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# The Effect of a Systemic Vocalization Method on Jazz Performance Achievement and Self-Efficacy

The primary purpose of this study was to investigate the effects of a singing-aural imitation treatment on collegiate instrumentalists' jazz performance achievement and self-efficacy to play and teach jazz and improvisation. A secondary purpose was to investigate to what extent various background variables might relate to jazz improvisation achievement. Participants ($N$ = 18) in the study received approximately sixty-minutes of jazz instruction. Jazz performances were evaluated by three expert judges using the researcher-constructed Jazz Melody and Improvisation Performance Achievement Measure. Results indicated significant increases from pre- to posttest on participants' ability to sing the notated jazz melody, nearly significant increases in participants' jazz improvisation, and non-significant differences in participants' ability to play the notated jazz melody. Participants reported greater self-efficacy for jazz performance and jazz teaching at posttest compared to pretest. The number of years participants spent in a jazz ensemble and improvising in genres other than jazz significantly correlated with scores on some of the performance measures. Findings of this study associated with singing strongly suggest that music educators should incorporate singing (a systematic vocalization system) in their instruction.

*Keywords: jazz improvisation, pedagogy, singing, self-efficacy, performance achievement*

## Introduction

Teaching students how to play music by having them sing first has been recommended as a pedagogical approach by many music educators and theorists (Bernhard, 2003); the concept being, if you can sing it, you can play it. Relations between music and language and embracing a sound-to-symbol approach to pedagogy is a feature of many traditional approaches to music teaching such as the Kodàly, Orff, Dalcroze, and Suzuki methods (Carder, 1990). This teaching approach is especially used by jazz educators to assist students towards using

appropriate style and improving their improvisational ability. Jazz educator and saxophonist Ron Carter describes jazz as a "vocally derived art form based on the African American dance tradition." He further states, "I believe the human voice was our first instrument" (personal communication, November 2, 2016). Wycliffe Gordon, jazz educator and trombonist, also asserts:

> The instrument is an extension of your voice . . . If you sing accurately and in tune, that means that you hear it. And if you can do that, that means that you've internalized the pitches. If you internalize something, the music comes from within you . . . you can actually hear it . . . feel it. You can actually train yourself to play it. (JazzTimesVideo, 2012)

Dunscomb and Hill (2002) emphasized the importance of having students sing to improve students' jazz performance ability. They stated:

> Proper jazz articulation is essential to all successful jazz ensembles, and without it, jazz never gains its character. Being able to sing using jazz syllables and teach your ensemble to sing is key to your group's successful performance of the jazz style. (p. 67)

Several studies have revealed aural imitative ability to be positively associated with improvisation ability (Bash, 1983; Madura, 1996; May, 2003). In line with this concept, Watson (2010) found students that received aural-based improvisation instruction improved significantly more than a group that received notation-based instruction. Additional studies have indicated how using vocalization as a tool helps students improve their musical ability and stylistic approach (Erwin, 1992; Krubsack, 2006), their jazz and improvisational skills (Bash, 1983; Biasutti & Frezza, 2009; Schneller, 2014), as well as their articulation and phrasing (Lee, 1996).

Lee (1996) revealed the experimental group's performance achievement in articulation and phrasing was significantly greater than the control group after receiving instruction on tonal patterns paired with vocalization techniques versus traditional notation-based instruction. Krubsack (2006) examined singing intervention on high school wind ensemble and concert band students' performance achievement. The control group was instructed how to practice etudes on their instrument while the treatment group was instructed how to practice singing the etudes. A significant increase was found with the wind ensemble's *singing* treatment difference scores and the concert band's post-non-singing and post-singing scores, with the latter score being higher.

Jazz methods books have been designed to help jazz educators incorporate singing, scat-singing, and different Doodle-tongue techniques along with jazz ar-

ticulations into their jazz and improvisation instruction (Carter, 2008; Dunscomb & Hill, 2002; Schneller, 2014). But unfortunately, there are still many music educators that feel teaching students how to play jazz and improvise is a challenging and "elusive mystery" (Tolson, 2013, p. 190). In addition, there appears to be no research that investigates whether a systematic vocalization method would have an impact on jazz performance achievement.

According to Schneller (2014), incorporating scat-singing vocalization with instrumental jazz playing has been a concept used since the inception of jazz. Many professional jazz musicians and educators learned by listening to jazz greats like Louis Armstrong, Ella Fitzgerald, and Clark Terry, which is evidenced using scat-singing in the studio teaching pedagogies of both Wycliffe Gordon and Bill Watrous (Schneller, 2014). Carter (2008) discusses developing teaching concepts based on listening, singing, and dancing to improve his students' ability to play jazz and improvise. Although jazz has been influenced by various cultures, these three approaches derive from "cultural concepts passed on through the West African tradition through the Black American culture, [which] is still evolving in our educational system" (p. 13). Teaching and learning jazz and improvisation from this cultural perspective has proven to be very successful for many jazz educators and musicians.

Improvisation is the essence of jazz (Baker, 1988) and it is what Schuller (1968) refers to as "the heart and soul of jazz" (p. 58). Learning to improvise is similar to learning the fundamentals and vocabulary of one's native tongue. When children learn to speak, they imitate those around them (Suzuki, 1983). Berliner (1994) states "just as children learn to speak their native language by imitating older competent speakers, so young musicians learn to speak jazz by imitating seasoned [jazz musicians and] improvisers" (p. 95). He further states that to help novice jazz musicians memorize tunes in various keys, "many jazz experts advise learners to practice singing tunes . . . to master the melodies aurally without relying on physical impressions such as fingering patterns or the visualization of an instrument's layout" (p. 66). Baker (1997) advises beginning jazz musicians to "sing every melody accurately before attempting to play it" (p. 1).

Learning and memorizing simple jazz melodies is one effective way to teach improvisation. When asked in an interview, "What . . . do most educators overlook or misinterpret when trying to teach students to be good improvisers," Ron Carter stated,

> They think they should already know all the theory. That's just like saying, before you start trying to speak English you should know all the alphabets . . . or know how to diagram sentences. [Instead], start by sound.

> Students should be taught to hear and sing chord progressions, [and to] learn and memorize tunes. (personal communication, November 2, 2016)

As a practice tool, jazz educators encourage those learning to improvise to sing and transcribe their solos. The rule of thumb is that the musician is 'you' and the instrument is just an amplification or extension of your mental concepts. Thus, a jazz musician should acquire the abilities to hear a solo, sing it, and then play it on their instrument (Logan, 2016; Tolson, 2013).

Findings in May (2003) revealed that the three best predictors for jazz improvisation were self-evaluation, aural imitation, and improvisation class experience. The predictive power of the aural imitation variable suggests that singing and audiation abilities could be important for learning to improvise. Unfortunately, research that explores the effects of singing and other sorts of aural training methods on jazz improvisation is scarce.

In addition, researchers have found that pre-service music educators tend to lack confidence in their ability to improvise and provide instruction to students on how to play jazz to levels of proficiency described by state and national music standards (Snell & Azzara, 2015; Ward-Steinman, 2007; Watson, 2010). Although the national standards do not specifically address jazz improvisation, they do include teaching students how to improvise as part of the necessary musical skills to be acquired in grades K-12. As such, teachers are at least encouraged to include improvisation in their music instruction. In both the National Standards for Arts Education (1994) and later the National Core Arts Standards (2014), improvisation should be an integral part of music curricula.

Thus, the primary purpose of this study was to investigate the effects of a systematic vocalization treatment on college instrumentalists' jazz performance achievement. Working from a practical conceptual framework based upon jazz pedagogues' and musicians' teaching and learning approaches (Berliner, 1994; Carter, 2008; Fay, 2013), this study looked specifically at the effects of a systematic vocalization teaching method on participants' abilities to perform jazz music and to improvise in a stylistically appropriate manner. A secondary purpose of the study was to investigate: (a) the effect of the experimental treatment on participants' self-efficacy to play and teach jazz and improvisation, and (b) to what extent various background variables might be related to jazz improvisation achievement.

## Method

### *Participants*

Eighteen music majors from a large Midwestern university in the United States were recruited through convenience and snowball sampling to participate in this study. A mechanical recording error occurred during the study, resulting in the loss of one participant's data, resulting in seven undergraduate ($n$ = 7) and ten graduate ($n$ = 10) music majors. The choice of selecting collegiate instrumentalists with the ability to facilitate on one's instrument was made to help minimize factors that might detract from the items measured. It was important that participants had a baseline of technical proficiency on their instrument if the effects of the treatment on stylistic accuracy and improvisation ability were to be assessed reliably. Participants were purposively sampled to include collegiate musicians with minimal jazz and improvisation performance experience because the experimental treatment was intended to reinforce basic performance concepts. These exclusion criteria were enacted to enhance the ecological validity of the study to investigate pedagogical techniques that could be beneficial for teaching novice jazz musicians in school settings.

The participants (male, $n$ = 12; female, $n$ = 5) consisted of six woodwind, three brasswind, and eight rhythm section instrumentalists. The sample was composed of twelve music education majors, three music performance majors, and two music theory majors.

### *Data Collection and Instrumentation*

Jazz improvisation achievement data were collected by recording the participants playing and singing an original 12-bar swing blues melody in the key of Bb and an improvised, two-chorus solo over the same chord changes. The accompaniment was a pre-recorded, Bb blues play-along track (Guitare Improvisation, 2013) at a swing tempo, quarter note equal 110 beats per minute. The participants' sung and played performances of the blues melody were evaluated with the researcher-created Calhoun Jazz Melody Performance Measure (CJMPM). The CJMPM consisted of eight items organized into three categories: melody, style/expression/soulfulness, and rhythm. Soulfulness, as described by the Essentially Ellington scoring rubric, results when "elements of swing are clearly uniform and [are] stylistically accurate. Intensity in the spirit of the music is almost never lacking" (Jazz at Lincoln Center, 2009). Each item of the CJMPM was paired with a 5-point Likert-type scale (1 = *very poor* to 5 = *excellent*).

The participants' jazz improvisations were also evaluated in addition to the jazz melody. The two chorus, 12-bar blues improvisations were measured using a researcher-adapted instrument – the Calhoun Jazz Improvisation Performance Achievement Measure (CJIPAM) – which consisted of items derived from several existing measures: Watson's (2010) Jazz Improvisation Performance Achievement Measure, Madura's (1992) Measure of Vocal Jazz Improvisation Achievement, and Jazz at Lincoln Center (2009) scoring rubric for the Essentially Ellington High School Jazz Band Competition. This measure consisted of twenty-four items organized into four categories: rhythm, melody, harmony, and style/expression/soulfulness.

Musical performances were recorded using a Blue Snowball USB Microphone that was synced to *GarageBand* software, running on an Apple computer platform. Participants' performance recordings were mixed down with the play-along track and exported as an MP3 file into *iTunes* software. Afterwards, pre- and post-instruction performance recordings were randomly ordered and uploaded to three private online data storage platforms. Three expert judges (professional jazz educators and musicians) evaluated the performances using the researcher-constructed measures. Prior to evaluating the performances, the judges participated in a two-hour training session. The judges completed the scoring of the performances over a six-week period. Cronbach's Alpha analyses were conducted to determine judges' intra- and interjudge reliability. Composite scores consisting of the average score across all three judges were used for each pretest and posttest performance measure (See Table 1).

## Procedures

Participants completed a background and experience questionnaire that was modeled after tools used in the Madura (1992) and Watson (2010) studies. Participants also completed a pre- and posttest Jazz Ability Self-Efficacy Measure (JASEM) adapted from Watson's (2010) Jazz Improvisation Self-Efficacy Scale. Adaptations included adding the item "I am satisfied with my current ability to improvise in a jazz context" and minor wording changes, such as changing the wording of the item "I could teach someone how to improvise in a jazz context" to "I have confidence that I can teach someone to play in a jazz style." The JASEM included 11 items that assessed participants' confidence for playing jazz and improvising and three items to assess their confidence to teach jazz and improvisation, using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Cronbach's alpha reliability of the pre- and post-self-efficacy jazz performance measures were .89 and .85, respectively, and .84 and .75, respectively for the jazz

**Table 1**
*Intra- and Interjudge Reliability for Composite Pre- and Posttest Performance Achievement Measures*

| | Judge 1 $\alpha$ | Judge 2 $\alpha$ | Judge 3 $\alpha$ | Interjudge $\alpha$ |
|---|---|---|---|---|
| Pre-Melody Sung | .94 | .71 | .90 | .62 |
| Post-Melody Sung | .97 | .47 | .71 | .61 |
| Pre-Melody Played | .95 | .83 | .93 | .79 |
| Post-Melody Played | .95 | .69 | .80 | .20 |
| Pre-Improvisation | .97 | .88 | .97 | .74 |
| Post-Improvisation | .98 | .91 | .97 | .74 |

teaching measures. In addition, four open-ended questions regarding the participants' attitudes toward the experimental treatment were added to the posttest administration of the self-efficacy measure.

Institutional Review Board approval was granted in Spring 2018. The consent form, background survey, and pretest JASEM were sent to participants and returned via email prior to attending the jazz lesson. To prevent outside events from having an effect on experimental outcomes and avoiding the claim that participants improved only due to the extended length of the study, the 60-minute jazz lesson was administered to each participant individually.

Narrative instructions and musical examples for each activity were all pre-recorded by the researcher. The session began with scalar and arpeggiated vocal and instrumental warm-ups in the key of Bb. Following the warm-up activities, participants practiced playing and singing an original written swing Bb blues melody and improvising a two-chorus solo as part of the pre-performance task. After each practice task of singing and playing a jazz exercise, participants were recorded. Immediately following the pre-instruction performance tests, the jazz lesson began, which focused on developing participants' ability to perform a written swing blues melody with stylistic appropriateness and to improvise a two-chorus 12-bar blues solo.

At the beginning of the lesson while looking at the notation, articulations, and scat-syllables, participants listened to a combined performance of a jazz trumpeter playing and vocalist singing (using scat-syllables) an original two-chorus transcribed solo in the key of Bb. Throughout the lesson, before each listening session, participants were instructed to pay close attention to the nuances of musicians' playing and singing, i.e., articulations, scoops, falls, dynamics, and style, so they could try to emulate the style later in the lesson. Following the solo listening example, participants practiced singing and playing basic scat syllable patterns and short jazz articulation phrases with pre-recorded examples.

Using Doodle Tonguing concepts from Carter (2008), the lesson warm-up began with singing basic musical exercises that combined consonant D with the vowels Á, É Í, Ó, and U (pronounced Ooh). Afterwards, participants were taught to first sing short swing jazz articulations phrases and rhythms using scat-syllables and then play them on their instrument. Some of the scat-syllables included: *Doo* (long notes), *Dah* (long accented notes), *Daht* (fat, heavy, accented notes), *Dot* (short, accented notes), *Dit* (short, spaced, non-accented notes), *Dá dd lah, Dé dd lah, Dé dd lah, Dí dd lah* (swung eighth notes) *Dá dd lah, Dé dd lah, Dí dd lah, Dú dd lah* (triplet-feel). The basic swing style discussed in this study can be described by having tension between a duple and triple rhythm. The bottom rhythm has a steady duple 4/4 pattern, known as "four on the floor," while the top rhythm, (mainly played on the ride cymbal) has a 6/8 triplet feel and passages are played giving emphasis on beats two and four, which is all placed over a walking bass line (Jazz at Lincoln Center's JAZZ ACADEMY, 2015). But the best way to understand and play in a swing style is by listening to masters such as Count Basie, Duke Ellington, Shirley Scott, Mary Lou Williams, Ella Fitzgerald, just to name a few.

After performing the warm-up and jazz exercises, participants read (notation and scat-articulation syllables) and listened to the jazz standard "Shiny Stockings," performed by Count Basie's Big Band, along with an overdubbed vocalist singing the scat-articulation syllables. For the second listening, participants were asked to sing along using the scat-articulation syllables. Participants then read and listened again to the original Bb blues melody and the two-chorus transcribed solo heard at the beginning of the lesson. After each listening, participants were asked to sing then play each task along with a pre-recorded backing track. For the final task of performing their own two-chorus solo, participants practiced singing their two-chorus solo with the backing track while looking at the chord progression before recording it on their instrument. When practicing their solo, participants were instructed to concentrate on creating conversational melodic phrases instead of scale patterns.

When playing the examples in the lesson, participants were encouraged to use the "singing-playing concept." The singing-playing concept, coined by the researcher, consisted of teaching participants how to first sing jazz concepts with scat-syllables then transfer those skills onto their instrument. The overall concept encompasses imagining, feeling, and articulating the syllables as if *singing* phrases through one's instrument.

At the conclusion of the jazz lesson, participants were asked to repeat posttest versions of the same pretest performance tasks, which were to sing and play an original written swing Bb blues melody and improvise a two-chorus jazz solo, as well as complete the posttest JASEM. The design for this study included one group. As such, all participants provided six performances: pretest melody sung, pretest melody played, pretest improvisation, and then posttest versions of each.

## Results

### *Jazz Style and Improvisation Achievement*

A *t*-test indicated a significant difference between the composite mean of the pretest melody sung scores ($M$ = 24.75, $SD$ = 3.87) and the posttest melody sung scores ($M$ = 29.47, $SD$ = 3.17), $t(16) = 6.21$, $p < .001$ (Table 2). The results showed an increase in mean as well as a slight decline in variability from the pretest. Cohen's $d$ indicated that the difference represented a very large effect ($d$ = 1.50). A *t*-test was conducted to determine whether a significant difference existed between pretest melody played scores ($M$ = 27.94, $SD$ = 4.95) and posttest melody played scores ($M$ = 29.76, $SD$ = 3.07). No significant difference was found, $t(16) = 1.67$, $p = .11$. The difference between the composite mean of pretest improvisation scores ($M$ = 76.10, $SD$ = 13.23) and the posttest improvisation scores ($M$ = 81.10, $SD$ = 13.21) was nearly significant, $t(16) = 2.07$, $p = .05$, $d = .05$.

As presented in Table 3, significant moderate correlations were found between pretest melody sung scores and pretest melody played ($r = .50$), posttest melody played ($r = .49$), pretest improvisation ($r = .49$), and posttest improvisation ($r = .49$) scores, indicating that those who sang the melody well in the pretest performance tended to play the melody well in the pretest and posttest and improvise well both in the pretest and posttest. The posttest melody sung composite scores were correlated with the pretest melody played ($r = .52$) and posttest improvisation ($r = .49$), indicating that participants who sang the melody well during the posttest, played the melody well during the pretest and improvised well during posttest.

**Table 2**
*Descriptive Statistics for composite Jazz Performance Measure*

| | *Mean* | *SD* | *Skewness* | *Kurtosis* |
|---|---|---|---|---|
| Pre-Melody Sung | 24.75 | 3.87 | -.72 | -1.05 |
| Post-Melody Sung | 29.47 | 3.17 | -1.01 | .27 |
| Pre-Melody Played | 27.94 | 4.95 | -.99 | .62 |
| Post-Melody Played | 29.76 | 3.07 | -.75 | .69 |
| Pre-Improvisation | 76.10 | 13.23 | .91 | 1.16 |
| Post-Improvisation | 81.10 | 13.21 | .66 | .71 |

*Note.* Range of possible scores for melody performances was 8 to 40 and 23 to 115 for improvisation performances.

**Table 3**
*Spearman Correlation of Composite Pre- and Post-Treatment Performance Scores (N =17)*

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Pre-Melody Sung | 1.00 | | | | | |
| Post-Melody Sung | .46 | 1.00 | | | | |
| Pre-Melody Played | .50* | .52* | 1.00 | | | |
| Post-Melody Played | .49* | .28 | .26 | 1.00 | | |
| Pre-Improvisation | .49* | .30 | .43 | .64** | 1.00 | |
| Post-Improvisation | .49* | .49* | .56* | .45 | .65** | 1.00 |

*Note.* * $p < .05$, ** $p < .01$

A significant correlation was also found between pretest melody played scores and posttest improvisation ($r$ = .56), suggesting that participants that played the melody well during the pretest tended to improvise well during the posttest. A significant correlation was also found between pretest improvisation and posttest melody played scores ($r$ = .64), indicating that those who improvised well during the pretest also played the melody well during the posttest. Lastly, there was a significant relationship between pretest improvisation with posttest improvisation ($r$ = .65), indicating that participants who improvised well in the pretest tended to improvise well during the posttest.

### *Self-Efficacy for Jazz Performance and Teaching*

A significant difference between the pre- ($M$ = 2.43, $SD$ = .82) and posttest ($M$ = 2.89, $SD$ = .70) performance self-efficacy scores was found, $t(16) = 3.89$, $p$ = .001. On average, participants reported greater self-efficacy to perform jazz at posttest compared to pretest. Cohen's $d$ indicated that the difference represented a large effect ($d$ = .94). For the pre- and post-teaching self-efficacy measures, a significant difference was also found between the pre- ($M$ = 2.90, $SD$ = 1.14) and posttest ($M$ = 3.61, $SD$ = .81) mean teaching self-efficacy scores, $t(16) = 3.36$, $p$ = .004 (Table 4). On average, at posttest, participants reported greater teaching self-efficacy to teach someone to play jazz and to improvise compared to the pretest. Cohen's $d$ indicated the difference also represented a large effect ($d$ = .81).

Table 5 reveals several positive correlations between participants' jazz performance achievement and self-efficacy. A significant correlation was found between posttest performance self-efficacy scores and posttest melody sung ($r$ = .50) composite scores. This finding suggests that participants with stronger performance self-efficacy beliefs at posttest tended to score relatively higher on the posttest singing performance of the blues melody. Several small to moderate positive correlations between participants' self-efficacy to teach jazz and improvisation with their performance scores were also found. Posttest teaching self-efficacy scores were significantly correlated ($r$ =.59) with posttest improvisation scores, indicating that participants that had more confidence in their ability to teach jazz and improvisation tended to perform well on the posttest improvisation achievement measure.

To investigate the extent to which various background experiences might be related to participant's jazz improvisation achievement, I examined the following questions: (a) How many years did you play in a jazz ensemble?, (b) How often did you improvise in the ensemble?, (c) How many years of experience have you had improvising in other genres?, (d) How often do you enjoy singing along with music you listen to?, and (e) How would you rate your singing ability?

**Table 4**
*Descriptive Statistics for Jazz Performance and Teaching Self-Efficacy Measures*

| | *Mean* | *SD* | *Skewness* | *Kurtosis* |
|---|---|---|---|---|
| Pre-Jazz Performance Self-Efficacy | 2.43 | .82 | .67 | 2.65 |
| Post-Jazz Performance Self-Efficacy | 2.89 | .70 | -.02 | 2.00 |
| Pre-Teaching Self-Efficacy | 2.90 | 1.14 | .40 | -.261 |
| Post-Teaching Self-Efficacy | 3.61 | .81 | -.23 | -.672 |

*Note.* Range of possible self-efficacy scores was 1 to 5.

**Table 5**
*Spearman Correlations Between Posttest Jazz Performance Scores and Pretest and Posttest Self-Efficacy Scores*

| | Post-Melody Sung | Post-Melody Played | Post-Improvisation |
|---|---|---|---|
| Pre-Performance Self-efficacy | .01 | .02 | .14 |
| Post-Performance Self-efficacy | .50* | .48 | .48 |
| Pre-Teaching Self-efficacy | .04 | -.10 | .25 |
| Post-Teaching Self-efficacy | .09 | .05 | .59* |

*Note.* * $p < .05$

Descriptive analyses of the selected background variables showed that of the 17 participants, 12 had previous opportunities to play in a jazz ensemble. However, most of the participants, seven, reported seldomly having the opportunity to improvise. Data also showed that 12 participants had experience improvising in other genres. When asked, "How would you rate your solo ability in these genres?" 11 of the 17 participants rated their ability from decent to very poor, with the latter being the highest (five participants). Only one participant responded excellent, and the remaining five responded with good. Examining participants' frequency of singing along with music they listen to, five participants sang several times per day, nine sang with music every day, two sang a few times per week, and one never sang with music. When asked to rate their singing ability, three participants rated their singing ability as excellent, four responded good, seven responded decent, one responded poor, and two responded very poor.

Two significant correlations were found between the selected background variables and the performance measures (Table 6). Those who spent more years playing in a jazz ensemble tended to do better on the posttest improvisation task ($r$ = .70) and those who spent more years improvising in other genres tended to do better on the posttest melody played ($r$ = .61) on their instruments.

## Discussion

In this study, the effects of a systematic vocalization method on jazz performance achievement were examined. Although the mean scores for all posttest performance achievement measures increased from pretest, significant differences were found in only one of three performance categories. Significant differences were found between pretest and posttest melody sung scores, with a very large effect size. Although not significant, the nearly significant difference between pretest and posttest improvisation scores yielded a medium effect size. These findings are similar to those from other researchers (Krubsack, 2006; Lee, 1996; Schneller, 2014; Snell & Azzara, 2015) and are consistent with the practices of notable music educators like Wycliffe Gordon (JazzTimesVideos, 2012) and Ron Carter (2008), who advocate implementing vocalization techniques to improve students' performance achievement.

A significant difference was not found between the pretest and posttest measure for playing of the blues melody. This result could have been in part because the statistical power or number of participants for the study was low. It is difficult to interpret this finding due to the poor reliability of the judges' rating of the posttest blues melody played task. Also, playing the blues melody was probably the easiest task for college music majors to accomplish. Although participants'

performance of the blues melody improved, there was perhaps less of an opportunity to improve as a result of the lesson. In subsequent research, incorporating two different melodies with equivalent characteristics for the pretest and posttest tasks could account for this finding.

Using systematic vocalization instruction resulted in a significant difference between pretest and posttest jazz performance self-efficacy and teaching scores, both with large effect sizes. These findings are consistent with previous literature that documented how participants' self-efficacy increased after receiving some form of instruction (Snell & Azzara, 2015; Ward-Steinman, 2007; Watson, 2010). This is especially important because although teaching students how to improvise is part of our K-12 music standards, "[jazz] and improvisation continues to be rare in most comprehensive music curricula" (Snell & Azzara, 2015, p. 80).

This study also investigated correlational relationships between jazz improvisation performance achievement, self-efficacy for playing and teaching jazz and improvisation, and various background variables that might be related to jazz improvisation achievement. There were significant positive correlations between participants' posttest performance self-efficacy scores and posttest melody sung. This finding demonstrated that participants who had stronger self-efficacy beliefs at posttest tended to sing the blues melody relatively better at posttest. Results for correlational relationships between participants' confidence to teach jazz and to improvise showed trends of relatively small to moderate relationships. However, a significant relationship indicated that participants who possessed a stronger sense of teaching confidence tended to perform relatively better on the post-improvisation task.

Although there were trends indicating positive relationships between selected background variables and participants' jazz performance achievement, only two significant correlations were found. These correlations were between years playing in jazz ensembles and the post-improvisation task, and between years improvising in other genres and playing the posttest melody. In both cases, participants who tended to perform better also tended to report more experience. This finding aligns with previous research findings showing that participants' jazz improvisation achievement was significantly related to their jazz experiences (Madura, 1996, Ward-Steinman, 2008a, 2008b).

Several limitations emerged in the current study. The lack of a control group makes it difficult to determine whether the treatment caused a difference in the participants' playing. For example, it is possible that the participants may have improved across the span of the study simply due to the time they spent working on jazz performance as opposed to the systematic vocalization method, specifically.

Similarly, without a control group, it is also difficult to tell whether participants' increases in scores may be due to a Hawthorne effect or the participants' desire to please the researcher (Gall et al., 2007). Therefore, future research with more rigorous designs, such as a true experimental, control group design would be beneficial.

Although it is impossible to control for all potential sources of error regarding intra- and interjudge reliability, more substantial and intense training would be helpful for improving reliability. Using exemplar recordings for each performance task to help the judges calibrate their expectations for excellent, good, poor, and very poor will be helpful. Also, directions for judges to listen to the recordings one time per category within each measure could improve consistency. For example, listening to the jazz melody performances three times for melody, style/expression, and rhythm. It is also important that judges be warned not to listen to recordings when tired and not listening to too many at one time. Judges could also be advised to avoid having big gaps of time between listening sessions (e.g., more than a day or two).

It is important to note that although the findings of this study may have pedagogical implications for music educators and musicians seeking to improve their jazz and improvisational skills, there were contextual limitations. The sample size for the study was small and although the majority of the participants rated their jazz improvisation ability decent to very poor and were novice jazz improvisers, their jazz and improvisation experiences were quite varied. Thus, effects of the study might have been more pronounced if the sample was uniform in improvisation experiences. Researchers should aim for larger sample sizes when conducting similar experiments in the future It may be valuable to use alternative sampling techniques such as random or cluster sampling.

Participants were purposively sought to include only collegiate musicians who had technical facilitation on their instrument. Although all majors were invited to participate in the study, all participants were music majors (predominantly music education). The geographical location of the participants was at a Midwestern university in the United States. Importantly, the study had limited control for internal validity since it utilized only one treatment group. Another consideration is the task criterion: a 12-bar swing blues melody and a two-chorus blues solo at a moderate tempo. Performances in different genres and tempos may elicit different results. Therefore, generalizations to other populations and musical genres should be made with caution.

Upon reading participants' open-ended responses from the questionnaire, it was apparent that all were receptive to using systematic vocalization instruction to improve their jazz performance ability and found many elements of the lesson

valuable. For example, Participant 1 commented, "The concept of 'If you can sing it, you can play it' gave me a lot more confidence while I was soloing. Really breaking down the process of singing it, then playing it and taking it step by step." This comment corroborates the significant increases in self-efficacy found. Participant 4 commented, "Surprisingly, figuring out jazz articulations really helped my style in my soloing. As a percussionist, I just assumed the sounds I heard, varying in dynamics and somewhat articulations were enough. However, when I actually had to produce the articulations, it provided a whole new feel and style aspect to my soloing that was not there before." The fact that participants commented on the benefits of the lesson for improvisation specifically, echoes the nearly significant increase in improvisation scores found from pre to posttest.

Participant 12 commented, "I could see this method being beneficial to me if I practice it more certainly. I feel the more you can sing what you play and vice versa the better. Also, it's helpful not to just play the 'correct' notes on your instrument, but to think about how you articulate and phrase. Quite simply, I feel that if you can sing a good solo or melody, then you can (at least) learn to play a good one." This participant's comment spoke to the general benefit of the lesson.

Based on some of the participants' comments to the open-ended questionnaire items, it seems music educators should strive to provide classroom environments that are engaging while also providing spaces in which students feel free and encouraged to play jazz and to improvise while receiving positive useful feedback. Collegiate music programs need to be committed to providing programs that will ensure pre-service teachers with the proper tools to be successful in performing and teaching jazz and improvisation when they begin their own music programs.

The significant findings and trends found between the composite pretest and posttest melody sung and improvisation scores all align with previous research and practices endorsed by professionals in the field. In addition, the lesson materials and sequencing ideas explored in this study could be adapted for pedagogical use. For example, singing a melody with jazz scat articulations then playing it could help students internalize the style. Playing blues melodies and imitating professional solos could help students develop jazz language for their own improvisations. Emphasizing playing by ear throughout each of these exercises would be important for students since it would help them acquire greater aural/oral sensitivity.

The results of this study suggest that it could be valuable to use a systematic vocalization method to assist musicians in learning how to play jazz and improvise. In support of jazz education, this study suggests that collegiate music programs may benefit from incorporating courses that utilize the methods explored in this study. In doing so, pre-service teachers could receive needed experience to

build their self-efficacy to play jazz and improvise, as well as teach these skills. Thus, the findings in this study suggest that music educators may benefit from incorporating singing in their instruction.

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