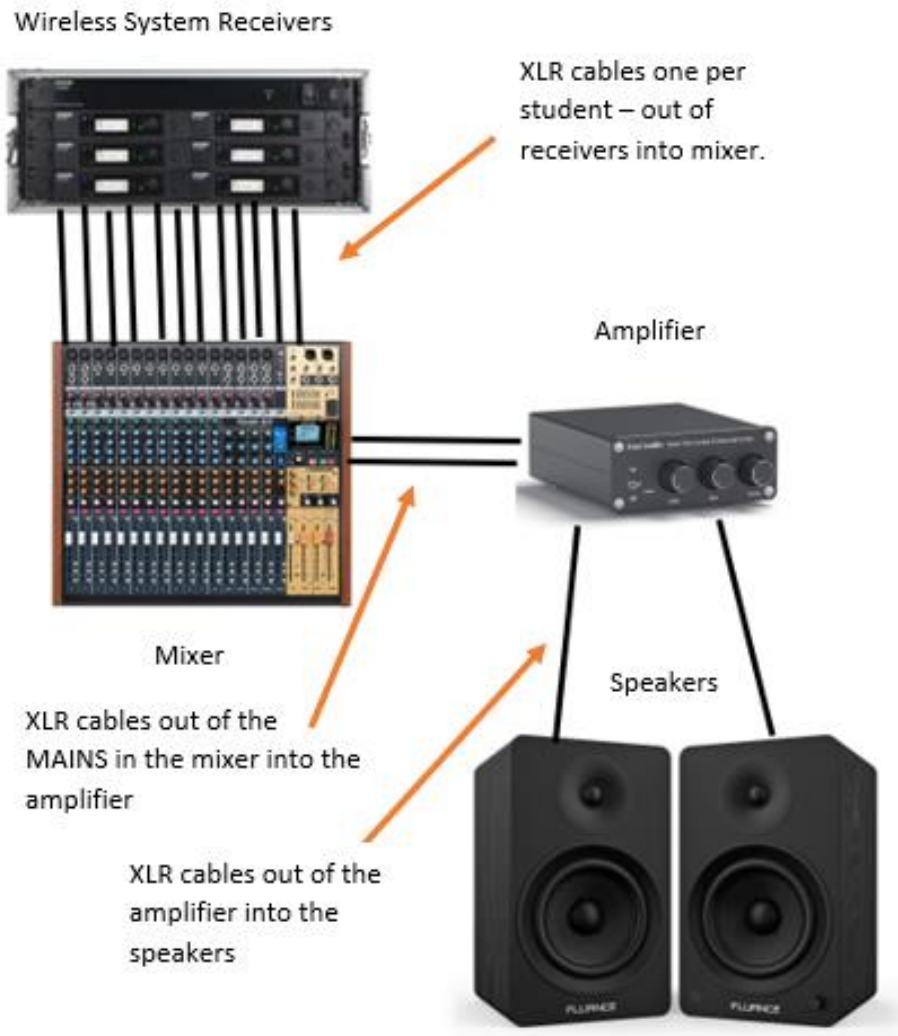
## PA System Set Up with Amplified Mixer or Speakers



(Wireless Receiver Image from Sweetwater Website, Mixer Image from Tascam Website, Speaker Image from Sony Website)

\*Note: You will have EITHER an amplified mixer or speakers – not both. If you push a signal through an amplified mixer into amplified speakers, the speakers will may be damaged.

### PA System Set Up with Separate Amplifier



(Wireless Receiver Image from Sweetwater Website, Mixer Image from Tascam Website, Amplifier Image from Sweetwater Website, Speakers Image from Sony Website)

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