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THE CASE FOR BASS GUITAR: CONCEPTS AND SUGGESTIONS FOR NON-BASS GUITARISTS

Contrary to popular belief, Leo Fender did not invent the bass guitar (that honour goes to Paul Tutmarc who invented the first bass guitar in 1935) but he did produce the first commercially successful one. As a viable alternative to lugging around its larger scaled cousin, the double bass, Leo Fender produced his first model "The Precision Bass" in 1951. According to a *Guitar Player* interview, Leo said: "We needed to free the bass player from the big doghouse, the acoustic bass. That thing was usually confined to the back of the band, and the bass player couldn't get up to the mike to sing. And besides, bands were getting a little smaller – combos – and sometimes guitar players would have an advantage if they could have an instrument with frets that would make doubling on bass easier for them."

Perhaps a reason for the multitude of student-musicians who choose the bass guitar, as opposed to the double bass, in elementary and secondary schools stems from the very reason why bass guitars were initially commercially successful: they were and are easier to carry around. Additionally, the cost of purchasing or even renting a quality double bass can sometimes be outside the price range of many parents or school music programs. This being said, I do believe that a student-musician should not be discouraged from choosing the double bass if she or he are interested in that instrument.

I have encountered music educators who do not believe in the inclusion of the bass guitar in a traditional wind ensemble or concert band setting because of the risk of upsetting the convention or perhaps because of a belief that the bass guitar's tone does not blend well with wind instruments. In my opinion, the bass guitar is capable of a wide variety of tones that is suitable for many applications including the wind band. The fact of the matter is that the bass guitar was developed, is a practical and viable instrument and it is here to stay. The question is: what can we do as music educators to increase our understanding of this instrument and to take advantage of its versatility so that the student-musician and thus the ensemble can achieve musical results?

Because of the multitude of possibilities that I will present within this article, please bear in mind that this is in no way definitive. Rather, these possibilities are merely concepts that have worked for me in my teaching and experience; hence, I submit these suggestions with humility.

What does one look for in an instrument?

When giving clinics, I am often asked the question: "What kind of bass guitar would be appropriate for students?" There are a multitude of bass guitars available, everything from very cheap student-models to customized high-end products. Of course, parents have to weigh the options and interest levels of their child when renting or purchasing instruments, but one must also keep in mind that the quality of the instrument could have an effect on the student-musician's learning. That being said, not all affordably priced instruments are cheaply constructed and not all professional models necessarily serve the needs of student-musicians. Bear in mind playability, practicality, and price point when making a purchasing or renting decision on a bass guitar.

Considering physical dimensions

A consideration includes the scale length of the bass guitar, that is, the length of the string from the nut to the bridge saddle. The most common bass guitar scale lengths are 34 or 35 inches. A longer scale length has the potential for difficulty in accessing the first position where the extra inches are most noticeable. Shorter scale lengths of 30 or 32 inches are available for student-musicians with shorter arm lengths. The added advantage is that sometimes the shorter scale length makes the instrument lighter. The differences in scale lengths are generally believed to have a distinct effect on the sound of the instrument. Consider the sonic difference between a nine foot grand piano and an upright.

Another consideration includes the fingerboard radius. Luthier Michael Pedulla discusses how the arc of the fingerboard affects playability:

> Fingerboard radius [the arc of the fingerboard] affects the neck's comfort and is adjusted depending on fingerboard width and neck shape. The higher the number, the flatter the fingerboard. We use a 12" radius on our 4 and 5 string basses and a 15" radius on our wider 5 and 6 string basses. Doing it right is important, because correct fingerboard radius facilitates technique. Most players are sensitive to the action [the height of the individual strings above the frets], but they often ignore the across-the-strings setup. Both the left and right hand pivot in a slight arc with most bass techniques, and the most comfortable fingerboard radius is one that mimics that arc. Too much arc requires excess motion in both hands, while too little arc becomes awkward. Both contribute to fatigue.

Consider also the taper of the neck from the nut to the twelfth fret and finally to the bridge. If the taper of the instrument is too great at the higher frets, the student-musician may have difficulty accessing frets and playing with accuracy because of the noticeable difference in feel.

The body shape of the instrument also influences such factors as balance and weight. Comfort and practicality should not be sacrificed for aesthetic appeal.

Extended range instruments

The development of extended range bass guitars in the seventies has given musicians the ability to access notes as low as an interval of a fourth below the fourth string E. Some bass guitars also have an extended upper range featuring a string tuned a fourth above the first string G. A six string bass guitar with twenty-eight frets has a four and a half octave range!

If there are many bass guitarists in the section, perhaps the director can have a few student-musicians playing in the upper register doubling a different part. The flexibility of the instrument would allow the student-musician the opportunity to practice their treble clef reading and allow them the opportunity to experience ensemble playing from a different perspective.

All about the sound

The student-musician who holds the bass guitar chair and who plays in a concert band must do her or his utmost to be sensitive musically in an acoustic environment. That being said, the sound of the instrument itself is one of the keys to musical results.

The production of sound from the instrument is linked like a chain. It begins with the student-musician's concept of music, her or his hands and fingers, the type of strings used, the wood used in the construction of the bass guitar, its electronic components, and finally the amplifier and speaker cabinet. The topic of a room's acoustic properties is beyond the scope of this article. Again, one must mention the number of possibilities that exist between the interactions of any one of these factors.

In spite of this, I still believe that all of these factors affect the sound chain and that it is important to examine each link just as any other instrumentalist would pay attention to the individual parts or portions of his or her instrument. Attention to all of these details will help toward achieving a good sound.

Concept of timbre

On the subject of tone, luthier Michael Tobias had this to say:

> Even though two bassists are using similar equipment, one player's sound will possess subtleties and nuances that are different [or absent] in the tone of the other. Like snowflakes, no two of us are alike – we don't have the same ears, the same fingers, the same muscles in our hands and arms. And we may not share the same idea of what constitutes good tone.

The student-musician's mental concept of music, among many other things, includes having an understanding of timbre and blend. The student-musician must understand that the instrument that she or he plays is the lowest pitched member of the guitar family and that it, therefore, shares the same "musical space" with other "constituents" of the bass clef.

Knowing what a tuba, a euphonium, a baritone horn, a baritone sax, a bass clarinet, a tenor trombone, or a double bass sounds like and what each of these instruments is capable of with regard to articulation, phrasing, and especially dynamic range is an invaluable aid to understanding how the bass guitar can function in concert band literature. The demonstration of these instruments by the teacher or a senior student would help the student-musician in understanding the concept of timbre. When called upon to play the bass clef parts in an ensemble, asking the student-musician to emulate the sound of those aforementioned instruments with the bass guitar may help to achieve a more cohesive understanding of timbre, blend, and therefore ensemble sound.

Ultimately, the student-musicians should possess in their minds the idea that they are holding an essentially acoustic instrument that is being helped along the way with electronic factors.

Dominant "striking" hand and fingers

The physical characteristic of the sound begins with the dominant hand, which is used for striking the strings. The most common method for striking the strings involves the use of the index and middle fingers.

The development of the two-finger technique is best illustrated in the following fashion: have the student-musician place her or his fingers on a flat surface and "let the fingers walk." The pad of the fingers should slide back with each "step forward" as if the fingers are doing the "moonwalk." The finger that strikes will immediately proceed to rest on the string below while the next finger prepares to strike. This repetitive and gentle motion, using the pad of the fingers and applied correctly to the strings, should produce a well-defined and pronounced attack.

The striking hand fingers should approach the bass guitar somewhere closer to a 45 degree angle since this is the most natural position for the arm and wrist. The ideal angle is different for different players and one must remember that comfort and ease of tension is the determinate factor.

Contrary to popular belief, the bass guitar's strings do not require to be struck with a large amount of force. When the fingers are "digging in" too much, the end result is the equivalent of a horn player articulating each note with an accent. It is counterproductive if the phrase calls for a legato articulation. Canadian-born and New York-based bass guitarist, Chris Tarry, outlines this concept in his book *The Bass Player's Companion* quite efficiently:

> When you pick a note with your right [left] hand, the string moves quickly back and forth, then eventually stops. When a bass note rings, there is a certain spot in the vibration cycle of the string that will inherently provide the best sound. When a note is played hard with the right [left] hand, it takes the string a second to settle into this optimum rate. Why not just pick the note lighter to start with, so [that] the great bass sound will be realized from the very point in which you play the note?

As Tarry further suggests, the softer striking of strings provides musicians with a wider dynamic range by raising the volume level at the amplifier. Of course, this requires that the student-musicians are sensitive with their range of dynamic expression or develop that sensitivity with the aid of the music director.

By varying the placement of where the hand strikes the strings, one can achieve access to a wide palette of timbres. Simply striking the strings closer to the neck reveals a softer, rounded attack with more fundamental overtones. As one moves the hand closer toward the bridge, where the strings are tauter, one can expect a harder and quicker attack.

Fretting hand and fingers

Capilano College and Vancouver Community College instructor and freelance bassist, Laurence Mollerup, suggests the following for fretting hand technique:

As a general rule, the fretting hand should be shaped like the letter "C" with the thumb between the index and middle fingers. Picking up a pop-can will illustrate the natural grasping hand position. The curved fingers that result from this position will be more "springy," allowing for more agility than a flat-fingered approach. The thumb should apply minimal pressure, which would thus focus the hand's energy on the fingers instead.

When fretting a note, the fingers should be placed right behind the fret to obtain the best possible sound with minimal fret buzz. As the middle finger is placed on the string, the index finger should remain pressed down in position. As the ring finger is placed, the middle and index fingers should remain down. Finally as the pinky finger is placed, all fingers should be down. Once again the development of control is essential.

Mollerup also details three basic fretting hand positions which he calls "Simandl," "Guitar," and "Extension."

The "Simandl" position is adapted from double bass first position playing and allows for a relaxed fretting hand in the lower positions. For younger student-musicians or for those with smaller fingers and hands, this hand positioning could work well. To use the "Simandl" position, the index and middle fingers are each assigned a fret while the ring and pinky fingers are grouped together and assigned the same fret.

The "Guitar" position, adapted from classical guitar playing, is easy to transpose to other keys as it takes advantage of the symmetry of the way the bass guitar is tuned. In this position, the fingers should strive to be parallel to the frets. This fretting hand position uses one finger per fret.

Although Mollerup accords the "Extension" position as being the 'most efficient fingering system,' it is also the most taxing position because of the hand's need to stretch. This position comes from 'cello fingering and entails a reach of a major third interval between the index and pinky finger. I recommend this positioning for student-musicians with advanced digit control. The "Extension" position essentially uses the index, middle, and pinky fingers, practically splaying the hand so as to take advantage of the availability of notes within the hand's reach.

Injuries

It is important to note that when stressing these aforementioned concepts to younger student-musicians, we, as music educators, should remember that their physical and fine motor skill development is ongoing. The weight of the bass guitar can sometimes produce considerable strain on the shoulder of a developing student-musician who uses the strap while she or he is standing. I recommend using a wide neoprene-constructed strap. While the additional width of this strap helps to diffuse the load more equally, the neoprene acts as a type of shock absorber.

I suggest a seated position with the student-musician "standing tall from the waist up." If the student-musician needs to stand, encourage her or him not to emulate bass guitarists who "wear" their basses very lowly (also known as "lo-riding") as this causes extreme playing angles. The music director must then pay attention to the elbow and wrist angles, making sure that there are no extremes that may cause fatigue, pain, and injury. This may require the bass guitar to be positioned at more of an upward 45-degree angle rather than being parallel to the floor.

For most beginners, as the hands and fingers are being asked to function in an awkward fashion, it may take time for proper playing habits to develop. It is important to emphasize that they take up a warm-up and stretching routine and that they must approach the instrument slowly at first and to know that it is okay to stop the moment they begin to feel pain. It is never too early to educate them about the reality of such afflictions as tendonitis or other repetitive stress injuries.

Strings

In the same way that differing strengths of reeds would produce different timbres on a saxophone, so does the type of material that is used in the construction of strings on a bass guitar. Wound strings are constructed by wrapping one or more layers of wire around a "core" wire. While there is a myriad of strings available on the market, our focus will be on three major types of strings: flatwound, nickel roundwound, and stainless steel roundwound.

Flatwound strings are wound with a flat ribbon outer wrap. As previously mentioned, flatwound strings were the first type of string included with Fender Precision bass guitars. Their role, along with the infamous foam muting at the bridge, was to give the bass guitar a sound that was rich in fundamental overtones and few upper partials. Its sound can be subjectively described as being "dark."

Nickel and stainless steel roundwound strings are considerably "brighter" sounding strings than flatwounds because of the round wire used in the coiled wraps around the string core. Roundwound strings constructed of nickel are said to be "gentler" on frets while stainless steel roundwound strings are said to last longer.

A typical 4 string set is gauged from .105 [E] to .045 [G] inches. Other factors include string tension and mass. I have found that having higher or lower string tension is a matter of feel and playability for the student musician. In addition, I have also found that higher gauge strings, being heavier (more mass), have a 'hotter' output and thus allow more 'manoeuvring room' in terms of accessibility of tones when altering striking hand placement.

Beware of so-called "open core" strings. These strings feature an exposed core at the bridge. While many manufacturers claim that they give a "piano-like" tone, I find the harmonic sequence to be somewhat "out of phase" when fretting past the twelfth position, the halfway point on the bass guitar. The result is a fundamental note and a ghost of another "out of phase" harmonic being sounded simultaneously.

Be sure that the string will fit the scale length of the bass guitar. A typical 34 inch scale bass guitar is generally considered to be a long scale instrument when purchasing strings.

As strings age, their range of expressiveness diminishes as they become fatigued. Replace them when necessary and note that a fresh set of strings will be brighter and will probably need to be broken in with playing, just like reeds.

Be aware that some student-musicians may have profusely sweaty hands or sweat glands that produce highly acidic sweat. This may cause the string to age prematurely [especially strings of the Nickel variety]. Having a cloth to rub the strings dry after each playing session is highly recommended.

Wood: "a notoriously quirky material"

Luthier Mike Kinal believes that the type of woods used in the construction of the bass guitar is ultimately crucial to the sound. According to Kinal, most entry level bass guitar bodies are constructed of Ash, Maple, or Laminated Plywood. The Ash and Maple, being a foreign species, tend to sound "brighter" on the treble side. The Laminated Plywood has a more compressed sound with a balance of treble and bass.

When Kinal selects hardwoods for use in instruments, the first thing that comes to his mind is what he calls the "tap tone." The "tap tone" is done by holding the wood with two fingers (generally the thumb and the index finger) and tapping the wood with a finger from your opposite hand in order to hear a tone. One should hold the board near the edge [the node] and tap on the center of the piece. If done correctly, one should hear a clear sustained tone. The second aspect involves the density of the particular piece. Both of these elements work hand in hand to produce tone and sustain. Generally hard stiff woods produce a brighter sound over softer open pore woods.

The woods used in the construction of the neck are also crucial to the overall sound since the neck acts like a "springboard" for the string sound to bounce off of. The neck is usually laminated with multiple pieces in order to create stability.

Knowing that there are always exceptions to the rule, some necks are also constructed of a single piece of wood that are embedded with graphite stabilizers to provide stability. The material used for the fingerboard also colours the sound. Generally speaking, ebony fingerboards provide a "brighter" more compressed tone while maple fingerboards offer a "warmer" tone. Rosewood and its many alternate species commonly give the bass a "smooth warm tone" – not too harsh on the high end with pronounced midrange and warm low end. Graphite fingerboards also provide a different sound: they accent a strong midrange and tend to produce a click to each note.

Finally, an instrument with a finish that is too thick can kill the resonance. An ideal finish is one that is of medium thickness that protects the wood and enhances the tonal quality of the instrument as it ages.

Pickups

There are various different types of pickup systems available including magnetic, piezo and optical. Of the three, the magnetic pickup is the most popular. The magnetic pickup senses the strings' vibrations and converts them into electric signals. In the March 2003 issue of *Bass Player* Magazine, Jonathan Herrera writes, "Pickups rely on the basic principle that disrupting a magnetic field produces a corresponding current flow in a nearby conductor. In a pickup, a magnet is wrapped with copper wire; the number of wire turns, the magnet's size, and the wire gauge all affect the pickup's output and tone."

Again, there are a myriad of configurations of magnetic pickups that are available, but the two most popular include the single coil and the humbucker. The single coil uses one pickup while the humbucker is comprised of two single coil pickups right next to each other with each coil wired in and each magnet placed in opposite directions. This causes the cancellation of 60 cycle hum because of the coil and magnet positions.

Onboard Preamps

After the pickup, the signal is usually routed through a passive volume and tone circuit. As detailed in the September 2003 issue of Bass Player Magazine, Jonathan Herrera writes, "Your bass's pickups sense string vibration passively, but amplifying your sound requires external power. Passive electronics often incorporate controls that cut volume and high frequencies, leaving your amp to take care of volume and EQ boosts."

For multiple pickup configurations, sometimes multiple pots are available to control the individual pickups. Again, there are various combinations, but the largest consideration is whether or not the onboard preamp provides the student-musician with the most flexibility in terms of sound. Active [battery powered] preamps provide the possibility for a wider tonal palette than passive tone circuits. However, I encourage my student-musicians to access variations in sound through the use of striking hand placement as opposed to "knob-fiddling" as certain musical situations will require different sounds and that the time is better spent "making music" as opposed to "fiddling with knobs."

As in the case of pickups, more experienced players may have differing opinions with regard to onboard preamps. Herrera writes further, "Some experts argue that they are less susceptible to noise-producing interference, while others say their more complex design is inherently noisy. One side says there's potential for trouble, while the other espouses flexibility."

Amplifiers and speaker cabinets

The final part of the sound chain involves the amplifiers and the speaker cabinets. Amplifiers are powered in three varieties: by tubes (otherwise also known as valve state), by solid state, or by a combination of both. Tube powered amplifiers are not as prevalent with today's bass guitar amplifiers [though some blues guitarists still swear by them]. These amplifiers fell out of favour with the advent of solid state electronics because they were both difficult and expensive to maintain.

Most affordable amplifiers are of solid state construction because of their durability, "clean" tone, and ability to output larger amounts of power. Many hybrid amplifiers feature a tube

preamplifier section with a solid state power amp section. It has been said that this combination provides the best of both worlds with the "warmth" afforded by tubes and the stability of solid state technology.

The power output of amplifiers is measured in terms of wattage. While it is not the sole indicator of how "loud" an amplifier can be, it does tell us how much "headroom" we have to deal with. Simply stated, the more wattage an amplifier can output, the more capacity there is for dynamic range.

Consider the adaptability of the amplifier by examining the versatility of the equalization section. Equalization at the amplifier is especially helpful for "fine-tuning" the sound for a particular room or environment.

Check also to see if there are RCA inputs and headphone outputs as these features are particularly useful for practicing to a recording or practicing "without waking up the neighbours." Features that may not prove to be especially useful include "onboard effects" such as reverb, chorusing, or limiting/compression. The latter effect can cause the student-musician to rely on the amplifier to control her or his dynamic range and thus not develop musical sensitivity to ensemble playing. For the beginning student-musician, I suggest a solid state "combo" amplifier that can supply between 50 and 100 watts.

Speaker cabinets are offered as stand-alone units or in combination with amplifiers. When considering the purchase of a separate amplifier and speaker cabinet system, be sure to match up the power handling and impedance of both units. For example, an efficient system would have the amplifier outputting 200 watts at 8 ohms with the speaker cabinet handling the same wattage. Most speaker cabinets are constructed of plywood and are therefore quite heavy. To alleviate the weight when moving the amplifier from place to place, see if casters and spring handles are available.

As an alternative option, one may also consider using a keyboard amplifier. These amplifiers are solid state and are constructed with a range of applications in mind, including the handling of a variety of keyboard generated sounds and, therefore, bass sounds. I have used keyboard amplifiers in performances on tour when bass amplifiers were not available and have generally been pleased with the results.

Conclusion

You can see that I refer to the instrument as a bass guitar and not an electric bass because I wish to imply that one should play the instrument with an acoustic mindset dealing with acoustic phenomena.

In summary, this comprehensive overview of the bass guitar and its capabilities is aimed towards music educators and student-musicians who wish to learn more about the instrument. This highlighting of possibilities with regard to the bass guitar, its equipment, and the technique used to play it is aimed to serve as a resource for purchasing decisions and bass guitar instruction.

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